KEYENCE

J18GB

Vision System with Built-in AI

VS Series

User's Manual

Read this manual before use.
Keep this manual in a safe place for future reference.

User Support Website
Documentations on how to install and configure the unit, software, and CAD data can be downloaded from the following URL.
URL: www.keyence.com/vs-support

Introduction

This manual describes the hardware and its basic operation. Read this manual thoroughly in order to understand how the VS Series works and to maximize the performance of the system.

Notations used in this manual

Symbols

The following warning symbols are used to ensure safety and to prevent human injury and/or damage to property when using the system.

DANGER	**Indicates a hazardous situation which, if not avoided, will result in death or serious injury.**
WARNING	**Indicates a hazardous situation which, if not avoided, could result in death or serious injury.**
CAUTION	**Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**
NOTICE	**Indicates a situation which, if not avoided, could result in product damage as well as property damage.**
Important	**Indicates cautions and limitations that must be followed during operation.**
Point	**Indicates additional information on proper operation.**

Reference Indicates tips for better understanding or useful information.

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Safety Precautions

Precautions on the robot operation

DANGER	• For the industrial robot connected to the VS Series with Vision-Guided Robotics function, those who installed the industrial robot must perform a risk assessment for that machine to realize an adequate risk reduction. • The industrial robot connected to the VS Series with Vision-Guided Robotics function must comply with the requirements of ISO 10218-1 and ISO 10218-2. • Those who operate the industrial robot through the VS Series with Vision-Guided Robotics function must be trained according to the applicable laws, rules, regulations and standards in the country or region where the industrial robot is installed. • The manual reduced speed mode must be used for jogging, teaching, programming and program verification of the industrial robot. The speed of the industrial robot must be equal to or less than 250 mm/s under this mode.

General Cautions

DANGER	• Do not use this product for the purpose to protect a human body or a part of human body. • Do not use this product in a hazardous location and/or potentially explosive atmosphere. • Do not use this product in an application that may cause death, serious injury or serious property damage due to a failure with this product should occur, such as nuclear power plants, on aircraft, trains, ships, or vehicles, used within medical equipment, playground equipment, roller coasters and other rides, etc.

WARNING	• If the product is used in a manner not specified by this manual, the protection provided by the product may be impaired. • You must perform a sufficient risk assessment for the machine where this product is to be installed prior to installing this product. Provide appropriate protective fail-safe measures on the machine independent from this product in case a failure with this product should occur.

CAUTION	Do not operate the unit after disassembling or modifying it. Doing so may result in fire, electrical shock, or device failure.

Installation location

Avoid locations such as the following when installing the VS Series:

CAUTION	• Locations where the unit is exposed to direct sunlight. • Locations where the surrounding air temperature exceeds the range listed in the specifications. Locations prone to rapid temperature changes. • Locations with poor ventilation. • Locations where relative humidity exceeds 0 to 85% RH. Locations subject to condensation. • Locations where corrosive or flammable gasses are present. • Locations where there is excessive dust, salt, or iron powder. • Locations where the unit is exposed to splashes of substances such as oil, or chemical agents. • Locations where the unit is subject to direct vibrations or mechanical shocks. • Locations where the unit may be influenced by radiation noise or static electricity. • Separate the unit and the cables as far as possible from high-voltage lines and power lines. Interference from such lines may result in nonstandard operation or device failure.

Handling

NOTICE	Be sure to stop the supply of power to this product before connecting or disconnecting cables. Connecting or disconnecting cables while power is supplied may lead to malfunctions of and damage to this product and the devices to which it is connected.

Safety Precautions on Laser Product

The VS Series (VS-LxxxMX/CX, VS-SxxxMX/CX) uses a visible semiconductor laser as a light source.
Follow the instructions mentioned in this manual. Otherwise, injury to the human body (eyes and skin) may result.

WARNING	Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. • Do not disassemble this product. Laser emission from this product is not automatically stopped when it is disassembled. Class 1 Laser Product • Do not stare into the direct or specularly reflected beam. • Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

The VS Series (VS-LxxxMX/CX, VS-SxxxMX/CX) laser classes are classified as per the following.

Models	VS-L160MX/VS-L160CX/VS-L320MX/VS-L320CX/ VS-L500MX/VS-L500CX/VS-L1500MX/VS-L1500CX/ VS-S160MX/VS-S160CX/VS-S320MX/VS-S320CX/ VS-S500MX/VS-S500CX/VS-S1500MX/VS-S1500CX
Wavelength	660 nm

IEC 60825-1,	Output	390 uW
FDA(CDRH) Part 1040.10*1	Laser class	Class 1

*1:The laser classification for FDA(CDRH) is implemented based on IEC 60825-1 in accordance with the requirements of Laser Notice No. 56.

Precautions on Regulations and Standards

CE and UKCA Markings

Keyence Corporation has confirmed that this product complies with the essential requirements of the applicable EU Directive(s) and UK regulations, based on the following specifications. Be sure to consider the following specifications when using this product in the Member States of European Union and in the United Kingdom.

EMC Directive (CE) and Electromagnetic Compatibility Regulations (UKCA)

- Applicable standard (BS)EN61326-1, Class A
- Use cables shorter than or equal to 30 m to connect this product and its external devices.

Remarks: These specifications do not give any guarantee that the end-product with this product incorporated complies with the essential requirements of EMC Directive and Electromagnetic Compatibility Regulations. The manufacturer of the end-product is solely responsible for the compliance on the end-product itself according to EMC Directive and Electromagnetic Compatibility Regulations.

North American Regulations

This product complies with the following North American regulations.

- Applicable regulation FCC Part15 Subpart B, Class A Digital Device
  CES-003, Class A Digital Apparatus
- Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- FCC CAUTION
  Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CSA Certificate

This product complies with the following CSA and UL standards and has been certified by CSA.

- Applicable standard: CAN/CSA C22.2 No.61010-1
  UL61010-1

To use this product as a CSA-qualified product, note the requirements described in the included instruction manual.

KC mark (Republic of Korea)

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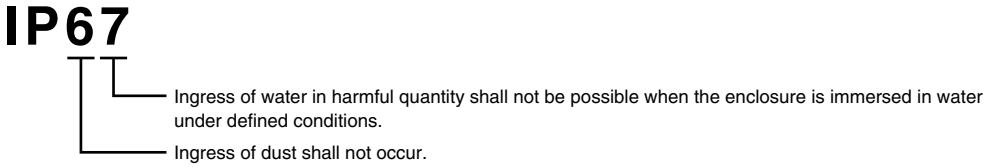
Enclosure rating

Only when a KEYENCE-specified cable is correctly mounted on this product does it achieve an enclosure rating equivalent to IP67 as prescribed by IEC/EN 60529.



(All IP tests are performed for the prescribed time and using the prescribed method, so they do not guarantee the protection of the product for a long period of time.)

Note that IP67, the enclosure rating of this product, cannot be met when this product is used by itself or with a cable or similar items other than those specified by KEYENCE mounted on the product.
When the cable is not connected to the connector of this product, attach the waterproof cap for included with the connector to maintain the enclosure rating.
Only remove the microSD card slot cover when inserting or removing memory cards.
We cannot guarantee that the product will meet the stated enclosure rating while the cover is removed.

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Table of Contents

Introduction 2

Notations used in this manual 2

Symbols 2

Trademarks 2

Software information 2

Safety Precautions 4

Precautions on the robot operation 4

General Cautions 4

Installation location 4

Handling 5

Safety Precautions on Laser Product 5

Precautions on Regulations and Standards 6

CE and UKCA Markings 6

North American Regulations 6

CSA Certificate 6

KC mark (Republic of Korea) 7

Enclosure rating 7

Software License Agreement 8

Chapter 1 Getting Started 1-1

Overview of the VS Series Vision System with Built-in AI 1-2

VS Series (VS Camera) 1-2

VS Creator 1-2

Flow of VS Creator Operations 1-3

Chapter 2 Preparing the System 2-1

Examples of System Configuration 2-2

Example of Basic System Connecting One Camera 2-2

Example of Basic System Connecting Two Cameras 2-3

Downloading and Installing the VS Creator 2-5

Downloading the Installer 2-5

Installing the VS Creator 2-5

System operating environment 2-5

Installation steps 2-6

Activation steps 2-8

Performing AI Activation 2-9

Uninstalling the VS Creator 2-9
Powering the System On and Starting the Software 2-10
Powering the System On and Starting the VS Creator 2-10
Closing the VS Creator 2-10
Chapter 3 [Connect to Device] Screen 3-1
Function overview 3-1
Connecting the VS Creator to a Device 3-1
Adding/Editing a Simulator 3-1
Screen Details 3-2
Menu bar 3-7
File 3-7
Display 3-7
Tool 3-7
System 3-8
Help 3-9
Context Menu 3-10
Context menu of list items 3-10
Context menu of list row 3-10
Connecting to Device 3-13
Procedure for Connection 3-13
Steps for Connection 3-13
When You Cannot Find a Device 3-15
Search Devices With Mismatching Network Address 3-15
Connecting Computer and Device Directly 3-15
Add Device with Specified IP Address 3-16
Adding/Editing a Simulator 3-18
Adding a Simulator 3-18
Adding from [Connect to Device] Screen 3-18
Adding from [Transfer File (Program Settings)] Dialog 3-18
Adding from Windows Explorer 3-19
Editing a Simulator 3-20
Screen Details 3-20
Get Information from Device 3-22
Get Information from Exported Settings 3-22
Configuring Device's Network Settings 3-23
Screen Layout 3-23

Updating Firmware 3-25
Updating Peripheral Devices 3-26
Screen Details 3-26
Procedure for Update 3-27
Performing AI Activation 3-29
Performing AI Activation on VS Cameras 3-29
Activation steps 3-29
Performing AI Activation on Simulators 3-30
Activation steps 3-30
Entering Lifetime Activation Code During the Trial Period 3-31
Activation steps 3-31

Chapter 4 Main Screen 4-1

Overview of Functions 4-2
Screen Layout 4-3
Menu Bar 4-5
[File] Menu 4-5
[Edit] Menu 4-6
Undo 4-7
Redo 4-7
[Display] Menu 4-7
[Execute] Menu 4-7
Trigger 4-8
Continuous Trigger 4-8
Execute Selected Subtask 4-8
Archive Review 4-8
Simulation Execution 4-9
Record 4-9
Save Image 4-9
Output Check 4-10
Reset 4-10
Clear Error 4-10
[Utilities] Menu 4-11
[Settings] Menu 4-11
Total Status Settings 4-11
Execution Error Settings 4-11
Position Adjustment Reference Settings 4-11
Archive Condition Settings 4-12
OPC UA I/O Data Settings 4-12
Recording/Simulation Image Settings 4-12
Settings Protection 4-12

[Global Settings] Menu 4-12
[System] Menu 4-13
[Layout] Menu 4-13
[Help] Menu 4-13
User's Manual 4-13
Setup Manual 4-14
User Support Site 4-14
Export Settings (For Debugging) 4-14
Version Information 4-14
Toolbar 4-15
Sidebar 4-18
Status Bar 4-20
Views 4-21
[Error Check] View 4-21
[Data List] View 4-22
View List 4-22
[Task] View 4-23
[Results Overview] View 4-23
Overall Task Results 4-24
Overall Tool Results 4-24
[Image Viewer] 4-24
[Vision Dashboard] View 4-25
[Custom Screen] Viewer 4-27
[Filmstrip] View 4-27
[Properties] View 4-28
[Tool Results] View 4-28
Display Full Results 4-28
Tool Results/Label Results 4-29
File 4-30
Setting Files and Folder Configuration 4-31
Setting Files 4-31
Global Settings Files 4-31
Settings Files Shared Across Program Settings 4-31
Files Related to Program Settings 4-31
Folder Configuration 4-32
Function overview 4-34
Create New Program Setting 4-35
[Create New Program Setting] dialog 4-35
Open Program Setting 4-37

[Open Program Setting] dialog 4-37
Save 4-38
Save As 4-39
[Save As] dialog 4-39
Convert File Format and Save 4-41
Rename Program Setting 4-42
[Rename Program Setting] dialog 4-42
Delete Program Setting 4-44
[Delete Program Setting] dialog 4-44
Convert Program Setting to Latest Version 4-45
Open Program Setting Backup Folder 4-46
Timing of backing up a program setting 4-46
Transfer File 4-47
Overview of Functions 4-47
Program Settings 4-47
Screen Details 4-47
Transferring files from the computer to a device 4-50
Transferring files from a device to the computer 4-51
Images and Other Files 4-51
Screen Details 4-51
Transferring files from the computer to a device 4-53
Transferring files from a device to the computer 4-54
Export Settings 4-55
[Export Settings] dialog 4-55
Import Settings 4-57
[Select Import Target] dialog 4-57
Manage ZoomTrax Settings 4-60
[Manage ZoomTrax Settings] dialog 4-60
Manage Model Images 4-63
[Model Image Management] dialog 4-63
Manage Files 4-65
[Manage Files] dialog 4-65
Remove SD Card 4-67
Exit 4-68

Utilities 4-69

List of utilities 4-69

ZoomTrax Setting Difference Comparison 4-70

Overview of Functions 4-70
Screen Details 4-70

Industrial Ethernet Communication Monitor 4-72

Overview of Functions 4-72
Screen Details 4-72

Non-Procedural Communication Monitor 4-79

Overview of Functions 4-79
Screen Details 4-79

Terminal I/O Monitor 4-81

Overview of Functions 4-81
[Terminal I/O Monitor] dialog 4-81

Error Log Viewer 4-83

Overview of Functions 4-83
Screen Details 4-84

Timing Chart Monitor 4-86

Overview of Functions 4-86
Screen Details 4-87
Analyzing Communication Issues 4-90

Print Calibration Pattern 4-94

Overview of Functions 4-94
Printing a calibration pattern 4-94

OPC UA Monitor 4-95

Overview of Functions 4-95
Screen Details 4-95

Settings 4-96

Overview of Functions 4-97

Total Status Settings 4-98

Execution Error Settings 4-99

[Execution Error Settings] dialog 4-99

Position Adjustment Reference Settings 4-100

[Default Position Adjustment Reference at Adding Measurement Tools] dialog .4-100
Archive Condition Settings 4-102
OPC UA I/O Data Settings 4-103
[OPC UA I/O Data Settings] Dialog 4-103
Recording/Simulation Image Settings 4-106
Settings Protection 4-107
Tool Protection 4-107
Vision Dashboard Protection 4-108
Program Setting Protection 4-109
Global Settings 4-110
List of Global Settings 4-111
Camera Settings 4-112
White Balance 4-112
Functional overview 4-112
Layout of the Screen 4-112
Adjusting the White Balance 4-114
Status LED 4-115
Functional Overview 4-115
Setting the Status LED Lighting Method 4-115
Lens Drive Time Limit 4-116
Functional Overview 4-116
Setting/Removing the Lens Drive Time Limit 4-117
Light Configuration Settings 4-118
Functional Overview 4-118
Layout of the Screen 4-119
Light Registration 4-121
Layout of the Screen 4-121
Context Menu 4-124
Network Settings for Environmentally-resistant Lighting Controllers 4-125
Layout of the Screen 4-125
Light Settings 4-128
Camera-Connected Light Settings 4-128
Functional Overview 4-128
Layout of the Screen 4-128
Lighting Controller Settings 4-129
Functional Overview 4-129
Layout of the Screen 4-130
Memory Allocation 4-133

Functional Overview 4-133
Changing the Memory Allocation for Each Use 4-133
Startup Mode Setting 4-135
Functional overview 4-135
Setting the startup mode 4-135
Date and Time Settings 4-136
Functional Overview 4-136
Setting the Date and Time 4-136
Setting the Date and Time Manually 4-136
Setting the Date and Time with Time Synchronization 4-137
Terminal I/O Settings 4-139
Functional Overview 4-139
Layout of the Screen 4-139
Initial Assignment 4-141
Assignable Functions 4-142
Functions Assignable to Input Terminals 4-142
Functions Assignable to Output Terminals 4-142
Network Settings 4-145
Device Name Setting 4-146
Functional Overview 4-146
Setting the Device Name 4-146
Industrial Ethernet Settings 4-147
Functional Overview 4-147
EtherNet/IP 4-147
PROFINET 4-147
PLC-Link 4-148
Layout of the Screen (for EtherNet/IP and PROFINET) 4-148
Assigning Receive/Send Functions to Bit Region/Byte Region (for EtherNet/IP and PROFINET) 4-153
Layout of the Screen 4-153
Functions Fixed-assigned to Bit Region (for EtherNet/IP and PROFINET) 4-157
Camera Receive Data 4-157
Camera Send Data 4-157
Assignable Functions (for EtherNet/IP and PROFINET) 4-158
Assignable Region (Address) 4-159
Camera Receive Data (Bit Region) 4-159
Camera Send Data (Bit Region) 4-159
Camera Send Data (Byte region) 4-160
Setting the Size of User-Defined Region (for EtherNet/IP and PROFINET) 4-161
Layout of the Screen 4-161

Layout of the Screen (for PLC-Link) 4-164
Changing the Address Settings (for PLC-Link) 4-167
Layout of the Screen 4-167
Non-Procedural Communication Settings 4-169
Functional Overview 4-169
Setting the Ports and Delimiters for Non-Procedural Communication 4-169
Robot Connection Settings 4-171
Screen Details 4-171
Check Connection (Robot) 4-172
Screen Details 4-172
Check Command 4-172
Screen Details 4-173
Target FTP Settings 4-174
Functional Overview 4-174
Configuring Destination FTP Server and Connection Settings 4-174
HTTP Settings 4-177
Functional Overview 4-177
Configuring the Settings for Communication Method and Certificates 4-177
Setting the Frequency of Screen Updates 4-178
Device's FTP Server Settings 4-179
Functional Overview 4-179
Configure FTP Server Settings 4-179
OPC UA Settings 4-181
Functional Overview 4-181
Layout of the Screen 4-181
DNS Server Settings 4-185
Functional Overview 4-185
Layout of the Screen 4-185
System Error Settings 4-187
Functional Overview 4-187
Layout of the Screen 4-187
Initial Value of Assignment States 4-188
Account Settings 4-190
Functional Overview 4-190
Layout of the Screen 4-190
[User] Tab 4-191

[Permission Group] Tab 4-192
Adding/Editing Users 4-194
Adding/Editing Permission Groups 4-194

System 4-196

Function overview 4-197

Change Mode 4-197
Change Account 4-197
Reboot 4-197
Update Firmware 4-197
System Information 4-197
Device Temperature List 4-197
Language 4-198
Startup Screen Settings 4-198

Change Mode 4-199

Function overview 4-199

Setup Mode 4-199
Run Mode 4-199
Editing Rights 4-199

Procedure 4-201

Change Account 4-202

Reboot 4-203

Update Firmware 4-204

System Information 4-205

Device Temperature List 4-206

Language 4-207

Custom Screen Viewer Settings 4-208

Startup Screen Settings 4-209

Layout 4-210

Overview of Functions 4-211

View status 4-211
About layout 4-212
Layout operations 4-212

[Layout] menu 4-213

Layout List 4-213
Create New 4-213
Duplicate 4-214

Rename....4-214
Delete....4-215
Lock....4-215
Layout Setting by Mode....4-215

Chapter 5 Measurement....5-1

List of tool categories....5-1

Capture....5-2

List of capture tools....5-2

Overview of [Capture] Tool....5-3

Image Capture Flow....5-3
Capture Mode....5-3
Standard Lighting Mode....5-3
LumiTrax Mode....5-4
MultiSpectrum Mode....5-6
Flickerless Mode....5-7
Image Capture Buffer....5-8
Multi-Capture....5-9

Capture (Standard Lighting Mode)....5-10

Properties....5-10
Configuration....5-10
Configuration Settings....5-10
Camera Attitude....5-12
Camera....5-12
Capture Settings....5-12
Image Intensity Adjustment....5-14
Image Capture Buffer (Common within Task)....5-15
Trigger....5-15
Trigger Settings....5-15
Light....5-17
Camera-Connected Light Settings....5-17
Light Settings....5-17
Light settings for individual light models....5-18
External Flash....5-24

Capture (LumiTrax Mode)....5-25

Properties....5-25
Configuration....5-26
Camera....5-26
LumiTrax....5-26
LumiTrax Capture Settings....5-26

Processed Image....5-27
Shape / Topography Image 1, 2, 3....5-27
Texture Pattern Image....5-29
Gradient X Image, Gradient Y Image....5-29
[Lighting Position Adjustment] Dialog....5-30
Screen details....5-31
Properties of lighting position adjustment....5-32
[Easy Setup Navigation] Dialog....5-32
Select a category....5-33
Adjust the feature size....5-33
Adjust the level....5-33
Adjust the contrast and noise removal....5-34
Trigger....5-34
Light....5-34
Capture (MultiSpectrum Mode)....5-35
Properties....5-35
Camera....5-36
MultiSpectrum....5-36
MultiSpectrum Capture Settings....5-36
Processed Image....5-37
Trigger....5-37
Light....5-38
Capture (Flickerless Mode)....5-39
Properties....5-39
Configuration....5-39
Camera....5-40
Trigger....5-40
Light....5-40
[Camera Attitude Verification] Dialog....5-42
Screen details....5-42
[ZoomTrax Settings] Dialog....5-44
[Easy Setup] Mode....5-44
Screen details....5-44
Capture Settings....5-45
Field of View Settings....5-46
[Standard] Mode....5-46
Screen details....5-47
Capture Settings....5-48
Field of View Settings....5-48
Field of View Information....5-49
[Capture Replication] Dialog....5-49
Screen details....5-50

Properties of Capture Replication 5-51
Restriction on the Number of Times of Switching between Different ZoomTrax Settings and Restriction on Capturing Interval 5-51
[Fine HDR] Dialog 5-53
Screen details 5-53
Fine HDR 5-54
[Track Moving Object] Dialog 5-56
Screen details 5-56
Settings of Track Moving Object 5-59
Calibration 5-61
Function overview 5-61
Image of the Measurement 5-61
Measurement Results Output 5-61
Properties 5-61
Calibration 5-62
Edit Calibration 5-62
Detailed Settings 5-62
Image Correction 5-63
Image Setting 5-63
Coordinate Conversion Settings 5-63
Image Adjustment 5-64
Display 5-65
Display Settings 5-65
[Teaching] Dialog 5-66
Screen details 5-66
Settings of teaching 5-67
Scaling 5-70
Function overview 5-70
Properties 5-70
Scaling 5-70
Scaling 5-71
Detailed Settings 5-72
[Scaling Coefficient Settings] Dialog 5-72
Screen details 5-72
Setting properties of Scaling Coefficient Settings 5-74
Inspection 5-75
Inspection Tool List 5-75
Area 5-76
Overview of functions 5-76
Image of the Measurement 5-76

Measurement Results Output 5-76
Measurement Example 5-76
Properties 5-76
Detection 5-77
Detection Conditions 5-77
Detailed Settings 5-77
Judgment 5-77
Judgment Conditions 5-78
Display 5-78
Display Settings 5-78
Intensity 5-79
Overview of functions 5-79
Images of the Measurement 5-79
Measurement Results Output 5-79
Properties 5-80
Details 5-80
Detailed Settings 5-80
Judgment 5-80
Judgment Conditions 5-80
Display 5-81
Display Settings 5-81
Color Detection 5-82
Overview of functions 5-82
Images of the Measurement 5-82
Measurement Results Output 5-82
Properties 5-83
Detection 5-83
Detection Conditions 5-83
Detailed Settings 5-84
Judgment 5-84
Judgment Conditions 5-84
Display 5-85
Display Settings 5-85
Pattern Search 5-86
Overview of functions 5-86
Images of the Measurement 5-86
Measurement Results Output 5-87
Measurement Example 5-87
Properties 5-88
Region 5-88
Detection 5-88
Detection Conditions 5-88
Label 5-89

Detailed Settings 5-90
Judgment 5-91
Judgment Conditions 5-91
Display 5-92
Display Settings 5-92
ShapeTrax3A 5-94
Overview of functions 5-94
Images of the Measurement 5-94
Measurement Results Output 5-94
Measurement Example 5-95
Properties 5-95
Region 5-96
Detection 5-96
Detection Conditions 5-96
Rotation Direction-Added Search 5-98
Overlap Elimination 5-100
Detection Target Selection Conditions 5-101
Adjacent Processing 5-102
Options 5-103
Detailed Settings 5-104
Feature Extraction 5-104
Feature Extraction Conditions 5-105
Eraser Tool 5-106
Judgment 5-106
Judgment Conditions 5-107
Display 5-108
Display Settings 5-108
Result Display 5-109
Edge Position 5-111
Overview of functions 5-111
Images of the Measurement 5-111
Measurement Results Output 5-111
Measurement Examples 5-112
Properties 5-112
Region 5-113
Detection 5-113
Detection Conditions 5-113
Options 5-114
Detailed Settings 5-115
Judgment 5-115
Judgment Conditions 5-115
Display 5-116
Display Settings 5-116
Edge Width 5-118

Overview of functions 5-118
Images of the Measurement 5-118
Measurement Results Output 5-119
Measurement Examples 5-120
Properties 5-120
Region 5-121
Detection 5-121
Mode 5-121
Detection Conditions 5-122
Options 5-123
Detailed Settings 5-124
Judgment 5-124
Judgment Conditions 5-124
Display 5-124
Display Settings 5-125
Edge Pitch 5-126
Overview of functions 5-126
Images of the Measurement 5-126
Measurement Results Output 5-126
Measurement Examples 5-128
Properties 5-128
Region 5-128
Detection 5-128
Mode 5-129
Detection Conditions 5-129
Options 5-130
Detailed Settings 5-131
Judgment 5-131
Judgment Conditions 5-131
Display 5-132
Display Settings 5-132
Edge Pairs 5-133
Overview of functions 5-133
Images of the Measurement 5-133
Measurement Results Output 5-133
Measurement Examples 5-135
Properties 5-136
Region 5-136
Detection 5-136
Mode 5-136
Edge Detection (1st Edge)/Edge Detection (2nd Edge) 5-137
Options 5-138
Detailed Settings 5-139
Judgment 5-139

Judgment Conditions 5-139
Display 5-140
Display Settings 5-140
Profile Position 5-142
Overview of functions 5-142
Images of the Measurement 5-142
Measurement Results Output 5-142
Measurement Examples 5-146
Properties 5-146
Region 5-146
Detection 5-146
Detection Conditions 5-147
Options 5-148
Best Fit Circle/Line 5-149
Detailed Settings 5-150
Judgment 5-150
Judgment Conditions 5-150
Display 5-152
Display Settings 5-152
Profile Width 5-154
Overview of functions 5-154
Images of the Measurement 5-154
Measurement Results Output 5-154
Measurement Examples 5-156
Properties 5-156
Region 5-157
Detection 5-157
Mode 5-157
Edge Detection 5-158
Options 5-159
Detailed Settings 5-161
Judgment 5-161
Judgment Conditions 5-161
Display 5-162
Display Settings 5-162
Profile Defect 5-165
Overview of functions 5-165
Images of the Measurement 5-165
Measurement Results Output 5-166
Measurement Examples 5-168
Properties 5-169
Region 5-169
Detection 5-169

Detection Conditions 5-169
Options 5-170
Detailed Settings 5-172
Defect Detection 5-172
Defect Detection Conditions 5-172
Defect Conditions 5-173
Options 5-174
Judgment 5-175
Judgment Conditions 5-176
Display 5-177
Display Settings 5-177
Defect 5-179
Overview of functions 5-179
Image of the Measurement 5-179
Measurement Results Output 5-180
Measurement Examples 5-182
Properties 5-182
Region 5-183
Detection 5-183
Detection Conditions 5-183
Grouping 5-185
Filter Settings 5-187
Detailed Settings 5-188
Judgment 5-188
Judgment Conditions 5-188
Display 5-189
Display Settings 5-189
Result Display 5-190
Blob 5-191
Overview of functions 5-191
Image of the Measurement 5-191
Measurement Results Output 5-191
Measurement Example 5-193
Properties 5-193
Region 5-194
Detection 5-194
Detection Conditions 5-194
Options 5-195
Filter Settings 5-197
Detailed Settings 5-198
Judgment 5-198
Judgment Conditions 5-198
Display 5-200
Display Settings 5-200

Grayscale Blob 5-203
Overview of functions 5-203
Image of the Measurement 5-203
Measurement Results Output 5-203
Measurement Example 5-206
Properties 5-206
Region 5-206
Detection 5-206
Detection Conditions 5-207
Segment Settings 5-207
Blob Settings 5-208
Options 5-209
Filter Settings 5-211
Detailed Settings 5-212
Judgment 5-212
Judgment Conditions 5-212
Display 5-215
Display Settings 5-215
Result Display 5-216
OCR2 5-218
Overview of functions 5-218
Image of the Measurement 5-218
Measurement Results Output 5-218
Measurement Example 5-220
Properties 5-220
Region 5-220
Detection 5-221
Block Settings 5-221
Block Region 5-223
Block Conditions (for [Recognition]) 5-223
Block Conditions (for [Auto]) 5-225
Line Settings 5-226
Character Settings 5-228
Detailed Settings 5-230
OCR Library 5-230
Library Settings 5-230
Registering a Library 5-232
Judgment 5-233
Judgment Conditions 5-233
Display 5-236
Display Settings 5-236
Result Display 5-237
When Character Recognition for [Auto] Is Unstable 5-238
1D Code Reader 5-241

Overview of functions 5-241
Image of the Measurement 5-241
Codes Supported by the 1D Code Reader Tool 5-241
Measurement Results Output 5-242
Measurement Example 5-243
Properties 5-244
Region 5-244
Detection 5-244
Detection Conditions 5-245
Detection Parameters 5-246
Options 5-248
Detailed Settings 5-249
Read Data 5-249
Read Data Settings 5-250
Judgment 5-251
Judgment Conditions 5-251
Display 5-252
Display Settings 5-253
Result Display 5-253
When codes cannot be read correctly 5-253
Code resolution is low 5-254
Code contrast is low 5-254
Code is out of focus 5-254
Little blank space (quiet zone) around code 5-254
2D Code Reader 5-255
Overview of functions 5-255
Image of the Measurement 5-255
Codes Supported by the 2D Code Reader Tool 5-255
Measurement Results Output 5-256
Measurement Example 5-258
Properties 5-258
Region 5-258
Detection 5-259
Detection Conditions 5-259
Detection Parameters 5-260
Options 5-263
Detailed Settings 5-267
Read Data 5-267
Read Data Settings 5-267
Judgment 5-268
Judgment Conditions 5-269
Display 5-270
Display Settings 5-271
Result Display 5-271
When codes cannot be read correctly 5-271

Code resolution is low 5-272
Code contrast is low 5-272
Code is out of focus 5-272
Printing of the code itself is either distorted or there is deviation/collapse of the cell 5-272
Gaps between cells or holes in cells 5-272
Small quiet zone (less than 2 cells) 5-272

Measurements & Dimensions 5-273

List of measurement and detection items 5-273

Points Distance 5-275

Overview of functions 5-275
Image of the Measurement 5-275
Measurement Results Output 5-275
Measurement Example 5-275
Properties 5-276
Detection 5-276
Detection Target 5-276
Detailed Settings 5-276
Judgment 5-277
Judgment Conditions 5-277
Display 5-278
Display Settings 5-278

Point/Line Distance 5-279

Overview of functions 5-279
Image of the Measurement 5-279
Measurement Results Output 5-279
Measurement Example 5-280
Properties 5-280
Detection 5-280
Detection Target 5-280
Detailed Settings 5-281
Judgment 5-281
Judgment Conditions 5-281
Display 5-282
Display Settings 5-282

Lines Distance 5-284

Overview of functions 5-284
Image of the Measurement 5-284
Measurement Results Output 5-284
Measurement Example 5-285
Properties 5-285
Detection 5-285
Detection Target 5-285
Detailed Settings 5-286

Judgment 5-286
Judgment Conditions 5-286
Display 5-287
Display Settings 5-287
Point/Circle Distance 5-289
Overview of functions 5-289
Image of the Measurement 5-289
Measurement Results Output 5-289
Measurement Example 5-290
Properties 5-290
Detection 5-290
Detection Target 5-290
Detailed Settings 5-291
Judgment 5-291
Judgment Conditions 5-291
Display 5-292
Display Settings 5-292
Line/Circle Distance 5-294
Overview of functions 5-294
Image of the Measurement 5-294
Measurement Results Output 5-294
Measurement Example 5-295
Properties 5-295
Detection 5-295
Detection Target 5-295
Detailed Settings 5-296
Judgment 5-296
Judgment Conditions 5-297
Display 5-297
Display Settings 5-297
Circles Distance 5-299
Overview of functions 5-299
Image of the Measurement 5-299
Measurement Results Output 5-299
Measurement Example 5-300
Properties 5-300
Detection 5-300
Detection Target 5-300
Detailed Settings 5-301
Judgment 5-301
Judgment Conditions 5-301
Display 5-302
Display Settings 5-302

Line Detection 5-304
Overview of functions 5-304
Image of the Measurement 5-304
Measurement Results Output 5-304
Measurement Example 5-305
Properties 5-305
Line Passing Two Points 5-307
Overview of functions 5-307
Image of the Measurement 5-307
Measurement Results Output 5-307
Measurement Example 5-308
Properties 5-308
Detection 5-308
Detection Target 5-308
Measurement Target 5-309
Detailed Settings 5-309
Judgment 5-309
Judgment Conditions 5-310
Display 5-310
Display Settings 5-310
Bisection of Two Lines 5-312
Overview of functions 5-312
Image of the Measurement 5-312
Measurement Results Output 5-312
Measurement Example 5-313
Properties 5-313
Detection 5-313
Detection Target 5-313
Measurement Target 5-314
Detailed Settings 5-314
Judgment 5-314
Judgment Conditions 5-315
Display 5-315
Display Settings 5-315
Angle Formed by Two Lines 5-317
Overview of functions 5-317
Image of the Measurement 5-317
Measurement Results Output 5-317
Measurement Example 5-318
Properties 5-318
Detection 5-318
Detection Target 5-319
Measurement Target 5-319

Detailed Settings 5-320
Judgment 5-320
Judgment Conditions 5-320
Display 5-321
Display Settings 5-321
Circle Detection 5-322
Overview of functions 5-322
Image of the Measurement 5-322
Measurement Results Output 5-322
Measurement Example 5-323
Properties 5-323
Line/V-Line Intersection 5-325
Overview of functions 5-325
Image of the Measurement 5-325
Measurement Results Output 5-325
Measurement Example 5-325
Properties 5-326
Detection 5-326
Detection Target 5-326
Detailed Settings 5-327
Judgment 5-327
Judgment Conditions 5-327
Display 5-328
Display Settings 5-328
Two Lines Intersection 5-330
Overview of functions 5-330
Image of the Measurement 5-330
Measurement Results Output 5-330
Measurement Example 5-330
Properties 5-331
Detection 5-331
Detection Target 5-331
Detailed Settings 5-331
Judgment 5-332
Judgment Conditions 5-332
Display 5-332
Display Settings 5-333
Center of Quadrangle 5-334
Overview of functions 5-334
Image of the Measurement 5-334
Measurement Results Output 5-334
Measurement Example 5-334

Properties 5-334
Detection 5-335
Detection Target 5-335
Detailed Settings 5-335
Judgment 5-336
Judgment Conditions 5-336
Display 5-336
Display Settings 5-337
Midpoint of Points 5-338
Overview of functions 5-338
Image of the Measurement 5-338
Measurement Results Output 5-338
Measurement Example 5-338
Properties 5-338
Detection 5-339
Detection Target 5-339
Detailed Settings 5-339
Judgment 5-339
Judgment Conditions 5-340
Display 5-340
Display Settings 5-340
AI Inspection 5-342
AI Inspection Tool List 5-342
Overview of functions 5-343
Workflow of the AI Inspection Tool Setting 5-343
Add Tool/Edit Region 5-343
Capture/Import Images 5-343
Set Training Images 5-344
Run Training 5-345
Shared AI Training 5-345
Adjust Settings/Re-train 5-346
AI Classification 5-347
Overview of functions 5-347
Image of the Measurement 5-347
Measurement Results Output 5-347
Measurement workflow 5-348
Properties 5-349
Region 5-349
Image Enhance 5-349
Train 5-350
Dataset 5-350
Train 5-351

Test Result 5-352
Options 5-352
Judgment 5-352
Judgment Conditions 5-352
Display 5-353
Display Settings 5-353
Result Display 5-353
Reset 5-354
[Add Image from Camera] dialog box 5-354
[Edit Dataset / Display Results] dialog box 5-356
Labeling Section 5-357
Thumbnail Section 5-362
Image Group 5-366
[Auto Image Selector] Dialog 5-368
Shared AI Training 5-370
Configuring Shared AI Training 5-371
Copying/Pasting Child Tools 5-372
Items That Can Have Independent Settings on the Child Tool Side 5-372
AI Detection 5-374
Overview of functions 5-374
Image of the Measurement 5-374
Measurement Results Output 5-374
Measurement workflow 5-375
Properties 5-376
Region 5-376
Train 5-376
Dataset 5-377
Train 5-378
Test Result 5-380
Options 5-380
Judgment 5-380
Judgment Conditions 5-380
Display 5-381
Display Settings 5-381
Result Display 5-381
Reset 5-381
[Add Image from Camera] dialog box 5-381
[Edit Dataset / Display Results] dialog box 5-384
Labeling Section 5-384
Thumbnail Section 5-389
[Defective (Fail) Part Specification] dialog box 5-393
AI Segmentation 5-398
Overview of functions 5-398
Image of the Measurement 5-398
Measurement Results Output 5-398

Measurement workflow 5-399
Properties 5-400
Region 5-400
Train 5-400
Dataset 5-401
Train 5-402
Test Result 5-403
Options 5-403
Judgment 5-403
Judgment Conditions 5-404
Display 5-404
Display Settings 5-404
Result Display 5-404
Reset 5-404
[Add Image from Camera] dialog box 5-405
[Edit Dataset / Display Results] dialog box 5-407
Labeling Section 5-407
Thumbnail Section 5-413
[Defective (Fail) Part Specification] dialog box 5-417
AI OCR 5-420
Overview of functions 5-420
Image of the Measurement 5-420
Measurement Results Output 5-420
Measurement Example 5-420
Properties 5-421
Region 5-421
Image Enhance 5-421
Character Recognition 5-421
Train 5-421
Character Recognition Settings 5-422
Options 5-424
Detailed Settings 5-424
Judgment 5-425
Registered String 5-425
Number of Characters 5-425
Match Degree 5-425
Display/Hide Judgment Conditions 5-426
Display 5-426
Display Settings 5-426
Result Display 5-426
[Additional Training] Dialog 5-427
[Match Degree Settings] Dialog 5-428
Region 5-430
List of region tools 5-430

Shared Region 5-431
Function overview 5-431
Measurement Overview 5-431
Measurement Results Output 5-431
Properties 5-431
Display 5-432
Display Settings 5-432
Image Region (Current Image) 5-433
Function overview 5-433
Measurement Overview 5-433
Measurement Results Output 5-433
Properties 5-434
Region 5-434
Display 5-434
Display Settings 5-434
Image Region (Model Image) 5-436
Function overview 5-436
Measurement Overview 5-436
Measurement Results Output 5-437
Properties 5-437
General 5-437
Region 5-437
Display 5-438
Display Settings 5-438
Shared Pattern (ShapeTrax3A) 5-439
Function overview 5-439
Measurement Overview 5-439
Measurement Results Output 5-439
Properties 5-439
Region 5-440
Edit Pattern Region 5-440
Detection 5-440
Detection Conditions 5-441
Rotation Direction-Added Search 5-441
Detailed Settings 5-443
Feature Extraction 5-443
Feature Extraction Conditions 5-444
Eraser Tool 5-445
Display 5-445
Display Settings 5-445
Image Conversion 5-447

List of Image Conversion Tools 5-447
Shared Image Enhance 5-448
Function overview 5-448
Measurement Overview 5-448
Measurement Results Output 5-448
Measurement Sample 5-448
Properties 5-448
Display 5-449
Display Settings 5-449
Subtraction Filter 5-450
Function overview 5-450
Measurement Overview 5-450
Measurement Results Output 5-450
Measurement Sample 5-450
Properties 5-451
Detection 5-451
Detection 5-451
Display 5-452
Display Settings 5-452
Image Position Adjustment 5-453
Function overview 5-453
Measurement Overview 5-453
Measurement Results Output 5-455
Properties 5-455
Image Correction 5-455
Detection Point 5-455
Reference Position 5-456
Region 5-456
Region Settings 5-456
Processing Outside Capture Area 5-456
Display 5-457
Display Settings 5-457
Vision-Guided Robotics 5-458
List of Vision-Guided Robotics Tools 5-458
Vision-Guided Robotics Tools 5-458
Vision-Guided Robotics Applications 5-458
Vision-Guided Robotics Function Setting Flow 5-459
Calibration (Robot) 5-460
Overview of Functions 5-460
Image of the Measurement 5-460
Measurement Results Output 5-460

Before executing calibration 5-460
Properties 5-461
Calibration 5-461
Edit Calibration 5-461
Detailed Settings 5-461
[Edit Calibration] Dialog 5-461
Detection 5-461
Calibration 5-462
Tool Center Calculation 5-465
Pick/Place 5-467
Overview of Functions 5-467
Image of the Measurement 5-467
Measurement results to be output 5-467
Measurement sample 5-468
Properties 5-468
Calibration 5-468
Calibration Data 5-469
Detection 5-469
Detected Position Settings 5-469
Reference Registration 5-470
Pick/Place Settings 5-470
Reference Pick/Place Position Coordinates 5-470
Reference Capture Position Coordinates 5-471
Register Reference Detection Position 5-473
Judgment 5-473
Judgment Conditions 5-474
Display 5-475
Display Settings 5-475
Grip Shift Correction 5-477
Overview of Functions 5-477
Image of the Measurement 5-477
Measurement results to be output 5-477
Measurement sample 5-478
Calibration 5-478
Calibration Data 5-478
Detection 5-479
Detected Position Settings 5-479
Reference Registration 5-479
Grip Shift Correction Setting 5-479
Reference Capture Position Coordinates 5-480
Register Reference Detection Position 5-481
Reference Place Position 5-482
Judgment 5-483
Judgment Conditions 5-483

Display 5-484
Display Settings 5-485
Robot Coordinate Transformation 5-486
Overview of Functions 5-486
Image of the Measurement 5-486
Measurement results to be output 5-486
Properties 5-486
Transformation 5-487
Edit Calibration 5-487
Transformation Target 5-487
Camera/Object Movement Correction 5-488
Display 5-489
Display Settings 5-489
Pick (1-Point Capture) 5-490
How to add applications 5-490
Application details 5-490
Pick (2-Point Capture) 5-492
How to add applications 5-492
Application details 5-492
Grip Shift Correction (1-Point Capture) 5-495
How to add applications 5-495
Application details 5-495
Grip Shift Correction (2-Point Capture) 5-497
How to add applications 5-497
Application details 5-497
Place (1-Point Capture) 5-500
How to add applications 5-500
Application details 5-500
Place (2-Point Capture) 5-502
How to add applications 5-502
Application details 5-502
Communication 5-505
Data Input (Industrial Ethernet) 5-506
Function overview 5-506
Properties 5-506
Input Data 5-506
Input Data Settings 5-506
Configuring Input Data 5-507
Input Source 5-509

Input Source Setting 5-509
Data Input (Non-Procedural) 5-510
Function overview 5-510
Properties 5-510
Input Data 5-510
Input Data Settings 5-510
Configuring Input Data 5-511
Input Source 5-512
Input Source Setting 5-512
Options 5-513
Options 5-513
Data Output (Industrial Ethernet) 5-514
Function overview 5-514
Properties 5-514
Bit Data Output (for EtherNet/IP and PROFINET) 5-514
Bit Data Output Settings 5-514
Configuring Output Data 5-515
Byte Data Output 5-515
Byte Data Output Settings 5-515
Configuring Output Data 5-517
Destination 5-518
Output Destination Settings 5-518
Options 5-519
Options 5-519
Data Output (Non-Procedural) 5-520
Function overview 5-520
Properties 5-520
Output Data 5-520
Output Data Settings 5-520
Configuring Output Data 5-521
Destination 5-522
Output Destination Settings 5-522
Options 5-523
Options 5-523
Data Output (FTP/Storage) 5-524
Function overview 5-524
Properties 5-524
Output Data 5-524
Output Data Settings 5-524
Destination 5-525
Output Destination Settings 5-525

Folder Settings 5-525
File Settings 5-525
Options 5-525
Options 5-525
Data Output (Terminal) 5-527
Function overview 5-527
Properties 5-527
Output Data 5-527
Output Data Settings 5-527
Destination 5-528
Terminal I/O Settings (Global Settings) 5-528
Options 5-528
Handling of Result Data of Unexecuted Tool 5-528
Image Output (FTP/Storage) 5-529
Function overview 5-529
Properties 5-529
Image Output 5-529
Image Output Settings 5-529
Destination 5-531
Output Destination Settings 5-531
Folder Settings (Common within Program Setting) 5-531
File Settings 5-532
Options 5-533
Options 5-533
Image Output with Graphics (FTP/Storage) 5-534
Function overview 5-534
Properties 5-534
Image Output 5-534
Image Output Settings 5-534
Destination 5-536
Output Destination Settings 5-536
Folder Settings (Common within Program Setting) 5-536
File Settings 5-537
Options 5-537
Options 5-537
Display 5-538
Graphics Display 5-539
Function overview 5-539
Display image 5-539
Properties 5-539
Graphic Part 5-539

Position Adjustment 5-540
Graphic Part 5-540
Setting Items of [Rectangle] 5-541
Settings 5-541
Advanced Settings 5-542
Display Settings 5-542
Setting Items of [Circle] 5-543
Settings 5-543
Advanced Settings 5-543
Display Settings 5-544
Setting Items of [Oval] 5-544
Settings 5-544
Advanced Settings 5-545
Display Settings 5-545
Setting Items of [Ring] 5-546
Settings 5-546
Advanced Settings 5-547
Display Settings 5-547
Setting Items of [Arc] 5-548
Settings 5-548
Advanced Settings 5-548
Display Settings 5-549
Setting Items of [Point] 5-549
Settings 5-549
Advanced Settings 5-550
Display Settings 5-551
Setting Items of [Line] 5-551
Settings 5-551
Advanced Settings 5-553
Display Settings 5-553
Setting Items of [Horizontal Line] 5-554
Settings 5-554
Advanced Settings 5-554
Display Settings 5-555
Setting Items of [Vertical Line] 5-555
Settings 5-555
Advanced Settings 5-556
Display Settings 5-556
Setting Items of [String] 5-557
Settings 5-557
Advanced Settings 5-558
Display Settings 5-558
Setting Items of [Number] 5-558
Settings 5-559
Advanced Settings 5-560
Display Settings 5-560

Data Analysis 5-561

Statistics 5-562

Function overview 5-562

Statistical Data Accumulated 5-562

Properties 5-563

Statistics 5-563

Setting of Statistical Targets 5-563

Options 5-564

Clear Statistical Data 5-564

Posting statistical data on the Vision Dashboard 5-564

Yield Rate 5-566

Function overview 5-566

Yield Rate Data Accumulated 5-566

Properties 5-566

Yield Rate 5-567

Setting of Targets 5-567

Options 5-568

Clear Yield Rate Data 5-568

Posting yield rate data on the Vision Dashboard 5-568

Data History 5-569

Function overview 5-569

Archived Data 5-569

Properties 5-569

Archive 5-569

Archive Target Settings 5-569

Options 5-571

Clear Archived Data 5-571

Posting archived data on the Vision Dashboard 5-571

Control 5-572

List of Control Tools 5-572

Change Program Setting (PL) 5-574

Properties 5-574

Command Settings 5-574

Command Settings 5-574

Save Settings (PS) 5-575

Properties 5-575

Command Settings 5-575

Command Settings 5-575

Issue Soft Event (SEI) 5-576
Properties 5-576
Command Settings 5-576
Command Settings 5-576
Clear Error (ERC) 5-577
Properties 5-577
Command Settings 5-577
Command Settings 5-577
Clear Tool Buffer (TBC) 5-578
Properties 5-578
Command Settings 5-578
Command Settings 5-578
Reset (RS) 5-579
Properties 5-579
Command Settings 5-579
Command Settings 5-579
Initialize Output Data (RSOD) 5-580
Properties 5-580
Command Settings 5-580
Disable Output (OD) 5-581
Properties 5-581
Command Settings 5-581
Command Settings 5-581
Disable Trigger Input (TD) 5-582
Properties 5-582
Command Settings 5-582
Command Settings 5-582
Register Model Image (MG) 5-583
Properties 5-583
Command Settings 5-583
Command Settings 5-583
Change Model Image (MS) 5-584
Properties 5-584
Command Settings 5-584
Command Settings 5-584
Update Pattern Information (PDU) 5-585

Properties....5-585
Command Settings....5-585
Command Settings....5-585
Update Position Adjustment Reference Value (RPU)....5-586
Properties....5-586
Command Settings....5-586
Command Settings....5-586
Update Registered String (JSU)....5-587
Properties....5-587
Command Settings....5-587
Command Settings....5-587
Update Collation Pattern (CRU)....5-588
Properties....5-588
Command Settings....5-588
Command Settings....5-588
Copy Cell Value (CCV)....5-589
Properties....5-589
Command Settings....5-589
Command Settings....5-589
Export Cell Values (CEV)....5-590
Properties....5-590
Command Settings....5-590
Command Settings....5-590
Import Cell Values (CIV)....5-591
Properties....5-591
Command Settings....5-591
Command Settings....5-591
Execution Order....5-592
Execution Order....5-592
Tool Common Setting Items....5-593
Navigation Dialogs When Adding a Tool....5-594
[Current Image] Dialog....5-595
Dialog details....5-596
Operation....5-597
[Edit Inspection Region] Dialog....5-597
[Edit Inspection Region] Dialog ([Subtraction Filter] Tool)....5-598
[Edit Pattern Region] Dialog....5-599

[Reference Position Registration] Dialog 5-600
Measurements & Dimensions 5-601
[Specify Point] Dialog 5-601
[Specify Line] Dialog 5-601
[Specify Circle] Dialog 5-602
[Line Detection] Dialog 5-602
[Circle Detection] Dialog 5-603
General 5-604
Region 5-606
Processing Overview 5-606
Position Adjustment 5-606
Region Settings 5-606
Shapes of regions that can be used by different tools 5-607
Position Adjustment 5-608
Region Settings 5-609
Rectangle 5-610
Circle 5-610
Oval 5-611
Ring 5-611
Arc 5-612
Polygon 5-612
Mask 5-613
Options 5-613
Pattern Region 5-614
Erasing Unnecessary Feature Information/Boundary Information (Eraser Tool) 5-615
Drawing a Region 5-615
Drawing a rectangle 5-616
Drawing a circle 5-617
Drawing an oval 5-618
Drawing a ring 5-618
Drawing an arc 5-619
Drawing a polygon 5-621
Editing the Inspection Region of the [Subtraction Filter] Tool 5-622
Dialog details 5-622
Properties of [Edit Region] Dialog 5-623
Editing the Inspection Region of the AI Inspection Tool 5-624
Dialog details 5-625
Properties of [Edit Region] Dialog 5-626
Editing a Pattern Region 5-627
Dialog details 5-627
Properties of [Edit Pattern Region] Dialog 5-628
Image Enhance 5-630
Processing Overview 5-630
Color Extraction 5-630

Image Enhance 5-632
Color Extraction 5-633
Dialog details 5-634
Properties of [Color Extraction Settings] Dialog 5-635
MultiSpectrum Color Extraction 5-638
Dialog details 5-638
Properties of [Color Extraction Settings] Dialog 5-639
[Add Color] Dialog 5-640
Properties of [Add Color] Dialog 5-642
Image Enhance 5-643
List of Image Enhancements 5-643
Binary 5-643
Blob Filter 5-644
Convex Hull 5-647
Expand 5-648
Shrink 5-649
Noise Isolation 5-649
Average 5-650
Median 5-651
Blur 5-651
Shading Correction 5-651
Image Extraction 5-654
Scratch Defect Extraction 5-655
Contrast Conversion 5-656
Contrast Expansion 5-657
Sharpen 5-658
Sobel X 5-658
Sobel Y 5-658
Sobel 5-659
Prewitt 5-659
Roberts 5-659
Laplacian 5-660
Custom 5-660
Detailed Settings 5-662

Chapter 6 Task 6-1

Overview 6-1
[Task] view 6-1
[Main Task] tab 6-1
[Subtask] tab 6-1
Task 6-1
Features 6-1
Example of Combination of Main Task and Subtask 6-2
Screen Details 6-3
Step Layout 6-3

Free Layout 6-5
Creating a Main Task 6-9
Creating Subtasks 6-10
Editing Tools 6-11
Adding a Tool 6-11
The Case of Step Layout 6-11
The Case of Free Layout 6-12
Handling a Tool 6-13
Renumbering the Tool ID 6-14
Grouping/Ungrouping Tools 6-15
Editing a Task 6-17
Properties 6-17
General 6-17
General 6-17
Task 6-18
Event Settings 6-18
Options 6-19
Adding a Subtask 6-20
Creating a Memo 6-20

Chapter 7 Image Viewer 7-1

Overview of Functions 7-2
How to Use 7-2
Screen Layout 7-3
Align Inspection Regions 7-6
Move Multiple Inspection Regions at Once 7-7

Chapter 8 Vision Dashboard 8-1

Overview of Functions 8-2
Spreadsheet Calculation Functions 8-2
Linkage with Other Views 8-3
Screen Details 8-5
Toolbar 8-5
Functions related to cell formats 8-6
Cell Condition Settings 8-7
Spreadsheet Calculation Functions 8-8
Find and Replace / Show/Hide Gridlines 8-8

Cell input area....8-9
Top auxiliary bar....8-10
Specifications on cell input....8-10
Editing by Context Menu....8-14
When the right-clicked target is a cell....8-14
When the right-clicked target is a button....8-15
When the right-clicked target is a chart....8-16
Configuring References....8-17
Referencing a result data item from a cell (linking from a result data item to a cell)....8-17
Referencing a cell from a setting parameter (linking from a cell to a setting parameter)....8-19
Show Links....8-20
Entering a Function....8-23
In the event of an error of a function....8-23
Ways of Entering a Function....8-24
Entering a function directly....8-24
Finding a function by search, and then inserting it....8-24
Spill....8-25
Spill usage example ① When specifying multiple cells and multiplying them....8-25
Spill usage example ② When finding the midpoint from the XY coordinates of two points using the MIDXY function....8-25
Operator....8-25
Operator_Reference (@)....8-26
Arithmetic Operator_Addition (+)....8-27
Arithmetic Operator_Subtraction (-)....8-27
Arithmetic Operator_Multiplication (*)....8-28
Arithmetic Operator_ Division (/)....8-29
Arithmetic Operator_Percent Presentation (%)....8-30
Arithmetic Operator_Exponentiation (^)....8-30
Comparative Operator_Equal to or Less Than (<=)....8-31
Comparative Operator_Equal to or Larger Than (>=)....8-32
Comparative Operator_Equal to (=)....8-33
Comparative Operator_Not Equal to (<>)....8-34
Comparative Operator_Smaller than (<)....8-35
Comparative Operator_Larger than (>)....8-35
Character String Operator_Concatenation (&)....8-36
Date/Time Functions....8-37
DATE(argument 1, argument 2, argument 3)....8-37
DATEVALUE(argument 1)....8-38
DAY(argument 1)....8-39
EDATE(argument 1, argument 2)....8-40
HOUR(argument 1)....8-41
MINUTE(argument 1)....8-41
MONTH(argument 1)....8-42
NOW()....8-43
SECOND(argument 1)....8-43
TIME(argument 1, argument 2, argument 3)....8-44

TIMEVALUE(argument 1) 8-45
TODAY() 8-46
YEAR(argument 1) 8-46
Math/Trigonometry Functions 8-47
ABS(argument 1) 8-48
ACOS(argument 1) 8-49
ASIN(argument 1) 8-49
ATAN(argument 1) 8-50
ATAN2(argument 1, argument 2) 8-51
CEILING(argument 1, argument 2) 8-51
CEILING.MATH(argument 1, [argument 2], [argument 3]) 8-52
COS(argument 1) 8-53
DEGREES(argument 1) 8-53
EVEN(argument 1) 8-54
EXP(argument 1) 8-55
FLOOR(argument 1, argument 2) 8-55
FLOOR.MATH(argument 1, [argument 2], [argument 3]) 8-56
INT(argument 1) 8-57
LN(argument 1) 8-57
LOG(argument 1, [argument 2]) 8-58
LOG10(argument 1) 8-59
MOD(argument 1, argument 2) 8-59
MROUND(argument 1, argument 2) 8-60
ODD(argument 1) 8-61
PI() 8-61
POWER(argument 1, argument 2) 8-62
PRODUCT(argument 1, [argument 2], ...[argument 32]) 8-62
QUOTIENT(argument 1, argument 2) 8-63
RADIANS(argument 1) 8-64
RAND() 8-64
ROUND(argument 1, argument 2) 8-65
ROUNDDOWN(argument 1, argument 2) 8-65
ROUNDUP(argument 1, argument 2) 8-66
SIGN(argument 1) 8-67
SIN(argument 1) 8-67
SQRT(argument 1) 8-68
SUM(argument 1, [argument 2], ...[argument 32]) 8-69
SUMIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n]], ...) 8-69
TAN(argument 1) 8-71
MDETERM(argument 1) 8-71
MINVERSE(argument 1) 8-72
MMULT(argument 1, argument 2) 8-73
ACOSD(argument 1) 8-74
ASIND(argument 1) 8-74
ATAND(argument 1) 8-75
ATAN2D(argument 1, argument 2) 8-75
COSD(argument 1) 8-76
SIND(argument 1) 8-77
TAND(argument 1) 8-77

Statistics Functions 8-78
AVERAGE(argument 1, [argument 2], ...[argument 32]) 8-79
AVERAGEA(argument 1, [argument 2], ...[argument 32]) 8-80
AVERAGEIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n]], ...) 8-80
COUNT(argument 1, [argument 2], ...[argument 32]) 8-82
COUNTA(argument 1, [argument 2], ...[argument 32]) 8-82
COUNTBLANK(argument 1) 8-83
COUNTERROR(argument 1, [argument 2], ...[argument 32]) 8-83
COUNTIFS(argument 1, argument 2, argument 3, [argument 1[n], argument 2[n], argument 3[n], ...) 8-84
INRANGE(argument 1, argument 2, argument 3) 8-85
LARGE(argument 1, argument 2) 8-86
LARGEINDEX(argument 1, argument 2) 8-87
MAX(argument 1, [argument 2], ...[argument 32]) 8-87
MAXA(argument 1, [argument 2], ...[argument 32]) 8-88
MAXIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n], ...) 8-89
MAXINDEX(argument 1, [argument 2], ...[argument 32]) 8-90
MEDIAN(argument 1, [argument 2], ...[argument 32]) 8-91
MIN(argument 1, [argument 2], ...[argument 32]) 8-91
MINA(argument 1, [argument 2], ...[argument 32]) 8-92
MINIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n]], ...) 8-93
MININDEX(argument 1, [argument 2], ...[argument 32]) 8-94
MODE.SNGL(argument 1, [argument 2], ...[argument 32])/MODE(argument 1, [argument 2], ...[argument 32]) 8-95
RANK.EQ(argument 1, argument 2, [argument 3])/RANK(argument 1, argument 2, [argument 3]) 8-95
SMALL(argument 1, argument 2) 8-97
SMALLINDEX(argument 1, argument 2) 8-97
STDEV.P(argument 1, [argument 2], ...[argument 32])/STDEVP(argument 1, [argument 2], ...[argument 32]) 8-98
STDEV.S(argument 1, [argument 2], ...[argument 32])/STDEV(argument 1, [argument 2], ...[argument 32]) 8-99
STDEVA(argument 1, [argument 2], ...[argument 32]) 8-100
STDEVPA(argument 1, [argument 2], ...[argument 32]) 8-101
VAR.P(argument 1, [argument 2], ...[argument 32])/VARP(argument 1, [argument 2], ...[argument 32]) 8-102
VAR.S(argument 1, [argument 2], ...[argument 32])/VAR(argument 1, [argument 2], ...[argument 32]) 8-102
VARA(argument 1, [argument 2], ...[argument 32]) 8-103
VARPA(argument 1, [argument 2], ...[argument 32]) 8-104
Lookup/Reference Functions 8-105
CHOOSE(argument 1, argument 2, [argument 3], ...[argument 32]) 8-105
COLUMN([argument 1]) 8-106
COLUMNS(argument 1) 8-107
HLOOKUP(argument 1, argument 2, argument 3, [argument 4]) 8-107
INDEX(argument 1, [argument 2], [argument 3]) 8-109
ROW([argument 1]) 8-110
ROWS(argument 1) 8-111
VLOOKUP(argument 1, argument 2, argument 3, [argument 4]) 8-111

XMATCH(argument 1, argument 2, [argument 3], [argument 4]) 8-113
XLOOKUP(argument 1, argument 2, argument 3, [argument 4], [argument 5], [argument 6]) . 8-114
TRANSPOSE(argument 1) 8-116
FILTER(argument 1, argument 2, [argument 3]) 8-117
UNIQUE(argument 1, [argument 2], [argument 3]) 8-118
SORT(argument 1, argument 2, [argument 3], [argument 4]) 8-119
SORTBY(argument 1, argument 2, [argument 3], [argument 4, argument 5]…[argument 30, argument 31]) 8-121
String Operation Functions 8-122
CONCAT(argument 1, [argument 2], ...[argument 32]) 8-123
EXACT(argument 1, argument 2) 8-124
FIND(argument 1, argument 2, [argument 3]) 8-124
LEFT(argument 1, argument 2) 8-125
LEN(argument 1) 8-126
LOWER(argument 1) 8-127
MID(argument 1, argument 2, argument 3) 8-127
REPLACE(argument 1, argument 2, argument 3,argument 4) 8-128
RIGHT(argument 1, [argument 2]) 8-129
SEARCH(argument 1, argument 2, [argument 3]) 8-130
SUBSTITUTE(argument 1, argument 2, argument 3, [argument 4]) 8-131
TEXT(argument 1, [argument 2]) 8-131
TEXTJOIN(argument 1, argument 2, argument 3, [argument 4], ...[argument 32]) 8-132
UNICHAR(argument 1) 8-133
UNICODE(argument 1) 8-134
UPPER(argument 1) 8-134
VALUE(argument 1, [argument 2]) 8-135
TEXTSPLIT(argument 1, argument 2, argument 3, [argument 4]) 8-136
TEXTVERIFY(argument 1, argument 2, [arguments 3 to 32]) 8-137
Logical Functions 8-139
AND(argument 1, [argument 2], ...[argument 32]) 8-140
IF(argument 1, argument 2, argument 3) 8-141
IFERROR(argument 1, argument 2) 8-142
IFNA(argument 1, argument 2) 8-142
IFS(argument 1, argument 2, [argument 3, argument 4], ...[argument 31, argument 32]) 8-143
NOT(argument 1) 8-144
OR(argument 1, [argument 2], ...[argument 32]) 8-145
SWITCH(argument 1, argument 2, argument 3, [argument 2[n], argument 3[n]], …[argument 4]) 8-146
XOR(argument 1, [argument 2], ...[argument 32]) 8-147
Information Functions 8-148
ERROR.TYPE(argument 1) 8-148
FORMULATEXT(argument 1) 8-150
ISBLANK(argument 1) 8-150
ISERROR(argument 1) 8-151
ISEVEN(argument 1) 8-152
ISFORMULA(argument 1) 8-153
ISLOGICAL(argument 1) 8-154
ISNA(argument 1) 8-154
ISNONTEXT(argument 1) 8-155
ISNUMBER(argument 1) 8-156

ISODD(argument 1) 8-157
ISREF(argument 1) 8-158
ISTEXT(argument 1) 8-158
TYPE(argument 1) 8-159
Engineering 8-160
BIN2DEC(argument 1) 8-161
BIN2HEX(argument 1, [argument 2]) 8-161
BITAND(argument 1, argument 2) 8-162
BITLSHIFT(argument 1, argument 2) 8-163
BITOR(argument 1, argument 2) 8-164
BITRSHIFT(argument 1, argument 2) 8-164
BITXOR(argument 1, argument 2) 8-165
DEC2BIN(argument 1, [argument 2]) 8-166
DEC2HEX(argument 1, [argument 2]) 8-167
HEX2BIN(argument 1, [argument 2]) 8-168
HEX2DEC(argument 1) 8-169
2D Geometric Operation Functions 8-169
ANGLE(argument 1, argument 2) 8-171
ANGLETRANS(argument 1, argument 2) 8-172
CALIBINFO(argument 1) 8-173
CIRCLE(argument 1, [argument 2]) 8-173
CIRCLETAN(argument 1, argument 2, [argument 3]) 8-174
CONVCRD(argument 1, argument 2, argument 3, [argument 4]) 8-176
TRANSXY(argument 1, argument 2) 8-177
TRANSXYINV(argument 1, argument 2) 8-178
DIST(argument 1, argument 2) 8-179
I2CIRCLE(argument 1, argument 2, [argument 3]) 8-180
I4XY(argument 1, argument 2, argument 3, argument 4, [argument 5]) 8-181
I4LINE(argument 1, argument 2, argument 3, argument 4, [argument 5]) 8-183
ILINECIRCLE(argument 1, argument 2, [argument 3]) 8-184
INNERPROD(argument 1, argument 2) 8-186
I2LINE(argument 1, argument 2) 8-187
LINE(argument 1, [argument 2]) 8-187
LLANGLE(argument 1, argument 2) 8-188
LNDIST(argument 1, argument 2) 8-189
LNDISTP(argument 1, argument 2) 8-190
LNDISTXY(argument 1, argument 2) 8-191
MIDLINE(argument 1, argument 2, [argument 3]) 8-192
MIDXY(argument 1, argument 2) 8-194
MULTIPOINTCALIB(argument 1, argument 2, [argument 3]) 8-194
OUTERPROD(argument 1, argument 2) 8-196
ROTATE(argument 1, argument 2, argument 3, [argument 4]) 8-197
ROTCENTER(argument 1, argument 2, argument 3) 8-199
ROTCENTERLS(argument 1, argument 2) 8-200
VMIDLINE(argument 1, argument 2) 8-201
SHIFTLINE(argument 1, argument 2) 8-202
Setting a Conditional Format 8-204
How to Set Format Rules 8-205

Using Default Format Rule 8-205
Configuring a New Format Rule 8-206
Format all cells based on the cell value 8-206
Formatting only the cells that contain the specified value 8-209
Determine the cell to format by using a formula 8-209
Clearing a format rule 8-210
Editing a format rule 8-210
Editing of format rules 8-211
Configuring Data Validation 8-213
Using a Template 8-215
Inserting a Template 8-215
Registering a Template 8-216
Exporting a Template File 8-216
Importing a Template File 8-217
Inserting an Image 8-218
Steps of inserting an image 8-218
Editing an image 8-218
Inserting a Button 8-219
Steps of inserting a button 8-219
Configuring a Button 8-219
[Edit Region] dialog 8-220
Inserting a Link 8-222
Inserting a Chart 8-223
Steps of inserting a chart 8-226
Configuring a chart 8-226
Chapter 9 Custom Screen 9-1
Overview of Functions 9-2
Page Configuration of Custom Screen 9-2
Screen Details 9-4
Adding Pages 9-6
[Create New] Dialog 9-6
Page Properties 9-7
General 9-7
Style 9-7
Page Template 9-8
Registering a Template 9-8
Exporting a Template 9-8

Importing a Template 9-9
Using a Template 9-9

Adding Parts 9-11

Moving and Aligning Parts 9-11
Part Properties 9-12
General 9-12
Display Generation Settings 9-13

Parts 9-15

Camera Image 9-15
General 9-15
Style and Data 9-16
Toolbar 9-17
Image File 9-18
General 9-18
Style 9-18
Text 9-18
General 9-18
Style 9-18
Advanced Settings 9-19
Data 9-19
General 9-19
Style 9-20
Data 9-21
PASS/FAIL 9-22
General 9-22
Style and Data 9-22
Mode Display 9-22
General 9-23
Style 9-23
Tool Result List 9-23
General 9-23
Style 9-23
Data 9-23
Tool Judgment List 9-24
General 9-24
Style 9-24
Data 9-24
Rectangle 9-24
General 9-24
Style 9-25
Button 9-25
General 9-25
Style and Data 9-25
Drop-down Menu 9-26
General 9-26

Style and Data 9-26
Numeric Input Box 9-27
General 9-27
Style and Data 9-27
Checkbox 9-28
General 9-28
Style and Data 9-28
Toggle Switch 9-28
General 9-28
Style and Data 9-28
Text Input Box 9-29
General 9-29
Style and Data 9-29
Graph (Statistics) 9-29
General 9-29
Style and Data 9-30
Graph (Yield Rate) 9-30
General 9-31
Style and Data 9-31
Web Browser Display 9-32
Operating Environment 9-32
Display by Web Browser 9-32
Screen Details 9-33
Difference from the [Custom Screen] View 9-35
Run Mode 9-35
Setup Mode 9-35

Chapter 10 Filmstrip 10-1

Archive Review 10-2

Overview of Functions 10-3
Screen Layout 10-4
Export Archived Images 10-7
Archive Condition Settings 10-8
Edit Archive Condition 10-9
Archive Reviewing Procedure 10-11

Simulation Execution 10-12

Overview of Functions 10-13

Screen Layout 10-14
Recording/Simulation Image Settings 10-16
Recording Settings 10-16
Simulation Image Settings 10-16
Simulation Execution Option 10-17
Simulation Image Detailed Settings 10-17
Loading Folder Specification Method 10-18
Loading Folder 10-18
Specification Method 10-18
Switch Tasks 10-18
Image List 10-18
Image Setting Method 10-19
Simulation Execution Procedure 10-21

Chapter 11 Properties 11-1
Overview of Functions 11-2
Screen Layout 11-3
Properties Setting Method 11-5
Enter Text or Numbers Directly 11-5
Reference Setting Parameters/Result Data/Cells 11-6
Dragging and dropping from the data list 11-8

Chapter 12 Error Check 12-1
Overview of Functions 12-2
Screen Layout 12-3

Chapter 13 Control/Data Output 13-1
Overview of Control/Data Output Settings 13-2
Control Methods/Interfaces Available in the System 13-2
The Flow for the Control and Data Output Setting 13-3
Selecting an Interface 13-3
Changing the Interface and Communication Mode Settings 13-3
Changing the Data Output Settings of the VS Camera 13-4
Control/Data Output via External Terminals 13-5
Overview of Control/Data Output via External Terminals 13-6
Functions available with the external terminals 13-6

Operation Flow 13-6

Preparing External Terminal Connections 13-7

Checking the terminal assignment of the VS camera 13-7

Pin layout 13-7

Wiring 13-8

Input circuit diagram 13-8

Example of connections 13-8

Output circuit diagram 13-8

Connection example: when connecting this device's outputs via a positive common 13-9

Connection example: when connecting this device's outputs via a negative common 13-9

Verifying the Wiring State Using the I/O Monitor 13-10

Checking the Input Signal 13-10

Checking the Output Signal 13-11

Controlling the VS Camera via External Terminals 13-12

Functions Used for Direct Control 13-12

Inputting Trigger/Outputting Strobe Light 13-12

Outputting the Tool Tolerance Judgment 13-12

Controlling VS Cameras 13-13

Checking the VS Camera Status 13-14

Changing the External Terminal Input/Output Settings 13-15

Timing Chart 13-17

Typical operations at startup 13-17

Typical Operation at Startup (When EhterNte/IP, PROFINET is Used) 13-18

Typical operations with a single trigger (When the image capture buffer is reserved for one fixed image) 13-19

Typical operation when using overdrive lighting with the capture tool 13-19

Image capture and FLASH output timing for the trigger operation 13-20

Pass/Fail Operations (Sync with STO) 13-21

Pass/Fail Operations (One Shot) 13-21

Pass/Fail Operations (With Handshake) 13-22

Busy Operations 13-22

Control/Data Output via EtherNet/IP 13-24

Overview of Control and Data Output via EtherNet/IP 13-25

Fixed-cycle Communication (Implicit) 13-25

Explicit Message Communication 13-26

Operation Flow 13-27

Preparing EtherNet/IP connection 13-29

Model compliant with EtherNet/IP connection 13-29

Keyence Corporation PLC 13-29

Rockwell Automation, Inc. PLC 13-29

Omron Corporation PLC 13-29

Mitsubishi Electric Corporation PLC 13-30

EtherNet/IP communication specifications 13-30
How to distinguish between using explicit message communication or implicit fixed-cycle communication 13-30
Example of input data settings (VS series → Keyence KV-8000 series) 13-31
Example of output data settings (Keyence KV-8000 series → VS series) 13-34
Changing EtherNet/IP settings 13-37
Outputting measurement data via cyclic communication of EtherNet/IP (Data Output) 13-39
Data Output Flow 13-39
Timing Chart 13-40
I/O Control via cyclic communication of EtherNet/IP 13-41
I/O Control Flow 13-41
Controlling the VS Camera via cyclic communication of EtherNet/IP (Command Control) 13-42
Command Processing Flow with EtherNet/IP 13-42
Timing Chart 13-43
Communicating with the another device via EtherNet/IP message communication 13-44
Object configuration 13-44
Notation for description 13-44
ClassID : 4 (04Hex) Assembly Object 13-45
Instance : 100 (64Hex) 13-45
Instance : 101(65Hex) 13-48
ClassID : 104 (68Hex) Vision System Object 13-50
Instance : 1 (01Hex) 13-50
Service details 13-52
Controlling the Camera with EtherNet/IP message communication 13-54
How to use message communication 13-54
Control using the message communication 13-55
Controlling the image capture with EtherNet/IP message communication 13-55
Control image of image capture service (40Hex) 13-55
Data example 13-56
Sending commands with EtherNet/IP message communication 13-56
Control image of command execution service (41Hex) 13-56
Data example 13-57
Retrieving the measurement data with the EtherNet/IP message communication (result data retrieval) 13-58
Control image of result data retrieval service (42Hex) 13-58
Data example 13-58
Rewriting the Data Input Tool Settings with Message Communication via EtherNet/IP (Rewrite Data Input Tool) 13-59
Control image of rewrite data input tool service (43Hex) 13-59

Data example 13-60

Control/Data Output via PROFINET 13-61

Overview of Control and Data Output via PROFINET 13-62

Data I/O communication (cyclic communication) 13-62
Record data communication (non-cyclic communication) 13-62

Operation Flow 13-63

Preparation for the PROFINET Connection 13-65

PROFINET Connection Supporting Models 13-65

Siemens PLCs 13-65

PROFINET Communication Specifications 13-65

Data I/O communication (cyclic communication) 13-65
Record data communication (non-cyclic communication) 13-65
Example of input data settings (from VS camera to Siemens SIMATIC S7-300 Series) 13-66
Example of output data settings (from Siemens SIMATIC S7-300 Series to VS camera) 13-69

Changing the PROFINET Settings 13-71

Outputting measurement data via cyclic communication of PROFINET (Data Output) 13-73

Data Output Flow 13-73

Timing Chart 13-74

I/O Control via cyclic communication of PROFINET 13-75

I/O Control Flow 13-75

Controlling the VS Camera via cyclic communication of PROFINET (Command Control) 13-76

Command Processing Flow with PROFINET 13-76

Timing Chart 13-77

Control/Data Output via PLC-Link 13-78

Overview of Control/Data Output via PLC-Link 13-79

Usage Examples of PLC-Link 13-79

Operation Flow 13-80

Preparing PLC-Link Connection 13-82

Model compliant with PLC-Link connection 13-82

Keyence PLC 13-82
Mitsubishi Electric Corporation PLC 13-82

Connecting the Device to a PLC 13-83

When connecting to Keyence KV series 13-83
When connecting to MELSEC (link unit) 13-83

When connecting to MELSEC (internal Ethernet port) 13-84
Changing PLC-Link Settings 13-86
Outputting Measurement Data via PLC-Link (Data Output) 13-88
Data Output Flow 13-88
Timing Chart 13-89
Controlling the VS Camera via PLC-Link (Command Control) 13-90
Command Processing Flow with PLC-Link 13-90
Timing Chart 13-91
Control/Data Output via Non-Procedural Communication . 13-92
Preparing for Non-procedural Communication 13-93
Changing the Non-Procedural Communication Settings 13-94
One-to-one connection of the device with a PC 13-95
Connecting the device to a PC 13-95
An example of communicating with the device using Telnet software and non-procedural mode 13-95
One-to-n connection of the devices with a PC 13-97
Differences from one-to-one connection 13-97
Notes on one-to-n connections 13-97
Outputting data via non-procedural communication (data output) 13-99
FTP Client/Server Function 13-101
Using the FTP Client/Server Functions 13-102
FTP Client function 13-102
FTP Server function 13-102
Outputting Data/Images via FTP Communication (FTP Client Function) 13-103
Changing the Relevant FTP Client Settings 13-103
Before changing the settings 13-103
Changing the settings 13-104
Configuring the Output Data 13-104
Using the Device as FTP Server (FTP Server Function) 13-107
OPC UA Server Function 13-108
OPC UA 13-109
Precautions for Security 13-110
Do not use in a vulnerable state 13-110

Design and maintain network configurations to ensure security 13-110

Overview of OPC UA Server Function 13-111

OPC UA Server Function 13-111
Monitor Function 13-111
Connection from OPC UA Client 13-111

Flow from Setup to Connection 13-112

OPC UA Server Function Specifications 13-113

Supporting versions of the VS Camera and VS Creator 13-113
OPC UA Server Function Specifications 13-113
Overview of OPC UA Server Function 13-114
Operation Verified Client List 13-114
OPC UA Client Operation Restrictions 13-114

OPC UA Server Settings 13-116

Enabling OPC UA Server Function and Various Settings 13-116
IP Address Setting of the VS Camera 13-116

OPC UA Server Security Function 13-117

Application Authentication 13-117
Security Policies 13-117
Examples of Application Authentication 13-117
Certificate Types 13-119
Certificate Management 13-119
User Authentication 13-124

Connection from OPC UA Client 13-125

Preparing Certificates 13-125
Registering Server Certificates 13-125
Providing Client Certificates 13-125
Access to Endpoint URL 13-125
Reading and Writing/Controlling Nodes 13-125
Checking/Reading and Writing Nodes 13-126
Controlling Nodes 13-127
Node Operation Permissions 13-128

Control via Commands 13-129

Overview of Control via Commands 13-130

Notes on Command Input and Output 13-130
Command execution time 13-130
Operation mode 13-130
Command execution during mode transition 13-130
Reset/Switching of program settings 13-130
In the event of an error in command acceptance 13-130
Restrictions on parameters 13-131

Format of numbers output from read-type commands (Non-procedural communication) 13-131
Handling of strings (Non-procedural communication) 13-132

Command 13-133

Command List (Available Operation vs. Situation) 13-133
100 : TRG : Issue Trigger 13-135
101 : TD : Disable Trigger Input 13-135
102 : TSR : Read Trigger Input Enable/Disable Status 13-137
103 : RS : Reset 13-137
104 : RB : Reboot 13-138
105 : RUN : Switch to Run Mode 13-139
106 : SET : Switch to Setup Mode 13-140
107 : MOR : Read Run/Setup Mode 13-141
108 : OD : Disable Output 13-142
109 : PL : Change Program Setting (Specify No.) 13-143
110 : PR : Read Program Setting 13-144
111 : PS : Save Program Setting 13-145
112 : MS : Change Model Image (Specify No.) 13-146
113 : MR : Read Model Image 13-147
114 : RPU : Update Position Adjustment Reference Value 13-148
115 : PDU : Update Pattern Information 13-150
116 : EC : Echo 13-151
117 : ERC : Clear Error 13-152
118 : TW : Write Date & Time 13-153
119 : TR : Read Date & Time 13-154
120 : ICC : Clear Image Capture Buffer 13-154
121 : HMR : Read Hardware Model 13-155
122 : FVR : Firmware Version Read 13-156
123 : SEI : Issue Soft Event 13-157
124 : CWN : Write Cell Number 13-158
125 : CWS : Write Cell Text 13-159
126 : TT : Execute Tool Test 13-160
127 : JSU: Update Registered String 13-163
128: CRU: Update Collation Pattern 13-164
129: MG: Register Model Image (Specify No.) 13-165
130: CWB: Write Logical Value to Cell 13-167
131: RBMW: Set Robot Tool Mode 13-167
132: RBCD: Execute Robot Calibration Detection 13-169
133: RBCP: Read Robot Calibration Coordinates 13-169
134: RBCE: Execute Robot Calibration 13-171
135: RBMR: Read Robot Tool Mode 13-172
136: RBCSR: Read Robot Calibration Status 13-173

137: RBCPW: Update Robot Capture Position 13-174
138: RBRPW: Update Robot Coordinates 13-175
139: TBC: Clear Tool Buffer 13-176
140: CCV: Copy Cell Value 13-177
141: DRC: Reconnect Device 13-178
142: RSOD: Initialize Output Data 13-179
143: CEV: Export Cell Values 13-180
144: CIV: Import Cell Values 13-181

Port Used for Communication 13-183

Chapter 14 Display Expansion Monitor/Unit 14-1

Overview of Functions 14-2

Monitor type (12-inch Display Panel CG-MP120T) 14-2
Unit type (Display Unit CG-MU100) 14-2

Flow of Setting 14-3

[Initial Setting Screen] dialog box 14-4

Display Expansion Unit Settings 14-6

[Display Expansion Unit Settings] dialog box 14-6

Device Settings 14-7

Mouse 14-7
Keyboard 14-7
Monitor 14-7
Touch Panel (CG-MU100) 14-8
USB Storage 14-8

System Settings 14-9

System Information 14-9
Network 14-9
Language 14-10
Date and Time Settings 14-10
Date/Time 14-10
Internet Time Settings 14-11
Startup Screen 14-11
Setting Export/Import 14-11
Export 14-12
Import 14-12
Update 14-12

Displaying the Custom Screen Viewer 14-13

Screen Details 14-13

Menu Bar 14-14
File 14-14
Layout 14-14
Utilities 14-16
System 14-16
Display Configuration Settings 14-16
Restrictions on the Display Expansion Monitor/Unit 14-18
Items Common to the [Connect to Device] and Main Screens 14-18
Window Operations 14-18
Software Keyboard 14-18
Display Expansion Unit Settings 14-18
Language Setting 14-18
Simulator 14-18
Manual 14-18
User Support Website 14-19
Main Screen 14-19
Operations by the Touch Panel 14-19
AI Inspection Tool 14-19
Industrial Ethernet Settings 14-19
Print Calibration Pattern 14-19
Vision Dashboard 14-19
Custom Screen 14-20
File Save Destination 14-20
Displaying the Camera Image on Multiple Screens 14-20
Limit on the Number of Camera Pixels 14-20
Error 14-21

Chapter 15 Appendix 15-1

Main Specifications 15-2

Camera Units (VS-S___MX/CX, VS-L___MX/CX, VS-C___MX/CX) 15-3
Display Unit (CG-MU100) 15-7
12-inch Display Panel (CG-MP120T) 15-8
IP67 Lighting Controller (CG-LC100) 15-9
PoE Switching Hub (CG-SW100) 15-10
Lighting Conversion Unit (directly connected to camera) (CG-LC10, CG-LC20) 15-11

How to Read the Settings Parameters/Results Data List 15-12

Composition of the list 15-12
Notations 15-14

Settings Parameters and Results Data that Possess Arrays 15-15
Absolute Measured Values of Results Data 15-15

Settings Parameters List..... 15-16

Common to Tools 15-17
Region 15-23
Color Extraction 15-28
MultiSpectrum Color Extraction 15-29
Image Enhance 15-30
Capture 15-37
Calibration 15-59
Scaling 15-61
Area 15-62
Intensity 15-64
Color Detection 15-66
Pattern Search 15-74
ShapeTrax3A 15-80
Edge Position 15-97
Edge Width 15-101
Edge Pitch 15-105
Edge Pairs 15-109
Profile Position 15-116
Profile Width 15-125
Profile Defect 15-134
Defect 15-146
Blob 15-152
Grayscale Blob 15-160
OCR2 15-171
1D Code Reader 15-189

2D Code Reader 15-200
AI Classification 15-215
AI Detection 15-217
AI Segmentation 15-219
AI OCR 15-221
Points Distance 15-226
Point/Line Distance 15-229
Lines Distance 15-232
Point/Circle Distance 15-235
Line/Circle Distance 15-238
Circles Distance 15-241
Line Detection 15-244
Line Passing Two Points 15-251
Bisection of Two Lines 15-254
Angle Formed by Two Lines 15-256
Circle Detection 15-258
Line/V-Line Intersection 15-265
Two Lines Intersection 15-268
Center of Quadrangle 15-270
Midpoint of Points 15-272
Shared Region 15-274
Image Region (Current Image) 15-275
Image Region (Model Image) 15-276
Shared Pattern (ShapeTrax3A) 15-277
Shared Image Enhance 15-280
Subtraction Filter 15-281
Image Position Adjustment 15-283
Calibration (Robot) 15-284

Pick/Place 15-285
Grip Shift Correction 15-293
Robot Coordinate Transformation 15-300
Data Input (Industrial Ethernet) 15-304
Data Input (Non-Procedural) 15-305
Data Output (Industrial Ethernet) 15-306
Data Output (Non-Procedural) 15-308
Data Output (FTP/Storage) 15-310
Data Output (Terminal) 15-312
Image Output (FTP/Storage) 15-313
Image Output with Graphics (FTP/Storage) 15-314
Graphics Display 15-315
Statistics 15-333
Yield Rate 15-334
Data History 15-335
Change Program Setting (PL) 15-336
Save Settings (PS) 15-337
Issue Soft Event (SEI) 15-338
Clear Error (ERC) 15-339
Clear Tool Buffer (TBC) 15-340
Reset (RS) 15-341
Initialize Output Data (RSOD) 15-342
Disable Output (OD) 15-343
Disable Trigger Input (TD) 15-344
Register Model Image (MG) 15-345
Change Model Image (MS) 15-346
Update Pattern Information (PDU) 15-347
Update Position Adjustment Reference Value (RPU) 15-348

Update Registered String (JSU) 15-349
Update Collation Pattern (CRU) 15-350
Copy Cell Value (CCV) 15-351
Export Cell Values (CEV) 15-352
Import Cell Values (CIV) 15-353
Common to Program Setting 15-354

Results Data List 15-356

Tasks 15-357
System Property 15-358
Common to Tools 15-359
Inspection Region (Common to Tools) 15-360
Capture 15-362
Calibration 15-363
Scaling 15-364
Area 15-365
Intensity 15-366
Color Detection 15-367
Pattern Search 15-372
ShapeTrax3A 15-373
Edge Position 15-375
Edge Width 15-376
Edge Pitch 15-377
Edge Pairs 15-378
Profile Position 15-380
Profile Width 15-384
Profile Defect 15-386
Defect 15-390
Blob 15-395

Grayscale Blob 15-406
OCR2 15-416
1D Code Reader 15-419
2D Code Reader 15-421
AI Classification 15-427
AI Detection 15-428
AI Segmentation 15-429
AI OCR 15-430
Points Distance 15-432
Point/Line Distance 15-433
Lines Distance 15-434
Point/Circle Distance 15-435
Line/Circle Distance 15-436
Circles Distance 15-437
Line Detection 15-438
Line Passing Two Points 15-441
Bisection of Two Lines 15-442
Angle Formed by Two Lines 15-443
Circle Detection 15-444
Line/V-Line Intersection 15-447
Two Lines Intersection 15-448
Center of Quadrangle 15-449
Midpoint of Points 15-451
Image Position Adjustment 15-452
Calibration (Robot) 15-453
Pick/Place 15-454
Grip Shift Correction 15-459
Robot Coordinate Transformation 15-464

Data Input (Industrial Ethernet) 15-465
Data Input (Non-Procedural) 15-466
Image Output (FTP/Storage) 15-467
Statistics 15-468
Yield Rate 15-469
Data History 15-470
Command Tool Common 15-471
Error Code List 15-472
System Error 15-473
Camera 15-473
Light 15-475
System File 15-477
Tasks 15-479
Internal Storage 15-479
SD Card 15-480
Command 15-482
Terminal 15-482
FTP 15-483
EtherNet/IP 15-485
PROFINET 15-487
PLC-Link 15-487
Hardware 15-487
OPC UA 15-488
Other 15-489
Setting Error 15-490
Common to Tools 15-490
Capture 15-492
Scaling 15-494
Calibration 15-494
Color Detection 15-494
Pattern Search 15-494
ShapeTrax3A 15-495
Defect 15-495
OCR2 15-495
1D Code Reader 15-496
2D Code Reader 15-496
Common to AI Inspection Tools 15-496

Subtraction Filter 15-497
Image Position Adjustment 15-497
Data Input (Industrial Ethernet) 15-497
Data Output (Industrial Ethernet) 15-498
OPC UA 15-498
Archive Condition 15-498
Statistics 15-498
Yield Rate 15-498
Data History 15-499
Simulator 15-499
Image Region (Model Image) 15-499
AI Classification 15-499
AI Detection 15-500
AI Segmentation 15-500
AI OCR 15-500
Custom Screen 15-501
Shared Pattern (ShapeTrax3A) 15-501
Robot Coordinate Transformation 15-501
Calibration (Robot) 15-502
Pick/Place 15-502
Grip Shift Correction 15-503
Program Setting 15-503
Other 15-503

Setting Failures 15-504

Common 15-504
Task 15-506
Subtask 15-506
Data List 15-506
Capture 15-507
OCR2 15-507
1D Code Reader 15-508
2D Code Reader 15-508
Common to AI Inspection Tools 15-509
AI Classification 15-514
AI Detection 15-515
AI Segmentation 15-516
AI OCR 15-517
Image Position Adjustment 15-517
Image Output (FTP/Storage) 15-517
File Operation 15-518
Manage Files 15-518

Light Registration 15-518
Terminal I/O Settings 15-518
Date and Time Settings 15-518
Layout 15-519
[Connect to Device] Screen 15-519
Add Simulator 15-519
Version 15-520
Custom Screen 15-520
Robot Calibration 15-520
Image Output with Graphics (FTP/Storage) 15-521
Eraser Tool 15-521
PC Operating Environment 15-521
Other 15-521
Execution Error 15-522
Common to Tools 15-522
Capture 15-524
Scaling 15-524
Color Detection 15-524
ShapeTrax3A 15-525
Edge Position 15-525
Edge Width 15-525
Edge Pitch 15-525
Edge Pairs 15-526
Profile Position 15-526
Profile Width 15-526
Profile Defect 15-526
Defect 15-527
Blob 15-527
Grayscale Blob 15-527
OCR2 15-528
1D Code Reader 15-528
2D Code Reader 15-529
Common to AI Inspection Tools 15-529
AI Detection 15-530
AI Segmentation 15-530
AI OCR 15-530
Measurements & Dimensions 15-531
Data Output 15-531
Image Output 15-531
Data Input 15-531
Vision-Guided Robotics 15-532

Technical Description 15-533

What is the HSB color system? 15-534

What is an Edge? 15-535

Restoring Factory Default Settings 15-537

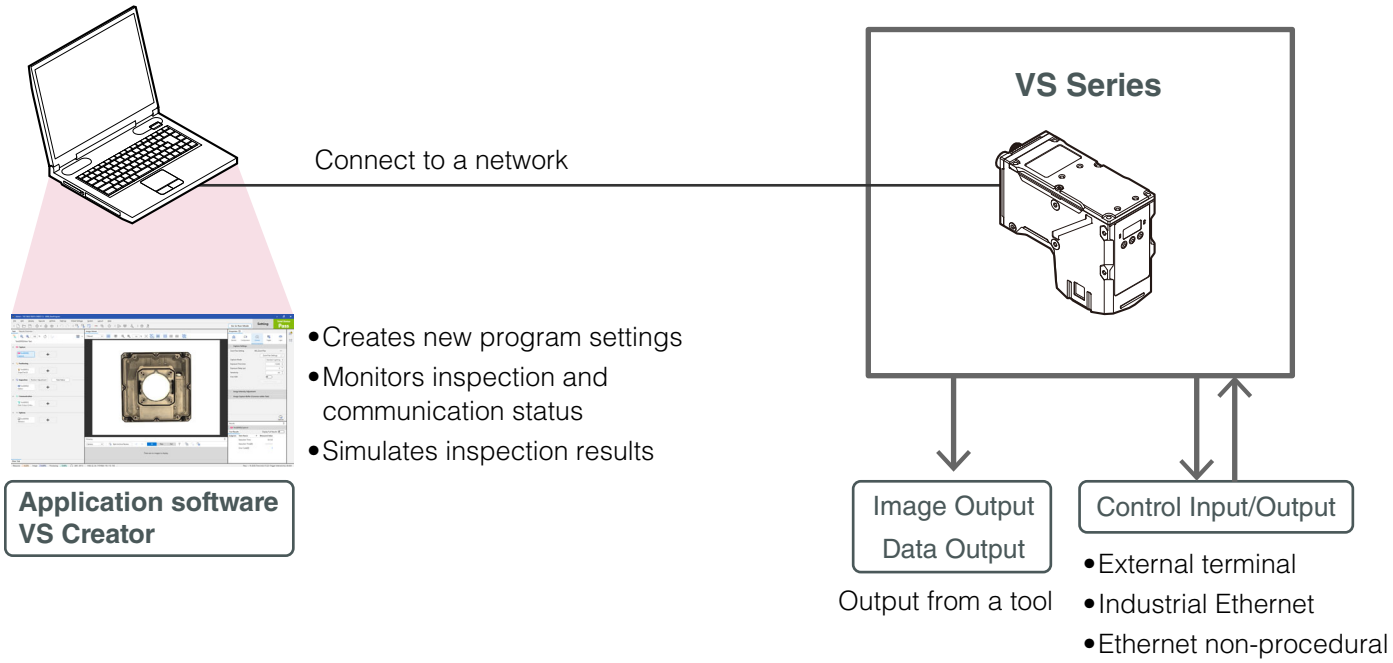
VS Camera 15-537

Chapter 1 Getting Started

This section provides an overview of the VS Series Vision System with Built-in AI and the inspection process using the VS Creator.

Overview of the VS Series Vision System with Built-in AI

#A001



VS Series (VS Camera)

VS cameras are cameras with a built-in execution environment. Highly complex inspections can be achieved in a compact configuration with cameras installed on a network without the need for a controller to perform the image processing. The unit supports the PoE power supply, so it can be used without the need for a separate power supply.

VS Creator

The VS Creator is integrated management software especially created for the VS Series. The program creation function for all processes and various utilities that the VS Series possesses provide total support from the development and debugging of new programs to the verification of operation post on-site installation through simulations.

Flow of VS Creator Operations

#A002

The standard flow of inspection and measurement using the unit is as follows.

Prepare the equipment (Setup Manual)

- Install VS cameras used for measurement and connect them to the network.
- Install the lens and lighting that is suitable for the object.
- Install the VS Creator used for Configuration and operation.

▼

Connect to the camera to be set up

Connect the camera that will be set up using the VS Creator.
→[Connect to Device] Screen
→Main Screen

▼

Configure the measurement conditions and operating environment in Setup Mode

- Configure capture conditions, such as the shutter speed in accordance with the object.
  →[Capture]Tool
- Add tools to [Task] View to create tasks (groups of processes that perform capture, measurement, etc.) in accordance with the purpose of the inspection.
  →[Task] View
- For each added tool, set the detection conditions, judgment conditions, and output settings.
  →[Inspection] Tool
  →[Measurements & Dimensions] Tool
  →[Region] Tool
  →[Image Conversion] Tool
  →[Communication] Tool
  →[Display] Tool
  →[Data Analysis] Tool
  →[Control] Tool
  →[AI Inspection] Tool
- Configure settings related to the overall operation of the unit that are common to all programs, such as communication control settings and account settings.
  →[Global Settings]Menu

▼

Perform a trial run

- Perform measurements in Run Mode, and check that the desired judgment can be made correctly under the set measurement conditions.
- Utilities, such as a monitor to check the communication status and a function to check the installation status of the camera, as well as archive review or simulations in the [Filmstrip] view using past measurement results and images prepared for verification, are used to optimize the settings.
  →[Utilities] Menu
  →[Filmstrip] View

▼

Officially start operation

- Switch to Run Mode and officially start the inspection.

Chapter 2 Preparing the System

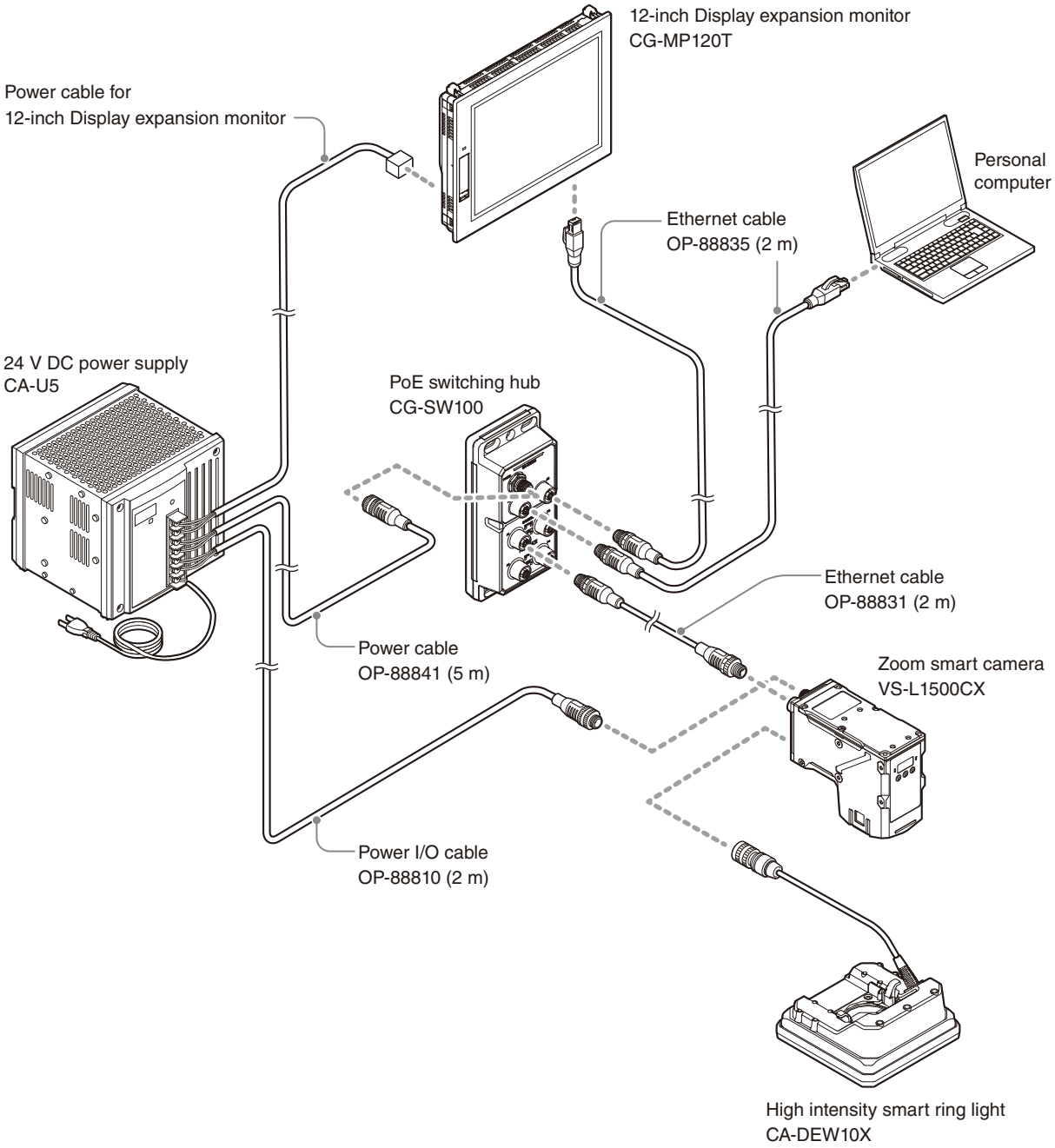
This section explains the basic system configuration of the VS Series and preparation for using the VS Creator.

Examples of System Configuration

#B001

The device can be used for various use cases by combining a light and other various optional items (separately sold) with the smart camera. Shown below are typical and basic system configurations that use a standard zoom smart camera.

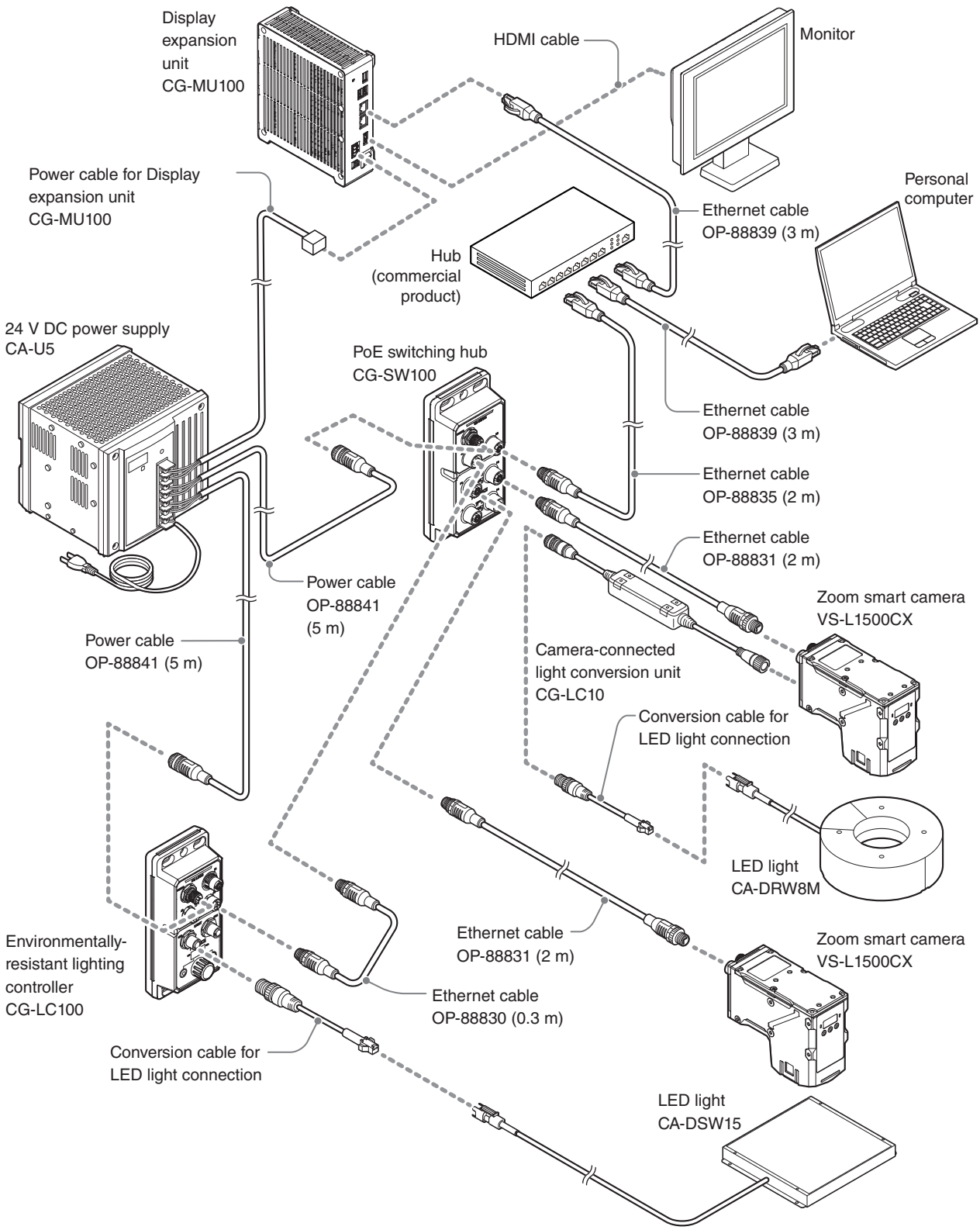
Example of Basic System Connecting One Camera



- This example uses a high intensity smart ring light.
- The 12-inch Display expansion monitor is optional. It will be used when the image processing screen needs to be displayed externally in addition to the computer display.
- The VS camera can be powered via PoE. When PoE is used, the 24-V power supply is not required for the VS camera.

Reference For the installation and specifications of individual devices, see the setup manual of the VS Series.

Example of Basic System Connecting Two Cameras



- In this system configuration, there are two cameras: a camera that uses the Camera-Connected Light Conversion Unit and a camera that uses a environmentally-resistant lighting controller.

- The Display expansion unit is optional. It will be used when the image processing screen needs to be displayed externally. Use an HDMI cable to connect a commercially available monitor.
- The conversion cable for connecting an LED light is an accessory that comes with the environmentally-resistant lighting controller (CG-LC100) and the Camera-connected Light Conversion Unit (CG-LC10).

Reference For the installation and specifications of individual devices, see the setup manual of the VS Series.

Downloading and Installing the VS Creator

#B002

The latest version of the VS Creator is available in the user support website. By downloading it from the user support website and installing it on your computer, you can connect the computer directly to a VS camera.

Downloading the Installer

Download the latest version of the installer from the user support website.

User support website
www.keyence.com/vs-support

Point
You need to register yourself and log in to the user support website to download the installer.

Installing the VS Creator

Install the VS Creator to your computer using the downloaded installer.

System operating environment

Supported OS

- Microsoft Windows 11 Home/Pro/Enterprise
- Microsoft Windows 10 Home/Pro/Enterprise

Point
- The VS Creator cannot be used in OSs other than the ones listed above.
- In the case of the LTSC/LTSB version, the ones that are supported are the 2016 LTSB and later. The VS Series cannot be used with the 2015 LTSB.
- The operation is not guaranteed with the IoT version as the specifications cannot be set in a single uniform manner due to the customization that is used. Please use the VS Series after having first verified its operation in the environment in which it will be used.

Runtime environment

- CPU: Intel® Core™i5 or higher
- RAM: 16 GB or more
- System Storage:
  8 GB or more of free space is required for software installation
  A separate amount of free space is required for saving images
  A separate amount of free space is required for AI training/testing [*1]

Point

*1 Please take note of the following points when running AI training/testing:

- It is recommended that you use an SSD as system storage.
- In addition to the space for saving the dataset images, a separate temporary free space in the system storage is required. If the necessary free space is not available, training/testing may fail.
  AI Segmentation: 100 GB or more
  AI Detection and AI Classification: 20 GB or more
- When there are more than 100 training images or when the AI dataset size exceeds 10 GB, the necessary temporary free space may greatly exceed the above mentioned amount.

- Monitor: 1280 × 1024 pixels or more

Installation steps

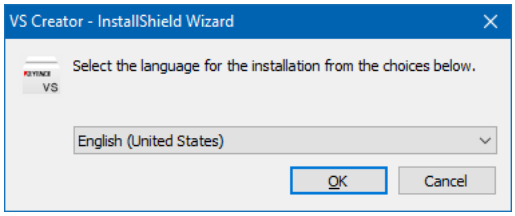
Point

- If your computer does not have a runtime component that is necessary for running this software, the installation screen for the component is displayed. Install all such components.
- Perform the installation with the administrator privileges.
- You can install different versions of the VS Creator together in your computer.

1 Double-click the downloaded file.

The installer starts, and when self-decompression finishes, a language selection screen appears.

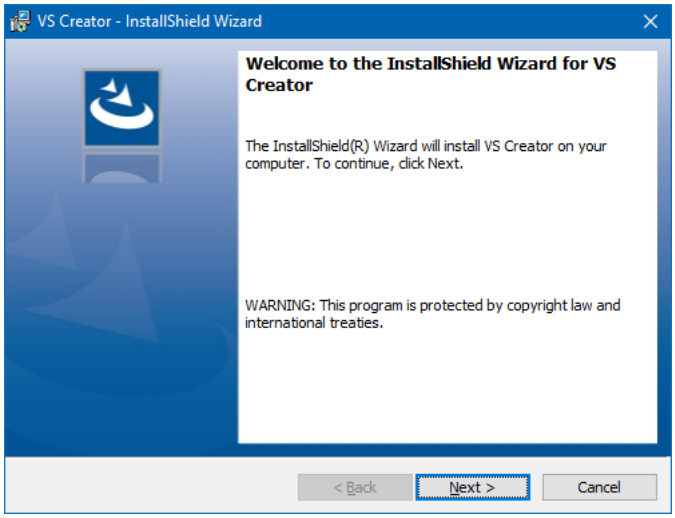
2 Select a language for the VS Creator to install, and click the [OK] button.



Reference If the installation screen of Microsoft Visual C++ Redistributable Package appears, click the [Install] button.

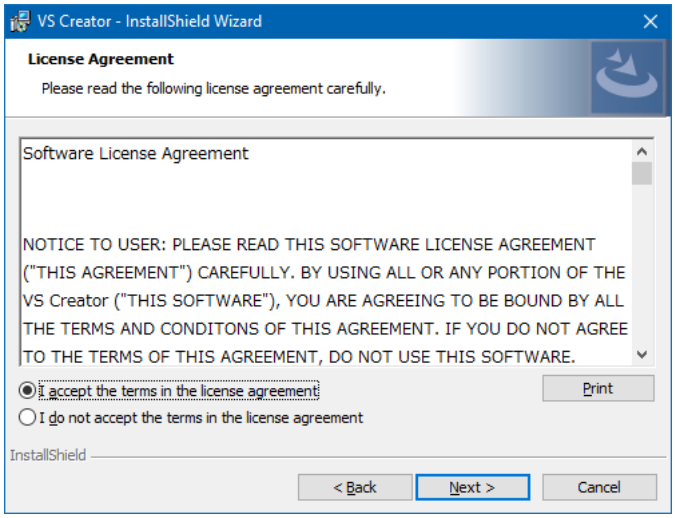
The [Welcome] screen of the installation wizard appears.

3 Click the [Next] button.



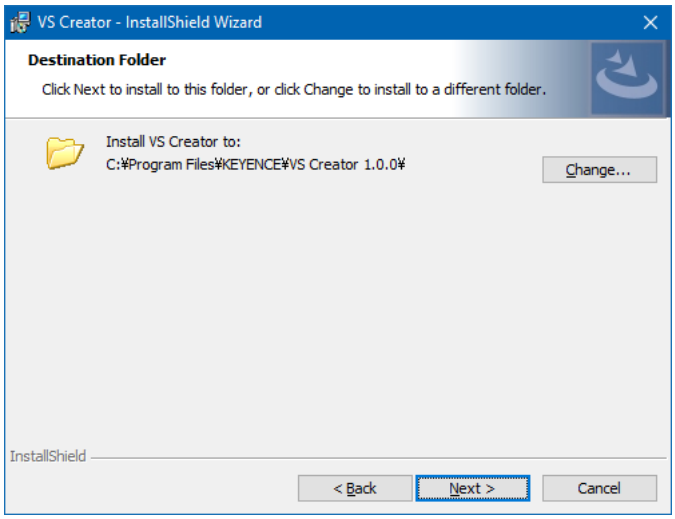
The [License Agreement] screen appears.

4 Select [I accept the terms in the license agreement], and click the [Next] button.

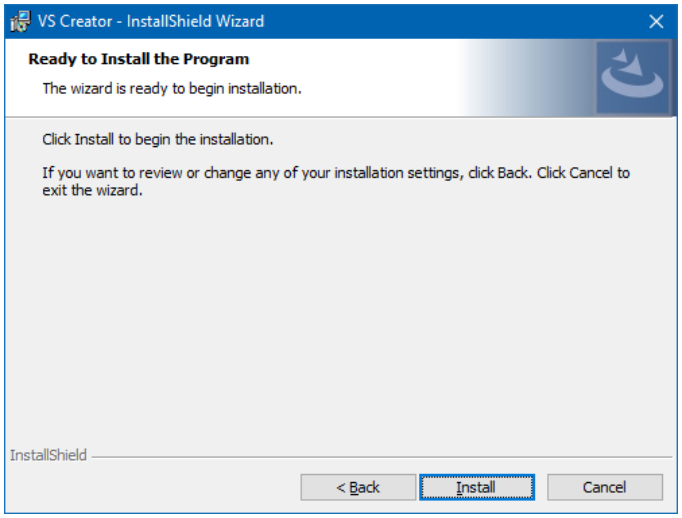


The [Destination Folder] screen appears.

5 Click the [Next] button.

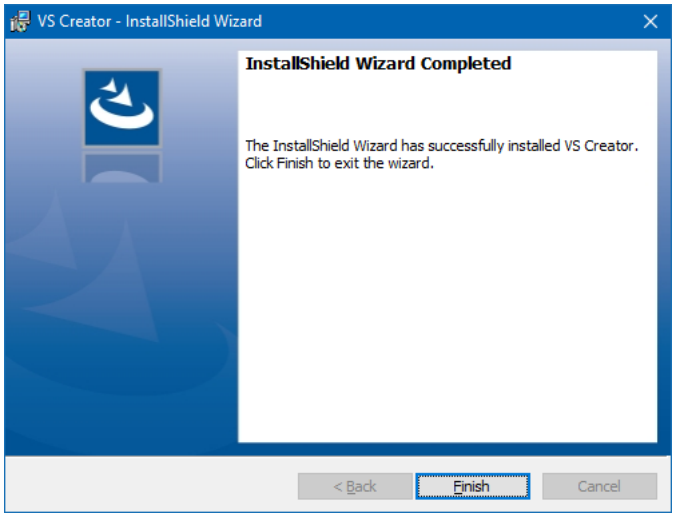


6 Click the [Install] button.



The installation of the VS Creator starts.
When installation finishes, the [Installation Completion] screen appears.

7 Click the [Finish] button.



Point Clicking the [Done] button displays a message to prompt a restart. Follow the on-screen message to restart the computer.

The VS Creator has now been installed.

- A shortcut of [VS Creator *.*.*] is added on your desktop.
- In the Windows Start menu, [KEYENCE VS Creator *.*.*] - [VS Creator *.*.*] is added.

Activation steps

To connect to a simulator when the Device List in the [Connect to Device] screen does not show VS cameras, you need to activate the VS Creator using an activation code. Activate the VS Creator in the following steps:

1 Start the VS Creator.
The [Connect to Device] screen appears.

2 Add a simulator.

For details of adding a simulator, see "[Connect to Device] Screen" - "Adding/Editing a Simulator" - "Adding a Simulator".

3 Select a simulator, and then click the [Connect] button.

The [Enter Activation Code] dialog appears. Your user ID is displayed, which is necessary for issuing the activation code.

Point The user ID is different for each computer. Use the user ID of the computer that you actually use when requesting the issuance of an activation code.

Reference Clicking the [Copy] button copies the displayed user ID to the clipboard. You can paste it in the entry field to request activation code issuance.

4 Access the activation page of the user support website.

VS series user support activation website:
www.keyence.com/vs-activation

5 Enter the user ID displayed in step 3 to request the issuance of an activation code.

Keyence sends the activation code to the registered email address.

6 Enter the activation code in the [Enter Activation Code] dialog.

Point The activation code is effective only for the user ID used when requesting the issuance of the activation code.

Reference We recommend that you enter the activation code by copying it from the received email text and pasting it in the entry field to prevent a typographical error.

Performing AI Activation

AI Activation is required to use some of the functions included in the AI Inspection tools.
→ "Performing AI Activation"

Uninstalling the VS Creator

Uninstall the VS Creator from Windows Start menu.

Reference The steps shown below are based on Windows 11.

1 Click the [Windows] menu, and select the [VS Creator] from the application list.

2 Right-click the version to be uninstalled, and then click the [Uninstall] button.

A confirmation message appears.

3 Click the [Yes] button.

The VS Creator is deleted.

Powering the System On and Starting the Software

#B003

This section explains the steps for starting and closing the VS Creator.

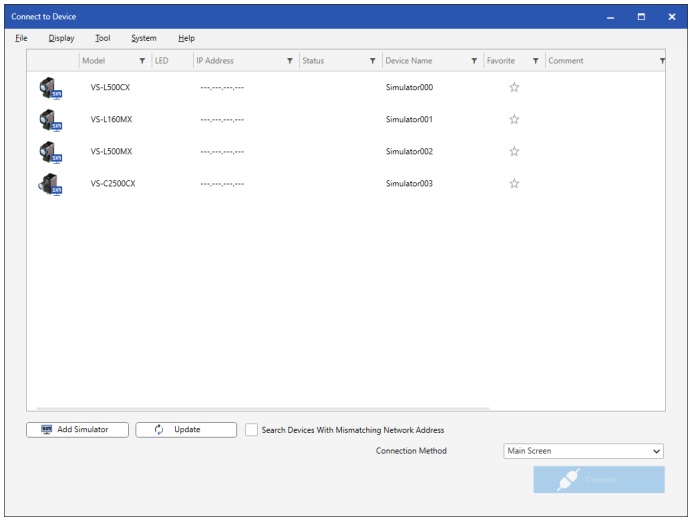
Powering the System On and Starting the VS Creator

1 Check that the cabling is correctly connected before powering the system on.

2 Double-click the shortcut icon of [VS Creator *.*.*] on the desktop.

Reference You can also start it by selecting [KEYENCE VS Creator *.*.*] - [VS Creator *.*.*] from the Start menu.

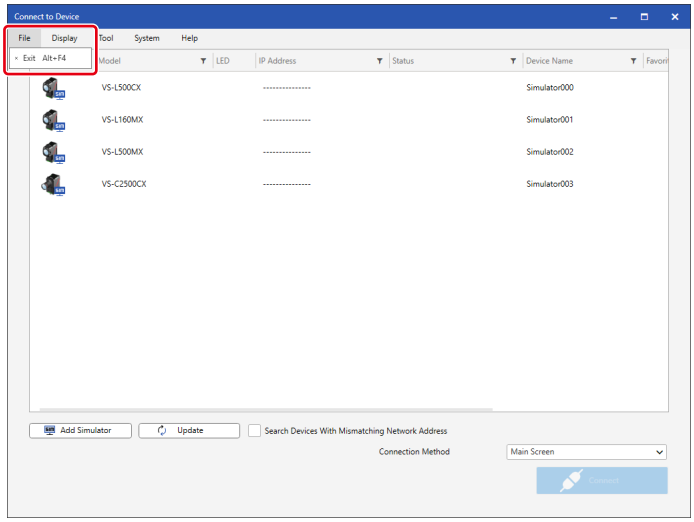
The VS Creator starts, and the [Connect to Device] screen appears.
After successful connection, VS cameras discovered from the network are listed on the screen.



Reference To make connection prioritizing IP addresses of VS cameras, change the IP address of the computer beforehand. If VS cameras are not listed on the screen, check the cabling and then click [Update] to make discovery again, or select the [Search Devices With Mismatching Network Address] check box before making discovery. (See [Connect to Device] Screen.)

Closing the VS Creator

1 Click [Exit] in the [File] menu in the [Connect to Device] screen.


Connect to Device
File
Display
Tool
System
Help
Exit Alt+F4
Model
LED
IP Address
Status
Device Name
VS-L500CX
VS-L160MX
VS-L500MX
VS-C2500CX
Simulator000
Simulator001
Simulator002
Simulator003
Add Simulator
Update
Search Devices With Mismatching Network Address
Connection Method
Main Screen
Connect

Chapter 3 [Connect to Device] Screen

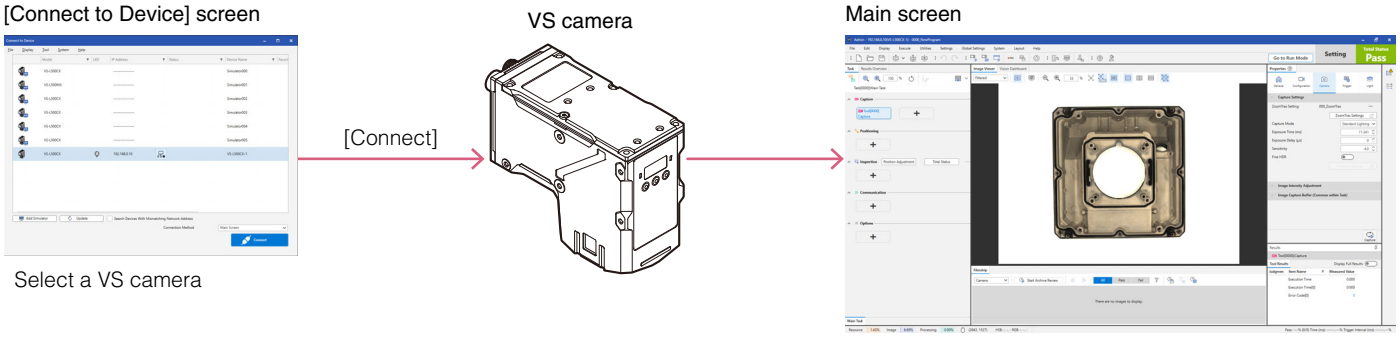
Function overview

#C001

This dialog is the first screen displayed after starting the VS Creator. When the VS Creator is started, devices on the network are searched and discovered devices are listed on the screen. The VS Creator maintains program settings for different VS cameras individually. This screen is used for managing VS cameras for which program settings are applicable.
The [Connect to Device] screen has the following two major functions.

Connecting the VS Creator to a Device

The VS Creator is connected to a device (VS camera or simulator in the computer) to edit program settings. Select a device on the network, connect it with the VS Creator, and display the main screen for editing the program setting.
→ "Connecting to Device"

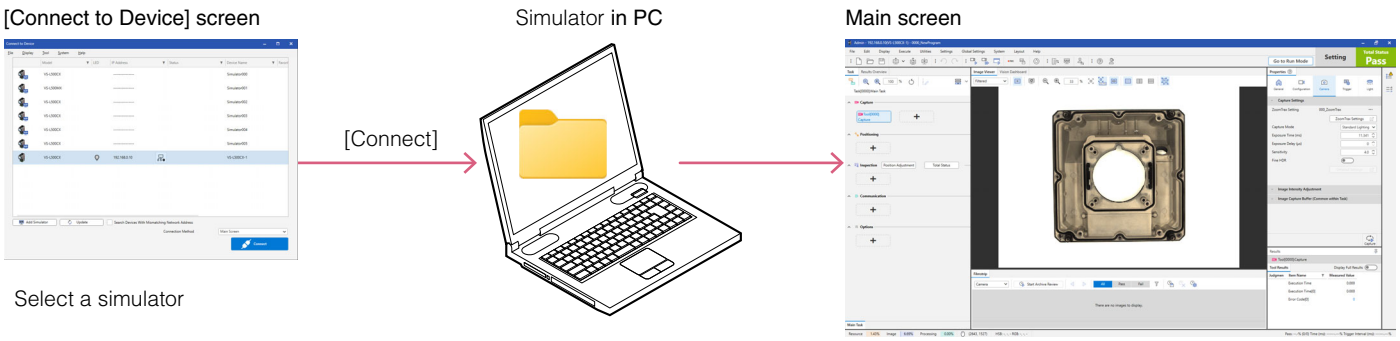


Adding/Editing a Simulator

A simulator is a workspace for simulating a program setting of a device (VS camera) to be connected. You can simulate a program setting without connection to a device by creating a simulator by copying the setting of a device on the network.
In the [Connect to Device] screen, you can add a new simulator or edit a simulator that you added.

Reference Other than by copying the information of an existing device, a simulator can also be added by setting and adding device information manually or by dragging and dropping from the Windows Explorer a file (*.zip) previously exported by the [Export Settings] function.

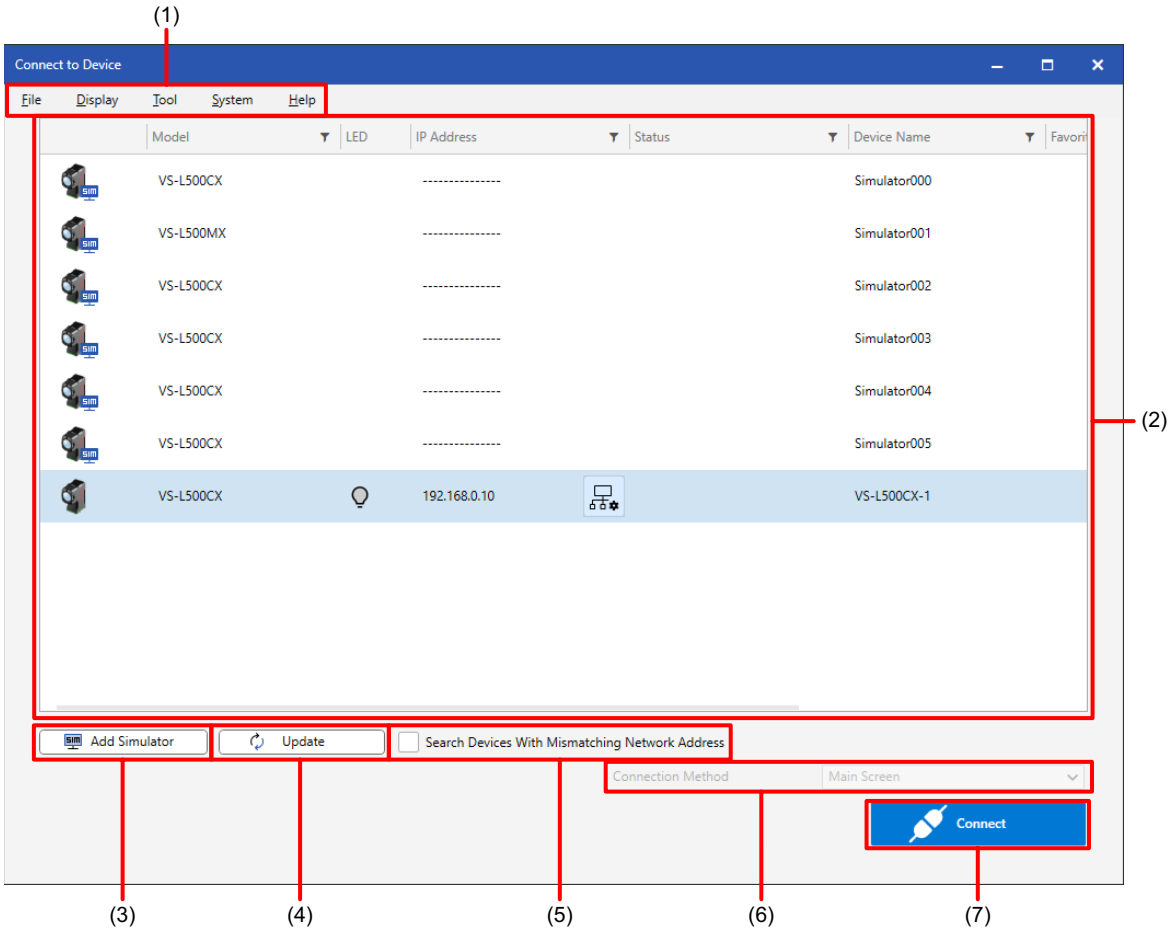
→ "Adding/Editing a Simulator"



Screen Details

#C002

This section explains the details of the [Connect to Device] screen.



Point If multiple IP addresses are set to a single network adapter, only the IP address whose priority is set to first can be detected. If the device you want to connect to is set to second or lower priority, change the settings for the network adapter.

(1) Menu bar

The menu bar lists operations on the [Connect to Device] screen.
→ [Menu bar]

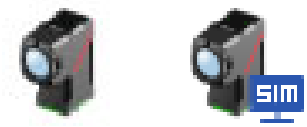
(2) Device List

The device list shows VS cameras on the network and simulators in the computer.

Reference
- Clicking a list item of the device list reorders the list in the ascending or descending order alternately.
- The icons on the titles of the device list are filters. You can enter a text to filter the list to display only those that include the text. Clicking [Status] or [Favorite] displays check boxes, and you can filter the list by selecting a check box item.
- Right-clicking a list item or a list row in the device list displays a context menu.
  → [Context Menu]

Device types

Device types are indicated by icons.



VS Camera Simulator

The mark displayed at the upper right of the icon indicates the device status (Status).

- (No mark): Connection possible
- : Connected
- : Network address mismatch or redundant IP address
- : Unfound device

Model

The model of the device (VS camera) is displayed.

LED

Clicking flickers the status LED of the device for 10 seconds. If you click again when the LED is flickering, the LED flickers another 10 seconds from the time of clicking.

Point The [LED] icon is not displayed for a simulator.

IP Address

IP addresses configured for devices are displayed.
For a simulator, [----------] is displayed. However, for a simulator created by importing the information of a device, the IP address of the source device is displayed.
For a device added by [Add Device with Specified IP Address], the specified IP address is displayed.

Point Selecting a device in the list displays the icon. You can edit the Network Settings of the selected device by clicking the icon. However, for a device added by [Add Device with Specified IP Address], only the IP address can be edited before it is connected. Once connected, setting items other than the IP address can also be edited.

Status

The statuses of devices are displayed in this column.

- **(Empty)**: Device that can be connected to the VS Creator.
- **Connected**: Device connected to the VS Creator and currently being configured. Simultaneous connection is possible. However, operation may be restricted even for a user with the setting change permission, depending on whether the status is Run Mode or Setup Mode or when a different user is currently editing the setting.
  → Change Mode, Account Settings
- **Network address mismatch**: Device with a network address that is different from the network address registered in the computer. The device is not discovered by the search performed when the [Connect to Device] screen is started, but is discovered by the search performed when [Search Devices With Mismatching Network Address] is enabled.

- **IP address is redundant**: Device with an IP address that is the same as another device on the list. The device can be connected but it may not operate properly.
- **Device not found**: Device registered in [Favorite] but not discovered from the network, or a device that was disconnected after the list was displayed due to communication failure or other causes. Connection to the device is not possible.

Reference The status can also be distinguished by the mark on the icon of Device types.

Device Name

Names configured for devices are displayed.

Favorite

This column indicates whether the device is registered as [Favorite]. By registering a device in [Favorite], you can display the device in [Favorite] regardless of whether the device was discovered at the start of the editor.

- ★: Registered
- ☆: Not registered

Reference Simulators are always displayed regardless of their registration in [Favorite].

Comment

Notes on devices are displayed in this column. The maximum number of the characters of a note is 64. You can enter a note by clicking the Comment column.

MAC Address

MAC addresses configured for devices are displayed.
For a simulator, [----------] is displayed. However, for a simulator created by importing the information of a device, the MAC address of the source device is displayed.

Reference For a device added by [Add Device with Specified IP Address], [----------] is displayed until it is connected once. Once connected, the MAC address is retrieved from the device and displayed.

Serial No.

The serial numbers of devices are displayed in this column.
If device information is not retrieved, [--------] is displayed. However, for a simulator created by importing the information of a device, the serial number of the source device is displayed.

Reference For a device added by [Add Device with Specified IP Address], [----------] is displayed until it is connected once. Once connected, the serial number is retrieved from the device and displayed.

Firmware Version

Firmware versions of devices are displayed in this column.
If device information is not retrieved, [--------] is displayed.

Reference For a device added by [Add Device with Specified IP Address], [----------] is displayed until it is connected once. Once connected, the firmware version is retrieved from the device and displayed.

Add-in Information

The AI Activation status of devices and simulators is displayed.

- **Not Activated**: AI Activation is not applied. The functions of the AI Inspection tools that require AI Activation cannot be used.
- **Lifetime**: Lifetime AI Activation is applied. The functions of the AI Inspection tools that require AI Activation can be used for an indefinite period of time.
- **X day(s) remaining**: AI Activation is in trial period. The functions of the AI Inspection tools that require AI Activation can be used during the trial period.
- **Expired**: The AI Activation trial period has ended. The functions of the AI Inspection tools that require AI Activation cannot be used.
- **Activation Not Possible**: AI Activation cannot be performed because a 1.6M camera is used, the firmware version is not 1.4 or later, or other issues exist.
- **Time-limited**: Displayed when the time-limited AI Activation has been applied to a device added by specifying an IP address.

(3) Add Simulator

You can add a simulator by clicking this button.
Other than clicking this button in the [Connect to Device] screen, there are different ways of adding a simulator.
→ "Adding a Simulator"

Reference

- A simulator is a workspace in which you can edit a program setting without network connection. You can create, edit, and adjust settings without access to a real device (when the device is not available or you do not want to connect to it because the device is running) because you can add a simulator using an existing device setting.
- Other than by copying the information of an existing device, a simulator can also be added by setting the device information manually or by dragging and dropping from the Windows Explorer a file (*.zip) previously exported by the [Export Settings] function.

(4) Update

Clicking this button searches devices on the network again to update the device list.

(5) Search Devices With Mismatching Network Address

When this check box is selected, device search on the network is made more widely. Search is made also for those devices whose network addresses do not match the network addresses registered in the computer.
→ "Search Devices With Mismatching Network Address"

(6) Connection Method

Select a device connection method from the drop-down menu.

- Main Screen
- Custom Screen Viewer

Point For simulators, [Main Screen] is the only connection method option.

Reference The selected connection method applies to all devices. Different connection methods cannot be set for different devices.

(7) Connect

Click this to connect to the device selected in the device list and display the VS Creator main screen or custom screen viewer.
For details, see "Connecting to Device".

Menu bar

#C003

The menu bar lists operations on the [Connect to Device] screen. This section explains functions of the items in the menu and their operation.

File

Exit

Clicking this closes the [Connect to Device] screen.

Display

- Clicking the item check boxes displays and hides items in the device list alternately.
  The operation is the same as the context menu displayed when you right-click a list item.
  → [Context Menu]
- When you select [Initialize Layout], the displaying/hiding condition in the device list are returned to the initial condition.

Tool

Add Simulator

You can add a simulator by clicking this.
Other than the method of adding a simulator from the menu, there are different ways of adding a simulator.
→ "Adding a Simulator"

Reference A simulator is a workspace in which you can edit a program setting without network connection. You can create, edit, and adjust settings without access to a real device (when the device is not available or you do not want to connect to it because the device is running) because you can add a simulator using an existing device setting.

Add Device with Specified IP Address

Specify the IP address of a device to add the device to the device list.
→ "Add Device with Specified IP Address"

Direct Connection

You can connect the computer directly to the device to edit the program setting by the VS Creator.
→ "Connecting Computer and Device Directly"

Usage Scenarios

– Temporarily connect to debug program settings.
– Connect a new device and set the IP address before building the network.
etc.

Update

Devices on the network are searched again to update the device list. The operation is the same as of the [Connect to Device] screen.
→ "Update"

Update Peripheral Device

Specify an environmentally-resistant lighting controller (CG-LC100) or a display expansion monitor/unit (CG-MP120T/MU100) on the network to update the device firmware.
→ "Updating Peripheral Devices"

System

VS Creator Settings

You can edit the VS Creator settings.

Item	Description
Simulator Base Path	Specify the base path for saving the simulator setting (default: C:\Users\Public\Documents\KEYENCE\VS). Click [Select Folder] to set the save destination in the dialog box that appears. This setting is not possible in the following cases: • At least one simulator is running. • A dialog is open for file manipulation such as switching program settings and file transfer.
Firmware Folder	Displays the path to the folder where the firmware is saved. Click [Open Folder] to open the save location folder.
Device List Search Timeout (sec)	Specify the timeout period of device search in seconds (default: 2 seconds. Setting range: 2 to 60 seconds).
Connect-to-Device Timeout (sec)	Specify the timeout period for connecting to the device in seconds (default: 5 seconds. Setting range: 5 to 60 seconds).
Language	Select the VS Creator display language from one of the following languages: English/Spanish/Brazilian Portuguese/German/French/Italian/Czech/Hungarian/Polish/Japanese/Simplified Chinese/Traditional Chinese/Korean/Thai/Vietnamese/Indonesian The default setting is set according to the language selected at the time of installation.
Use Startup User	Configure [User Name] (default: Admin) and [Password] (default: vacant) of the startup user who connects to a device from the [Connect to Device] screen. If you configure [Startup User] by the user name and password configured as the account information of the device to be connected, the [Login] dialog is not displayed when you connect to the device, saving the trouble of entering [User Name] and [Password]. → Account Settings

Reference
- You need to close the [Connect to Device] screen and restart the VS Creator to reflect the content of [Language].
- [Language] is a setting item common among the [Connect to Device] screen and the main screen.
- [Connect-to-Device Timeout (sec)] applies to the time taken until VS Creator and the device are connected and the time taken until the connection is considered to be lost during an active connection.

Custom Screen Viewer Settings

Set the display configuration of the custom screen viewer.

→ "Display Configuration Settings"

Startup Screen Settings

Set the screen to be displayed when starting the VS Creator.

Startup Screen

Select the screen to be displayed when starting the VS Creator from the drop-down menu.

- **"Connect to Device" Screen** (default): Displays the [Connect to Device] screen.
- **Main Screen**: Connects to the VS camera set in [Target IP Address] and displays the main screen directly without going via the [Connect to Device] screen.
- **Custom Screen Viewer**: Displays the custom screen viewer without going via the [Connect to Device] screen.

Target IP Address

This option appears if you selected [Main Screen] on [Startup Screen]. Directly enter the IP address of the VS camera to connect to at startup.

Reference [Startup Screen Settings] is a setting item common among the [Connect to Device] screen and the main screen.

Help

User's Manual

The User's Manual (this manual) is displayed.

Setup Manual

The Setup Manual is displayed.

User Support Site

If the computer has access to the Internet, the user support website is displayed.

Export Settings (For Debugging)

Click this to display the [Export Settings (For Debugging)] dialog.
→ "Export Settings (For Debugging)"

Version Information

The user ID and the version information of the VS Creator are displayed. Clicking the [Libraries Used] button displays the information of the libraries that the VS Creator is using.

Context Menu

#C004

Right-clicking a list item or a list row in the Device List displays a context menu.
This section explains functions of the items in the context menu and their operation.

Context menu of list items

This context menu is displayed when you right-click a list item in the device list. You can display or hide the list item. It is displayed in the device list if you select the check box, and it is hidden if you clear the check box.

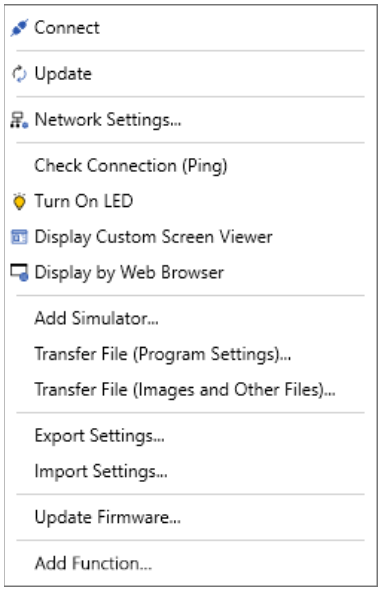
Point [Model], [LED], and [IP Address] are always displayed. You cannot hide these items.

Reference You can also display or hide a list item using [Display] on the menu bar.

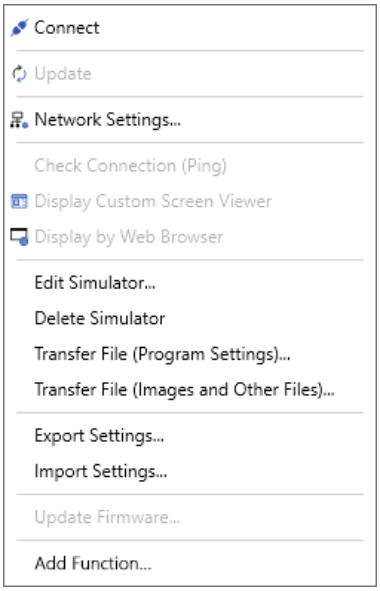
Context menu of list row

This context menu is displayed when you right-click a list row in the device list.

When a VS camera row is selected



When a Simulator row is selected



Connect

This item connects the VS Creator to the device selected in the device list, and displays the main screen of the editor.
For details, see "Connecting to Device".

Update

This item searches for the device selected in the device list again, and refreshes the content of the list row.

Network Settings

This item allows you to configure the network settings for the device selected in the device list.
→ "Configuring Device's Network Settings"

Check Connection (Ping)

This item sends a ping message to check the connection with the device selected in the device list.

Turn On LED

This item turns on the LED of the device selected in the device list. In such a case as there are multiple devices of the same model on the network, you can identify the target device for setting by turning the LED on.

Display Custom Screen Viewer

This item displays the custom screen viewer.
→ "Custom Screen"

Display by Web Browser

This item accesses the web content of the selected device.
→ "Display by Web Browser"

Add Simulator

This item adds a simulator for the device selected in the device list.
→ "Adding a Simulator"

Edit Simulator

This item edits the device configuration for the simulator selected in the device list.

Point You cannot edit the simulator that is currently connected.

→ "Editing a Simulator"

Delete Simulator

This item deletes the simulator selected in the device list.

Point You cannot delete the simulator that is currently connected.

Delete Device

This item deletes the device selected in the device list. A confirmation message is displayed. Click [OK] to delete the selected device.

Point You can only delete a device added by [Add Device with Specified IP Address] of the [Tool] menu. Also, you cannot delete it when it is connected.

Transfer File (Program Settings) / Transfer File (Images and Other Files)

These items transfer program settings, images, and other files from a device to the computer and from the computer to the device. You can use these items to transfer a program setting edited by the simulator to a device to overwrite, or to transfer an image saved in a device to the computer to use for a simulation.
→ Transfer File

Export Settings / Import Settings

These items export and import a set of setting data, which includes a program setting, an environment setting, a model image, and so forth. Use these items to reuse a working configuration for a different network.
→ Export Settings, Import Settings

Update Firmware

This item allows you to update the firmware for the device selected in the device list.
→ Updating Firmware

Add Function

This item applies AI Activation to the device currently selected in the device list.
→ "Performing AI Activation"

Connecting to Device

#C005

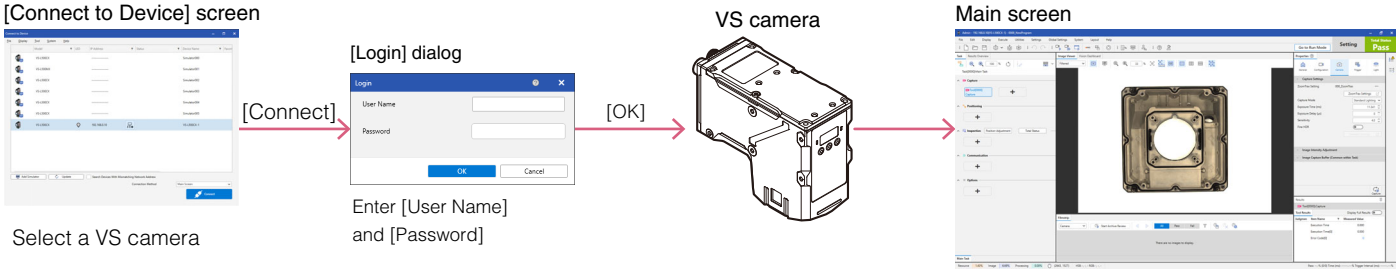
This section explains how to connect to the device selected in the device list and display the main screen.

→ "Procedure for Connection"
→ "Steps for Connection"

Reference This section describes the case where the Connection Method is set to [Main Screen]. If the Connection Method is set to [Custom Screen Viewer], the custom screen viewer will be displayed after connection or logging in.

Procedure for Connection

This section explains the procedure to establish a connection.



Steps for Connection

1 Select a VS camera from the device list.

Reference If the target device is not included in the device list, try the following:

- Search Devices With Mismatching Network Address
- Connecting Computer and Device Directly
- Add Device with Specified IP Address

2 Click [Connect].

The [Login] dialog appears.

Point
- If you have set [Startup User] by the user name and password configured as the account information of the device to be connected, the [Login] dialog is not displayed, saving the trouble of entering [User Name] and [Password]. After you click the [Connect] button, you are automatically logged into the device and the main screen is displayed.
- When using a version 1.6 or later VS Creator, it is not possible to connect to a version 1.5 or earlier VS camera.

3 Enter [User Name] and [Password], and click [OK].

You are logged into the device and the main screen is displayed.

Point

Operations that a user can make depends on the permission level of the user who has logged in. The adding and deleting of users, and the editing of a user's permission level are performed in [Account Settings] in the [Global Settings] menu of the main screen.

→ "Account Settings"

When You Cannot Find a Device

#C006

In the following cases, a device may not be discovered by the normal search made at the start of the [Connect to Device] screen, so that it is not included in the device list.

- A factory default device is connected to the network.
- A device that was used on a different network is connected to a new network.
- A new device with an unknown IP address is connected to the network.
- Multiple IP addresses exist on a single network adapter, and the IP address of the device you want to connect to is set to second or lower priority.
- A device is connected to a network beyond a router.

In cases such as above when a device is configured with an IP address not detected by normal search, the device may be discovered by searching devices including those that do not match network addresses (→ Search Devices With Mismatching Network Address). Also, when you want to connect to a new device having an unknown IP address or when you want to temporarily connect to a device for debugging the configuration, you can connect to the device by direct connection between the computer and the device (→ Connecting Computer and Device Directly). A device connected to a network beyond a router can be added to the device list and tried for connection by specifying the IP address (→ Add Device with Specified IP Address).

Reference This section describes the case where the Connection Method is set to [Main Screen]. If the Connection Method is set to [Custom Screen Viewer], the custom screen viewer will be displayed after connection or logging in.

Search Devices With Mismatching Network Address

Device search is made when you select the [Search Devices With Mismatching Network Address] check box at the bottom of the [Connect to Device] screen. A discovered device is included in the device list with status [Network address mismatch]. Connection to the device becomes possible by changing Configuring Device's Network Settings.

Connecting Computer and Device Directly

Connect the computer and a device using a network cable and establish a connection by temporarily changing the IP address.

Point
- The currently running device is disconnected when you make a direct connection.
- For the devices that are communicating with the PLC via industrial Ethernet communications (EtherNet/IP®, PROFINET, PLC-Link), disconnect the communications with the PLC, then directly connect to the devices.
- If a direct connection is made, the connection to the environmentally-resistant lighting controller already registered in the global settings is terminated.
- Do not configure the network settings of the environmentally-resistant lighting controller or register the lighting while a direct connection is being made.
- A device with [IP Address Assignment] set to [Auto (DHCP)] in [Network Settings] cannot be connected directly with the computer.

1 Connect the computer and the device by a network cable.

Reference If the computer has multiple network adapters, remember which network adapter you are using for the connection.

2 On the [Tools] menu, click [Direct Connection].

The [Direct Connection] dialog appears.

3 In [Network Adapter], select the network adapter that is connected to the device.

4 Click [Start Direct Connection] button.

Device search starts, and the discovered device is listed.

Reference If the device is not discovered, check the following, and click [Update] button to start search again.

- Whether the device is turned on
- Whether the network cable is connected correctly
- Whether you selected the correct network adapter

5 Select the target device from the list, and then click [Connect] button.

A confirmation message appears.

6 Click [OK].

The [Login] dialog appears.

Point If you have set [Startup User] by the user name and password configured as the account information of the device to be connected, the [Login] dialog is not displayed, saving the trouble of entering [User Name] and [Password]. After you click the [Connect] button, you are automatically logged into the device and the main screen is displayed.

7 Enter [User Name] and [Password], and click [OK].

You are logged into the device and the main screen is displayed.

Point Operations that a user can make depends on the permission level of the user who has logged in. Add, delete, or edit the permission level of a user in [Account Settings] in the [Global Settings].

→ Account Settings

Reference The IP address of the connected device can be set from the icon (: when the [Network address mismatch]) in the device list.

→ "Configuring Device's Network Settings"

Add Device with Specified IP Address

Specify the IP address of a device to add the device to the device list.

1 Click [Add Device with Specified IP Address] in the [Tool] menu.

The [Add Device with Specified IP Address] dialog appears.

2 Enter the IP address of the device to be connected, and then click [OK].

A device is displayed at the bottom of the device list with only [IP Address] being configured.

Point

At this point, the device information is not retrieved, so the device information other than the IP address is not displayed. Once the device is connected, the information other than the IP address is retrieved from the device and displayed in the device list.

Adding/Editing a Simulator

#C007

A simulator is a workspace in which you can edit a program setting without network connection. You can create, edit, and adjust settings without access to a real device (when the device is not available or you do not want to connect to it because the device is running) because you can add a simulator using an existing device setting.

- Adding a Simulator
- Editing a Simulator

Reference The setting file edited on the simulator can be transferred to a device to change the device setting to reflect the edition.
→ [Transfer File] - [Program Settings]

Adding a Simulator

You can add a simulator from the [Connect to Device] screen, the [Transfer File] dialog, or Windows Explorer.
→ Adding from [Connect to Device] Screen
→ Adding from [Transfer File (Program Settings)] Dialog
→ Adding from Windows Explorer

Adding from [Connect to Device] Screen

Add a simulator from the [Connect to Device] screen.

1 Display the [Add Simulator] dialog by one of the following ways.
- Click [Add Simulator] at the bottom of the [Connect to Device] screen, or [Add Simulator] in the [Tool] menu.
  The [Add Simulator] dialog is displayed without details such as the model being configured.
- Select a device from the device list, and select [Add Simulator] from the right-click context menu.
  The [Add Simulator] dialog is displayed with device information reflected from the selected device.

2 Select hardware configuration for the camera, lighting, etc.
→ Screen Details

3 Click [OK] button.
The simulator is added to the device list.

Adding from [Transfer File (Program Settings)] Dialog

Add a new simulator based on the configuration of a device.

1 Select a device from the device list, and select [Transfer File (Program Settings)] from the context menu.

The [Transfer File (Program Settings)] dialog appears.

2 From [Transfer Destination Simulator] of the [Device to PC] tab, select [Create New Simulator].

3 Configure transfer details, and click ◀.

Reference For the operation of the [Transfer File (Program Settings)] dialog, see [Transfer File] - [Program Settings].

The [Add Simulator] dialog appears.

4 Check hardware configuration for the camera, lighting, etc.
→ Screen Details

5 Click [OK] button.
The simulator is added to the device list.

Adding from Windows Explorer

Add a simulator by dragging and dropping a file (*.zip) exported by the Export Settings function from Windows Explorer to the [Connect to Device] screen.

Reference For how to export a setting file, see "Export Settings."

1 Drag and drop a file (*.zip) exported by the Export Settings function from Windows Explorer to the [Connect to Device] screen.

Point The folder configuration must be retained after exporting by the setting export function. The file cannot be imported if you change the folder configuration.

The [Select Import Target] dialog will appear.

2 Select the program setting to be imported and then click [OK] button.

Reference
- For details of the [Select Import Target] dialog, see "Import Settings."
- [Shared Program Settings], [Global Settings] and [Model Image] are enabled and fixed. The Shared Program Settings file, Global Settings file and Model Image file are also imported to the added simulator.
  → Setting Files and Folder Configuration
  Click the [Select Data] button, the [Select Data] dialog will appear.

The hardware information of the device such as the model, serial number, and MAC address, as well as the Global Settings and Network Settings are imported, and the [Add Simulator] dialog is displayed.

3 Select hardware configuration for the camera, lighting, etc.
→ Screen Details

4 Click [OK] button.
The simulator is added to the device list.

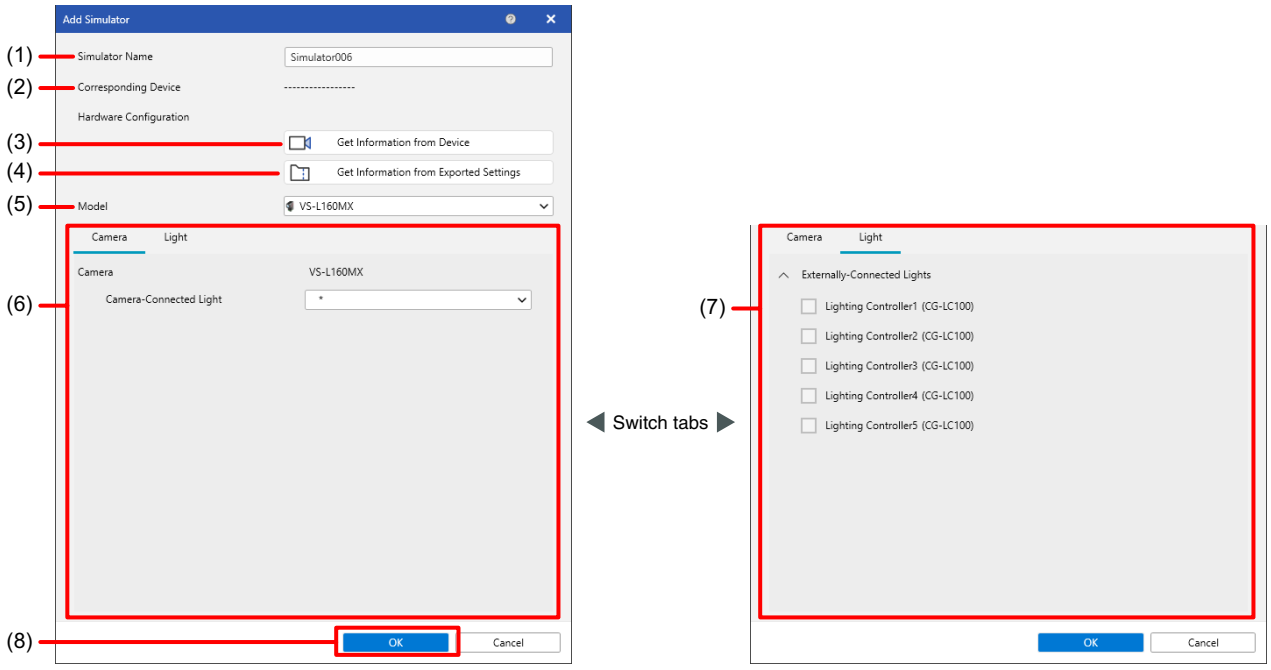
Editing a Simulator

Select a simulator from the device list, and select [Edit Simulator] from the context menu to display the [Edit Simulator] dialog.
In the [Edit Simulator] dialog, you can configure the device configuration of the simulator.

Reference The editable content of the [Edit Simulator] dialog is the same as the [Add Simulator] dialog. For operation details, see Screen Details.

Screen Details

This section explains the details of the [Add Simulator] and [Edit Simulator] dialogs.
The editable contents of the [Edit Simulator] dialog and the [Add Simulator] dialog are the same.
This section explains the [Add Simulator] dialog as an example.



(1) Simulator Name

Configure a name for the simulator to be added (initial value: Simulator000). A three-digit number is included in the name and the smallest available number is allocated when a simulator is added.
The maximum length of the name that you can enter is 60 characters.

(2) Corresponding Device

The MAC address of the device is displayed.

Reference When you add a simulator based on an existing device or when you edit a simulator after adding it based on an existing device, the MAC address of the base device is displayed initially.

(3) Get Information from Device

The hardware configuration information of an existing device is retrieved. The retrieved hardware configuration is reflected to [Corresponding Device], [Model], the [Camera] tab, and the [Light] tab.
→ "Get Information from Device"

(4) Get Information from Exported Settings

The hardware configuration information is retrieved from the setting file (*.zip) exported by the setting export function. The retrieved hardware configuration is reflected to [Corresponding Device], [Model], the [Camera] tab, and the [Light] tab.
→ "Get Information from Exported Settings"

(5) Model

Select the model of the target device (VS camera) of the simulator. The setting items of the [Camera] tab and the [Light] tab will change in accordance with the model selected in [Model].

Reference When you add a simulator based on an existing device or when you edit an existing simulator, the model of the base device/simulator is displayed initially.

(6) [Camera] tab

The VS camera model selected in [Model] is displayed (up to 8 units). From [Camera-Connected Light], select the model of the camera-connected light to be connected as necessary.

Reference
- A camera-connected light is a light of the following types:
  –High-intensity smart ring light (white, red, blue, or near-infrared)
  –MultiSpectrum Light
  –LumiTrax 400mm large-size light CA-DQW40X
  –Light connected by a camera-connected light conversion unit
- When you add a simulator based on an existing device or when you edit an existing simulator, the information of the base device/simulator is displayed initially.

(7) [Light] tab

Network connected lights (the environmentally-resistant lighting controller) that can be used with the VS camera are displayed (up to 5 units). If you check the checkbox, both 1ch/2ch lighting of the environmentally-resistant lighting controller will be enabled.

(8) OK/Cancel

- **OK**: Saves the edited setting, and closes the dialog.
- **Cancel**: Cancels the edited setting, and closes the dialog.

Get Information from Device

Information such as the hardware configuration of an existing device is loaded to the simulator being added or edited. You can easily create a simulator having the same hardware configuration as an existing device.

Point If you import information such as hardware configuration by [Get Information from Device], the simulator is linked to the source device. The program setting edited by connecting to a simulator can be transfered to the device linked by [Transfer File] - [Program Settings] to update its program setting.

1 Click [Get Information from Device].
The [Device Selection] dialog appears.

2 Select the target device to get information from, and then click [OK].
The hardware information of the device such as the model, serial number, and MAC address, as well as the Global Settings and Network Settings are acquired, and they are reflected to [Corresponding Device], [Model], the [Camera] tab, and the [Light] tab.

Get Information from Exported Settings

The hardware configuration information is imported from the setting file (*.zip) exported by the setting export function to the simulator being created or edited.

Point If you import information such as hardware configuration by [Get Information from Exported Settings], the simulator is linked to the source device. The program setting edited by connecting to a simulator can be transfered to the device linked by [Transfer File] - [Program Settings] to update its program setting.

1 Click [Get Information from Exported Settings] button.
The [Import Settings] dialog appears.

2 Select the exported file (*.zip) to get information from, and then click [Open] button.
The [Select Import Target] dialog will appear.

3 Select the program setting to be imported, and then click [OK] button.

Reference [Shared Program Settings], [Global Settings] and [Model Image] are enabled and fixed. The Shared Program Settings file, Global Settings file and Model Image file are also imported to the added simulator.
→ Setting Files and Folder Configuration
Click the [Select Data] button, the [Select Data] dialog will appear.

The hardware information of the device such as the model, serial number, and MAC address, as well as tthe Global Settings and Network Settings are imported, and they are reflected to [Corresponding Device], [Model], the [Camera] tab, and the [Light] tab.

Configuring Device's Network Settings

#C008

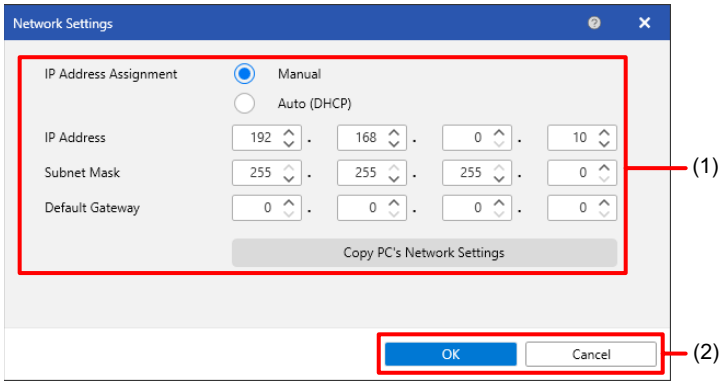
When you select a list line in the device list, an icon (: when the [Network address mismatch]) is displayed next to the IP address. Click the icon to display the Network Settings dialog where you can configure network settings for the device selected in the list row.

Point If any incorrect settings are made, the system as well as other network equipment may not work properly. Consult your system administrator or network administrator about network settings.

Reference You can also display the [Network Settings] dialog by selecting a list row in the device list and selecting [Network Settings] from the right-click context menu.

Screen Layout

This section describes the layout of the [Network Settings] dialog.



(1) Network Settings

Configuring the network settings for the device.

Point If all of the following conditions are met, the [Network Settings] dialog cannot be displayed from the connection screen.

- A version of VS Creator earlier than Ver.1.3
- A version of device firmware greater than or equal to Ver.1.3
- Device's HTTP setting is other than [HTTP]

IP Address Assignment

Select how to configure the network information (IP address/Subnet mask/Default gateway) for the device.

– **Manual** (default): Select to manually configure the network information.
– **Auto (DHCP)**: Select to automatically obtain the network information from the DHCP server.

Important If the IP address assignment is switched, the device must be rebooted. A reboot may not be necessary depending on the version of VS Creator or the firmware version of the VS Camera.

IP Address

Enter the IP address of the device when [IP Address Assignment] is set to [Manual] (default: 192.168.0.10).

Subnet Mask

Enter the subnet mask of the device when [IP Address Assignment] is set to [Manual] (default: 255.255.255.0).

Default Gateway

Enter the IP address of the default gateway of the device when [IP Address Assignment] is set to [Manual] (default: 0.0.0.0).

Copy PC's Network Settings

Click to set the network information configured for the camera to [IP Address], [Subnet Mask], and [Default Gateway].

Important The [Copy PC's Network Settings] button is not available for devices added by [Add Device with Specified IP Address].

Reference [IP Address] is set to the top three octets of the IP address set for the camera, and the last octet is set to "000". Please change it to the IP address assigned to the device.

(2) OK/Cancel

- **OK**: Saves the configured network information on the device and closes the [Network Settings] dialog.
- **Cancel**: Discards the settings and closes the [Network Settings] dialog.

Updating Firmware

#C009

Point

- On the menu bar in the main screen, selecting [System] - [Update Firmware] also enables the firmware to be updated. In this case, start from step 2 when the [Firmware Update] dialog box appears.
- A firmware update cannot be performed from the main screen when multiple main screens are displayed.

1 Select the device to update firmware in the [Connect to Device] screen and select [Update Firmware] from the right-click context menu.

The [Firmware Update] dialog appears.

2 In [Version After Updating], select the version to update to.

Important If a version lower than the current version is displayed in [Version After Updating], it is possible to downgrade the firmware.

3 Click [OK].

Firmware update will start.

Important

- It will take several minutes for the update to be completed.
- Be sure not to turn the power off or disconnect cables during the update.
- The device will automatically reboot during update processing.

A confirmation message will appear when the firmware update is complete.

4 Click [OK].

Firmware update is complete.

Updating Peripheral Devices

#C010

The firmware of the following devices can be updated from [Tool] - [Update Peripheral Device] on the [Connect to Device] screen.

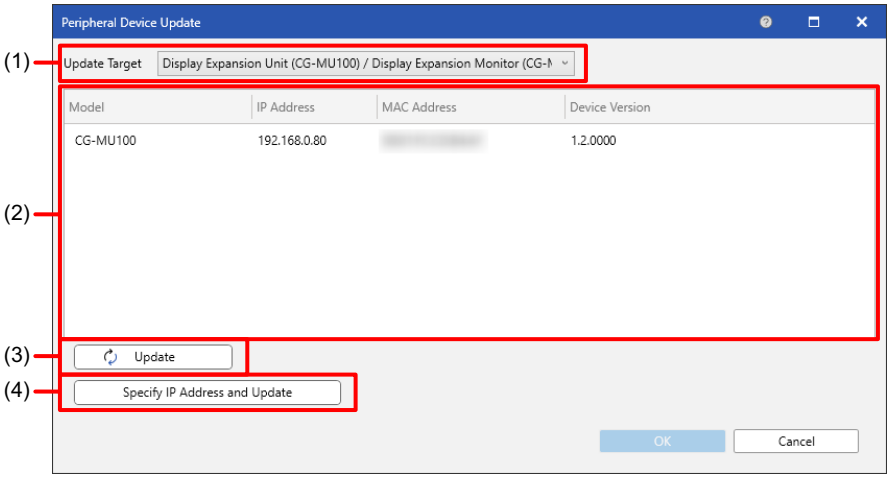
- Display Expansion Monitor CG-MP120T
- Display Expansion Unit CG-MU100
- Environmentally-Resistant Lighting Controller CG-LC100

Point

- Multiple devices cannot be updated simultaneously.
- The environmentally-resistant lighting controller cannot be updated via a router.
- The environmentally-resistant lighting controller cannot be updated while a VS camera is connected to the environmentally-resistant lighting controller. Update the environmentally-resistant lighting controller in a state where it is not connected to a VS camera, such as by turning off the power of the VS camera, unplugging the Ethernet cable between the VS camera and the environmentally-resistant lighting controller, or directly connecting the PC and the environmentally-resistant lighting controller only on a one-to-one basis.

Screen Details

This section describes the details of the [Peripheral Device Update] dialog.



(1) Update Target

Specify the target device to be updated from the following:

- Display Expansion Unit (CG-MU100) / Display Expansion Monitor (CG-MP120T)
- Environmentally-Resistant Lighting Controller (CG-LC100)

(2) Device List

Displays a list of the devices on the network which are of the type specified in [Update Target].

Point

The peripheral device update cannot be used unless the version of the display expansion monitor/unit is Ver. 1.2 or higher. Display expansion monitors/units of Ver.1.1 or lower will not be displayed on the device list.

Model

Displays the model of the device.

LED

Click to flicker the status LED of the device for 10 seconds. Click while the LED is flickering to continue flickering the LED for another 10 seconds from the time of clicking.

Point This is displayed when the [Environmentally-Resistant Lighting Controller (CG-LC100)] is selected in [Update Target].

IP Address

Displays the IP address set on the device.

MAC Address

Displays the MAC address of the device.

Device Version

Displays the device version of the device.

(3) Update

Click this to search for devices on the network again and update the device list.

(4) Specify IP Address and Update

Specify the IP address of the device to specify the device to be updated.

Reference This is displayed when the [Display Expansion Unit (CG-MU100) / Display Expansion Monitor (CG-MP120T)] is selected in [Update Target].

Procedure for Update

1 Specify the [Update Target].
A list of the devices on the network which are of the type specified in [Update Target] will be displayed.

2 Select the device to be updated from the device list and then click [OK].
The [Firmware Update] dialog appears.

Point If the device's network settings differ from the PC, a dialog box for temporarily changing the network settings will appear. Change to the same network as the PC you are using.

3 Select the version to update to.

When the [Display Expansion Unit (CG-MU100) / Display Expansion Monitor (CG-

MP120T)] is specified in [Update Target]

Select an update file in [Update File to Use].
The latest update file can be downloaded from the user support website.
User support website
www.keyence.com/vs-support

When the [Environmentally-Resistant Lighting Controller (CG-LC100)] is specified in [Update Target]

Select the version to update to in [Version After Updating].

4 Click [OK].

The [Transferring file...] dialog appears, and the update file will be transferred to the selected device. When the transfer is complete, the [File Transfer Completed] dialog appears.

Point

- Even after the [File Transfer Completed] dialog appears, the update process will continue on the device.
- It will take approximately 10 minutes for CG-MU100/MP120T and several minutes for CG-LC100 to complete the update.
- Be sure not to turn the power off or disconnect cables during the update.
- During the update, all devices that are connected via the target device will be disconnected.

5 Click [OK] to close the [File Transfer Completed] dialog.

6 Click [OK] to close the [Peripheral Device Update] dialog.

The update is complete when the update process on the device is complete.

Performing AI Activation

#C011

AI Activation is required to use some of the functions included in the AI Inspection tools.

- [Select Mode] in the AI Detection tool
- AI Segmentation tool

Important

- These functions are not supported with the VS Creator firmware version 1.3 or earlier, or on 1.6M camera models.
- If the VS camera where AI activation has been performed is connected to the computer, [Select Mode] in the AI Detection tool and the AI Segmentation tool can be used even if the simulator has not been activated.
- Activation cannot be performed if the status of the device is other than blank on the [Connect to Device] screen.

Performing AI Activation on VS Cameras

Activation steps

1 On the [Connect to Device] screen, select the VS camera to be activated and open the context menu.

→ [Context Menu]

2 Select [Add Function].

The [Enter Activation Code] dialog appears. Your Serial No. is displayed, which is necessary for issuing the AI activation code.

Point

- The serial No. is different for each VS camera. Use the serial No. of the VS camera that you actually use when requesting the issuance of an AI activation code.
- If a 1.6M camera model is selected in step 1, [Add Function] does not appear in the context menu.

Reference Click the [Copy] button to copy the displayed serial No. to the clipboard. You can then paste it in the entry field when requesting for activation code issuance.

3 Access the AI activation page of the user support website.

VS series user support AI activation page:
www.keyence.com/vsai01

4 Enter the serial No. displayed in step 2 and the AI activation license code to request the issuance of the AI activation code.

Keyence sends the AI activation code to the registered email address.

Important

- The license code is written on the license card (VS-AD1).
- You need to purchase the license card (VS-AD1) separately. Contact your Keyence sales representative for details.

Point
- One license code is assigned to one VS camera.
- A license code is required to issue a lifetime AI activation code.
- A license code is not required to issue a time-limited AI activation code.

5 Enter the AI activation code in the [Enter Activation Code] dialog.

When entering the lifetime activation code

AI activation is completed and you can use the "[Select Mode] in AI Detection tools" and "AI Segmentation tools".
Thereafter, you do not need to perform AI activation on that VS camera.

When entering the time-limited activation code

A message appears indicating that the 60-day trial period has started.
Click [OK] to enable the use of "[Select Mode] in AI Detection tools" and "AI Segmentation tool" during the trial period.
After the trial period expires, these functions will no longer be available.

Point
- The AI activation code is only valid for the serial No. it was issued for.
- AI activation codes for simulators cannot be entered for VS cameras.

Reference To prevent input errors, it is recommended that you copy and paste the AI activation code from the email you have received.

Performing AI Activation on Simulators

Activation steps

1 On the [Connect to Device] screen, select a simulator and open the context menu.
→ [Context Menu]

2 Select [Add Function].
The [Enter Activation Code] dialog appears. Your user ID is displayed, which is necessary for issuing the activation code.

Point
- The user ID is different for each computer. Use the user ID of the computer that you actually use when requesting the issuance of an activation code.
- If a simulator has already been activated, [Add Function] does not appear in the context menu.

Reference Click the [Copy] button to copy the displayed user ID to the clipboard. You can then paste it in the entry field when requesting for activation code issuance.

3 Access the AI activation page of the user support website.
VS series user support AI activation page:
www.keyence.com/vsai02

4 Enter the user ID displayed in step 2 and the AI activation license code to request the issuance of the AI activation code.

Keyence sends the AI activation code to the registered email address.

Important
- The license code is written on the license card (VS-AD1).
- You need to purchase the license card (VS-AD1) separately. Contact your Keyence sales representative for details.

Point
- With a single license code, you can have AI activation codes issued for multiple PCs.

5 Enter the AI activation code in the [Enter Activation Code] dialog.

AI activation is completed and you can use the "[Select Mode] in AI Detection tools" and "AI Segmentation tool".

Thereafter, you do not need to perform AI activation on that computer.

Point
- The AI activation code is only valid for the user ID at the time of the issuance request.
- Once AI activation is performed on a simulator, you can use the "[Select Mode] in AI Detection tools" and "AI Segmentation tool" on all simulators stored on your computer.
- AI activation codes for VS cameras cannot be entered for simulators.

Reference To prevent input errors, it is recommended that you copy and paste the AI activation code from the email you have received.

Entering Lifetime Activation Code During the Trial Period

Activation steps

1 On the [Connect to Device] screen, select the VS camera for which you want to enter the activation code and open the context menu.

→ [Context Menu]

2 Select [Add Function].

The [Enter Activation Code] dialog appears.

3 Enter the lifetime activation code in the [Enter Activation Code] dialog.

AI activation is completed. Thereafter, you do not need to perform AI activation on that VS camera.

Chapter 4 Main Screen

The main screen will appear when you select and connect a device on the [Connect to Device] screen.
You can configure various settings on the main screen, such as creating program settings for connected devices (configure various tool settings, create subtasks, etc.), setting up connected devices (cameras, lights, etc.), configuring communication settings, reproducing inspections with archived images, as well as configuring account and security settings.
This section explains the layout of the main screen and provides an overview of each component of the main screen.

Overview of Functions

#D001

The main screen consists of the following five components:

- **Menu Bar**: Functions are grouped by category. You can execute a function by selecting it from the menu.
- **Toolbar**: Operation buttons are displayed. You can execute an operation by clicking on the corresponding button.
- **Sidebar**: Icons for hidden views are displayed. Clicking an icon shows the hidden view.
- **Views**: Images, settings and results are displayed. Each view can be shown/hidden, docked/floated, etc. You can edit them with a mouse or keyboard.
- **Status Bar**: Displays information about the device.

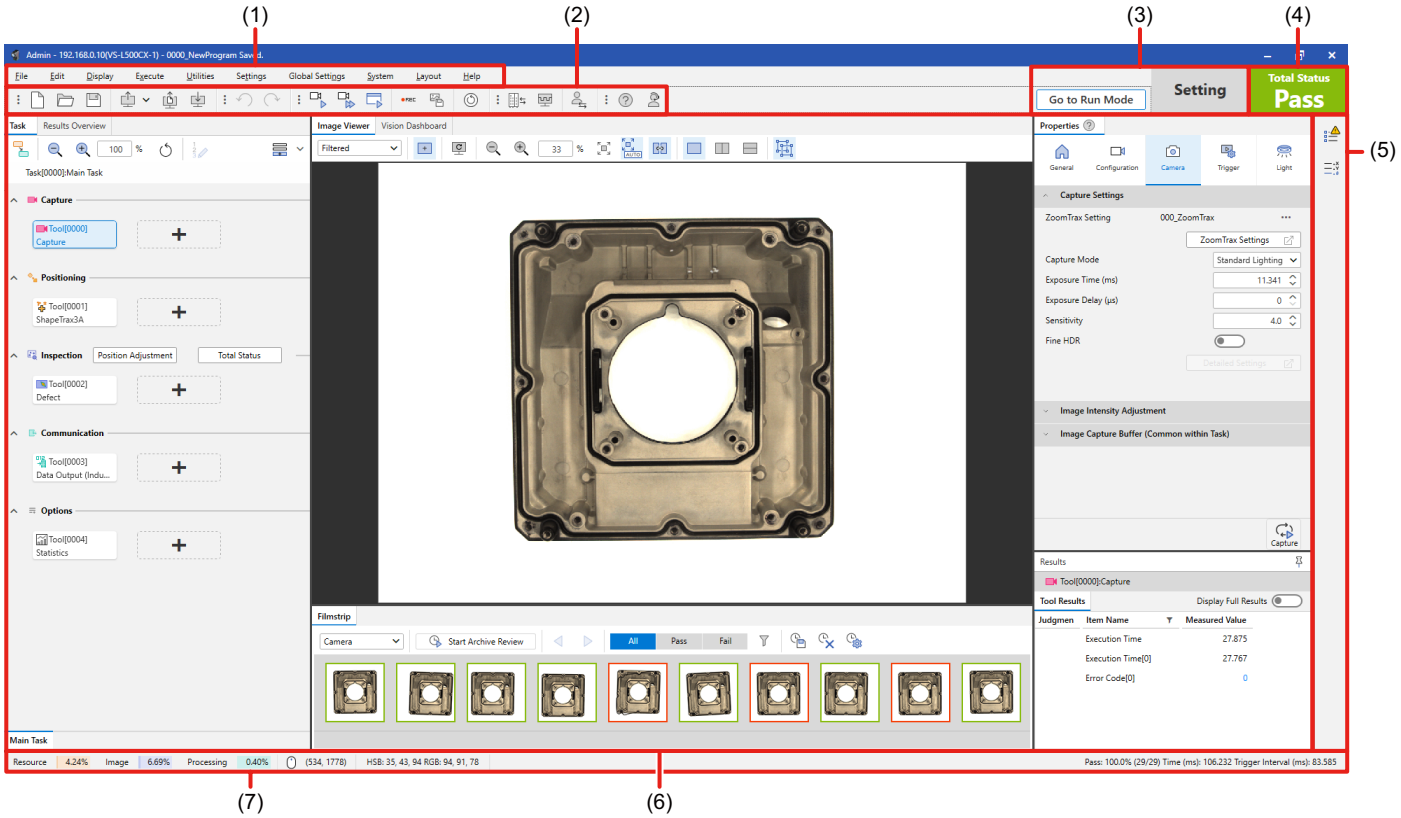
Reference

- You can change the layout of the main screen. You can also save the custom layout as "Layout".
- When you launch the main screen, it retrieves the image from the connected device.

Screen Layout

#D002

This section explains the layout of the main screen and the functions of each component. The default display layout (Setup Mode) of the main screen is shown below.
See the explanation for each component for more details.



(1) Menu Bar

Functions are grouped by category (File/Edit/Display/Execute/Utilities/Settings/Global Settings/System/Layout/Help). You can execute each function by selecting the item from the hierarchical menus. Items with ON/OFF status are marked with a check mark when set to ON.
For more details, see "Menu Bar".

(2) Toolbar

Operation buttons are displayed by group (File/Edit/Execute/Utilities/Change Account/System/Help/Mode). You can execute an operation by clicking on the corresponding button or selecting the item from the drop-down menu. For more details, see "Toolbar".

(3) Mode

This button indicates the operation mode (Setup Mode / Run Mode).
In Setup Mode, the button is displayed as [Run Mode], and clicking the button makes the system enter the Run Mode.
In Run Mode, the button is displayed as [Setup Mode], and clicking the button makes the system enter the Setup Mode.
For more details, see "System" - "Change Mode".

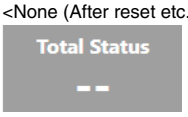
(4) Total Status Indicator

The total status result of the main task execution is displayed.

<Pass>

<Fail>

<None (After reset etc.)>



(5) Sidebar

Clicking the icon in the upper right corner of each view will close the view and display the view's icon in the sidebar. For more details, see "Sidebar".

(6) Views

This is an area where you can design and operate programs with the VS Creator, such as creating program settings and displaying inspection results, reviewing inspections with archived images, executing inspection simulations using selected images, as well as calculating and graphing measured values in the Vision Dashboard. You can design and operate programs by freely laying out each view and switching screens according to the settings and applications. For more details, see "Views".

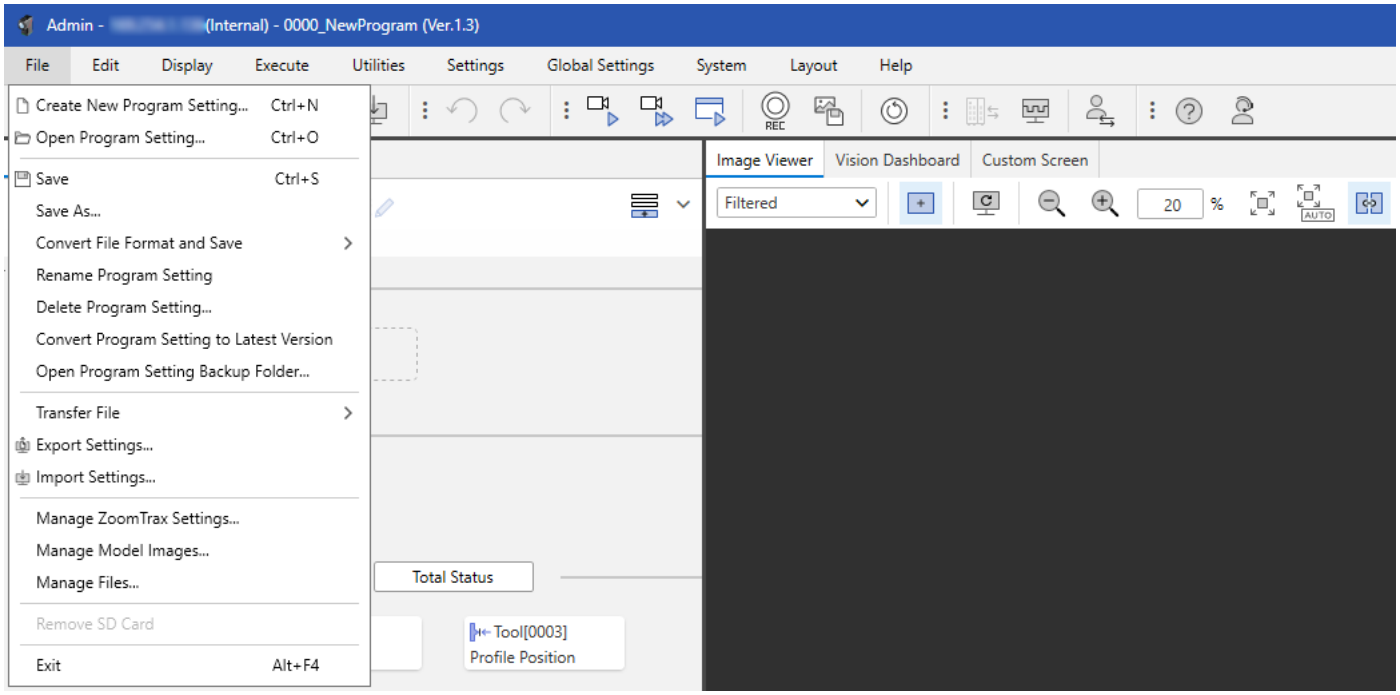
(7) Status Bar

Indicates the current device status. For more details, see "Status Bar".

Menu Bar

#D003

Clicking on an item in the menu bar will display a drop-down menu.



Menu items and their functions are as described below. See the explanation for each item for more details.

- [File] Menu: You can perform operations related to program settings, external files, etc.
- [Edit] Menu: You can perform operations related to editing.
- [Display] Menu: Shows/hides the views, toolbar, and status bar.
- [Execute] Menu: You can trigger the camera or operate the filmstrip.
- [Utilities] Menu: Displays the utilities.
- [Settings] Menu: You can configure settings that are common to the program settings.
- [Global Settings] Menu: You can configure settings related to devices and other global settings.
- [System] Menu: You can perform operations and settings related to the system.
- [Layout] Menu: You can create a custom layout.
- [Help] Menu: Displays various information about the VS Creator.

Point Available menus vary depending on your account permission level. For more details, see "Operational permissions based on account permission levels" in the description of each menu.

[File] Menu

In the [File] menu, you can perform operations related to program settings, external files, etc. For more details, see "File".

Menu items	Operational permissions based on account permission levels		
	Full control	Edit	View only
Create New Program Setting	✓	–	–
Open Program Setting	✓	✓*1	–

Menu items		Operational permissions based on account permission levels		
		Full control	Edit	View only
Save		✓	✓*1	–
Save As		✓	✓*1	–
Convert File Format and Save	Convert to Text Format	✓	✓*1	–
	Convert to Binary Format	✓	✓*1	–
Rename Program Setting		✓	–	–
Delete Program Setting		✓	–	–
Convert Program Setting to Latest Version		✓	–	–
Open Program Setting Backup Folder		✓	✓*1	–
Transfer File	Program Settings	✓	–	–
	Images and Other Files	✓	–	–
Export Settings		✓	–	–
Import Settings		✓	–	–
Manage ZoomTrax Settings		✓	–	–
Manage Model Images		✓	–	–
Manage Files		✓	–	–
Remove SD Card		✓	✓	✓
Exit		✓	✓	✓

*1:Depends on settings.

[Edit] Menu

You can perform operations related to editing.

Menu items	Operational permissions based on account permission levels		
	Full control	Edit	View only
Undo	✓	–	–
Redo	✓	–	–

Point The following operations are not supported by [Undo] and [Redo]. If you perform the following operations, the last edit will be cleared and [Undo] and [Redo] will no longer be available.

- Change a linked value
- Register a model image
- Renumber Tool ID
- Group/Ungroup
- Add/Delete a memo
- Add/Delete a subtask
- Change in Run Mode

Undo

Select to undo the last edit.

Reference You can also click the (Undo) button in the toolbar to undo the last edit.

Redo

Select to redo the last edit operation that was canceled.

Reference You can also click the (Redo) button in the toolbar to redo the last edit operation that was canceled.

[Display] Menu

In the [Display] menu, you can show/hide the views, toolbar, and status bar on the main screen. You can show or hide the toolbar by category. A check mark will appear to the left of the name of the view or bar currently displayed on the main screen. Selecting the name of a view or bar without a check mark (i.e. hidden) will display it on the main screen.

Reference When you show a view or bar that you have previously hidden, it replicates its previous position, docking state, etc.

Menu items		Operational permissions based on account permission levels		
		Full control	Edit	View only
Task		✓	–	–
Results Overview		✓	–	–
Image Viewer		✓	–	–
Vision Dashboard		✓	–	–
Custom Screen		✓	–	–
Filmstrip		✓	–	–
Properties		✓	–	–
Tool Results		✓	–	–
Data List		✓	–	–
Error Check		✓	–	–
Toolbar	File	✓	–	–
	Edit	✓	–	–
	Execute	✓	–	–
	Utilities/System	✓	–	–
	Mode	✓	–	–
	Help	✓	–	–
Status Bar		✓	–	–

[Execute] Menu

In the [Execute] menu, you can trigger the camera or operate the filmstrip.

Menu items		Operational permissions based on account permission levels		
		Full control	Edit	View only
Trigger		✓	✓*1	–
Continuous Trigger		✓	✓*1	–
Execute Selected Subtask		✓	✓*1	–
Archive Review	Start Archive Review	✓	✓	–
	Previous Image	✓	✓	–
	Next Image	✓	✓	–
	End Archive Review	✓	✓	–
Simulation Execution	Previous Image	✓	✓	–
	Repeat Image	✓	✓	–
	Next Image	✓	✓	–
	Stop After 1 Round	✓	✓	–
	Stop at Total Status Fail	✓	✓	–
Record		✓	✓	–
Save Image		✓	✓	–
Output Check		✓	✓	–
Reset		✓	✓	–
Clear Error		✓	✓	–

*1:Depends on settings.

Trigger

Inputs one trigger on the device.

Reference Triggers can also be input by clicking the (Trigger) button on the toolbar.

Continuous Trigger

Inputs multiple triggers on the device. Triggers will continue to be input until clicked again.

Reference Triggers can also be input by clicking the (Continuous Trigger) button on the toolbar.

Execute Selected Subtask

Places the selected subtask in queue for execution. The subtask placed in queue will be executed next to the currently executing task. Multiple subtasks cannot be placed in queue.

Reference You can also place the currently selected subtask in queue and execute it in order by clicking the (Execute Selected Subtask) button on the toolbar.

Archive Review

Selects the playback operation for archived images from the submenu. For more details, see "Filmstrip" - "Archive Review" - "Screen Layout".

- **Start Archive Review**: Starts the archive review.
- **Previous Image**: Replays the image before the selected one.
- **Next Image**: Replays the image after the selected one.

- **End Archive Review**: Ends the archive review.

Simulation Execution

Selects the playback operation for simulation images. For more details, see "Filmstrip" - "Simulation Execution" - "Screen Layout".

Reference You can also playback simulation images from the toolbar of the [Filmstrip] view.

Record

"Record" is a function that automatically saves captured images. When [Execute] - [Record] is selected from the menu bar, the item name will switch to [Stop Recording]. When you input a trigger and capture an image in this state, the image captured by the capture tool will be saved. For more details on the save destination of the images, see "Filmstrip" - "Simulation Execution" - "Recording/Simulation Image Settings" - "Recording Settings". Select [Stop Recording] to end the recording state.

Point Images generated by image processing with the Shared Image Enhance tool, Subtraction Filter tool, etc. will not be saved.

Reference You can also click the (Record) button in the toolbar to switch the recording state.

Save Image

You can save the images currently displayed in [Image Viewer]. The [Save Image] dialog will appear when you select [Execute] - [Save Image] from the menu bar. Sets the save location and file format for the images.

Reference You can also display the dialog by clicking the (Save Image) button on the toolbar.

Saving Folder Specification Method

Sets whether to change the save destination for image files from the default folder.

- **Default Folder** (default): Image files are saved in the simulator program settings folder on the computer.
  - For devices and simulators linked to devices
    (Simulator Base Path)\(MAC Address)\EM\VS\Camera\Programs\(Program Number_Program Name)\SimulationImages.
  - For simulators
    (Simulator Base Path)\(Simulator Name)\EM\VS\Camera\Programs\(Program Number_Program Name)\SimulationImages

  Point If the target program setting is on a microSD card, “EM” above changes to “SD”.

- **User-selected Folder**: Any save destination can be set. To change the save destination, click the [Select Folder] button and set the save destination in the dialog box that appears.

Save Destination Folder

Displays the location where the image files will be saved. Click the [Open Folder] button to view the saved image files.

File Format

Selects the save format (PNG/BMP/JPG) for the image files (default: PNG).

Save

Click the button to save the images.

Output Check

Data output can be set to be performed even in the simulator and in Setup Mode. Set whether to perform the following data output in the [Output Check Settings] dialog box.

- Data (Industrial Ethernet)
- Data (Non-Procedural)
- Data (FTP/Storage)
- Data (Terminal)
- Image (FTP/Storage)

Point

- For simulators, the outputting of Data (Industrial Ethernet), Data (Non-Procedural), and Data (Terminal) cannot be done.
- Depending on the program setting version, Output Check may not be usable.

Reset

Resets the device and initializes or clears the following data and signals.

- System property
- Various buffers containing images
- Total status
- Processing count
- Results of tool and task execution
- Output terminal
- Output regions of industrial Ethernet communications
- Archived data
- Statistical data
- Count value of the event "Timer (Interval Specification)"

The following state transitions will also occur:

- The trigger waiting state of the [Capture] tool is canceled.
- The name of the file to which the data will be saved is reset to the default value.
- A new destination folder for the image output tool, etc. is created.
- The processing returns to the beginning of the main task.

Reference You can also reset by clicking the (Reset) button on the toolbar.

Clear Error

Clears the system error.

[Utilities] Menu

The [Utilities] menu provides functions useful for creating and debugging program settings. For details, see "Utilities".

Menu items	Operational permissions based on account permission levels		
	Full control	Edit	View only
ZoomTrax Setting Difference Comparison	✓	✓	–
Industrial Ethernet Communication Monitor	✓	–	–
Non-Procedural Communication Monitor	✓	✓	–
Terminal I/O Monitor	✓	✓	–
Error Log Viewer	✓	✓	✓
Timing Chart Monitor	✓	–	–
Print Calibration Pattern	✓	–	–
OPC UA Monitor	✓	✓	–

[Settings] Menu

In the [Settings] menu, you can configure settings that are common to the program settings.

Menu items	Operational permissions based on account permission levels		
	Full control	Edit	View only
Total Status Settings	✓	–	–
Execution Error Settings	✓	–	–
Position Adjustment Reference Settings	✓	–	–
Archive Condition Settings	✓	–	–
OPC UA I/O Data Settings	✓	–	–
Recording/Simulation Image Settings	✓	✓	–
Settings Protection	✓	–	–

Total Status Settings

Sets the judgment target (tool/cell) for the main task. For more details, see "Task" - "Edit Task" - "Task" - "Options" - "Judgment Settings".

Execution Error Settings

For each tool, you can set whether a execution error should occur if the value being referenced is invalid data. For more details, see "Settings" - "Execution Error Settings"

Position Adjustment Reference Settings

You can set the position adjustment automatically when you add a new measurement tool that has a position adjustment setting. For more details, see "Settings" - "Position Adjustment Reference Settings".

Archive Condition Settings

You can set the conditions for storing the images used for inspections performed on the device and the result data as archive data in the device's memory. For more details, see "Filmstrip" - "Archive Review" - "Archive Condition Settings".

OPC UA I/O Data Settings

If the OPC UA server is enabled in the Global Settings, the display name and data type of the data to be input/output can be set. For more details, see "OPC UA I/O Data Settings".

Recording/Simulation Image Settings

You can specify the destination folder for recorded images and the loading folder from which simulation images are imported, as well as detailed settings for loaded images. For more details, see "Filmstrip" - "Simulation Execution" - "Recording/Simulation Image Settings".

Settings Protection

You can restrict the editing of tools and the Vision Dashboard, and allow only a restricted set of VS cameras to use program settings. For more details, see "Settings" - "Settings Protection"

[Global Settings] Menu

In the [Global Settings] menu, you can configure the operation environment with the camera settings, industrial Ethernet settings, FTP settings, system error settings, etc. For details, see "Global Settings".

Menu items	Operational permissions based on account permission levels		
	Full control	Edit	View only
Camera Settings	✓	–	–
Light Configuration Settings	✓	–	–
Light Settings	✓	–	–
Memory Allocation	✓	–	–
Startup Mode Setting	✓	–	–
Date and Time Settings	✓	–	–
Terminal I/O Settings	✓	–	–
Network Settings	✓	–	–
Device Name Setting	✓	–	–
Industrial Ethernet Settings	✓	–	–
Non-Procedural Communication Settings	✓	–	–
Robot Connection Settings	✓	–	–
Target FTP Settings	✓	–	–
HTTP Settings	✓	–	–
Device's FTP Server Settings	✓	–	–
OPC UA Settings	✓	–	–

Menu items	Operational permissions based on account permission levels		
	Full control	Edit	View only
DNS Server Settings	✓	–	–
System Error Settings	✓	–	–
Account Settings	✓	–	–

[System] Menu

The [System] menu allows you to perform operations and configure settings related to the system, such as toggling between Setup/Run modes, switching accounts, changing the system language, and rebooting the device. For more details, see "System".

Menu items		Operational permissions based on account permission levels		
		Full control	Edit	View only
Change Mode	Setup Mode	✓	✓*1	–
	Run Mode	✓	✓*1	–
Change Account		✓	✓	✓
Reboot		✓	–	–
Update Firmware		✓	–	–
System Information		✓	✓	✓
Device Temperature List		✓	✓	✓
Language		✓	–	–
Custom Screen Viewer Settings		✓	✓	✓
Startup Screen Settings		✓	✓	✓

*1:Depends on settings.

[Layout] Menu

The [Layout] menu allows you to save a customized layout of each view on the main screen as a "user layout". You can work efficiently by switching the user layout according to the operation you are performing in the VS Creator, such as creating program settings, running simulations, and editing the vision dashboard. You can also set a saved user layout as the initial display layout for each operation mode. For more details, see "Layout".

[Help] Menu

The [Help] menu displays various information about the VS Creator.

User's Manual

Displays the VS Creator User's Manual (this document).

Setup Manual

Displays the setup manual of the VS series.

User Support Site

Displays our user support site via the Internet.

Export Settings (For Debugging)

You can package data that is useful for root cause analysis and simulation when troubleshooting or debugging. Collected data includes simulators, images, logs, system environment, and device information.
Selecting [Help] - [Export Settings (For Debugging)] from the menu bar displays the [Export Settings (For Debugging)] dialog. Sets the file to be exported.

Subject Program Setting

Displays the name of the currently displayed program setting.

Export Destination:

Sets the export destination folder with the full path (default: My Documents for the logged in user).

Click the (Select Folder) button to open the [Select Folder] dialog. You can select a desired folder.

File Name

Sets the export file name. The file is exported with the specified file name appended with the year, month, day, hour, minute, and second information (specified filename_YYYYMMDD_hhmmss) of when the file was output.

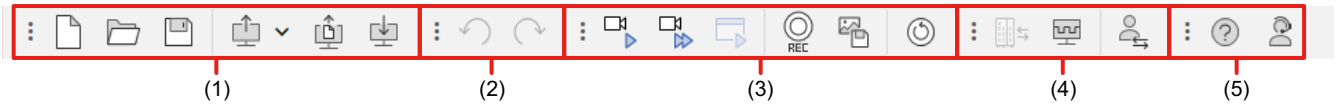
Version Information

The user ID and the version information of the VS Creator are displayed. Clicking the [Libraries Used] button displays the information of the libraries that the VS Creator is using.

Toolbar

#D004

The toolbar displays buttons of functions you frequently use to configure and operate the VS Creator. You can click a button in the toolbar to perform the same action as selecting an item from the menu bar.
The operation buttons are displayed in groups (File, Edit, Execute, Utilities/System, Help).



(1) File

You can perform operations related to program settings, external files, etc.

Create New Program Setting

Click the button to open the [Create New Program Setting] dialog. You can create new program settings. For more details, see "File" - "Create New Program Setting".

Open Program Setting

Click the button to open the [Open Program Setting] dialog. You can switch to existing program settings. For more details, see "File" - "Open Program Setting".

Save

When you click the button, a message appears asking if you wish to save the program setting. For more details, see "File" - "Save".

Transfer File

From the drop-down list, you can select either program setting file or other files (such as an image file).

Program Settings

Select to display the [Transfer File (Program Settings)] dialog. It allows you to transfer program setting files between PC and device. For more details, see "File" - "Transfer File" - "Program Settings".

Images and Other Files

Select to display the [Transfer File (Images and Other Files)] dialog. It allows you to transfer images and other files between PC and device. For more details, see "File" - "Transfer File" - "Images and Other Files".

Export Settings

Click the button to open the [Export Settings] dialog. You can export program settings, global settings, model images, etc. to a ZIP file. For more details, see "File" - "Export Settings".

Import Settings

Click the button to open the [Import Settings] dialog. You can import a ZIP file that has been exported from [Export Settings]. For more details, see "File" - "Import Settings".

(2) Edit

You can perform operations related to editing.

Undo

Click the button to undo the last edit. For more details, see "Undo" in the [Edit] menu.

Redo

Click the button to redo the last undone edit. For more details, see "Redo" in the [Edit] menu.

(3) Execute

You can trigger the camera or operate the filmstrip.

Trigger

Click the button to input one trigger on the device. For more details, see "Trigger" in the [Execute] menu.

Continuous Trigger

Click the button to input multiple triggers on the device. Triggers will continue to be input until clicked again. For more details, see "Continuous Trigger" in the [Execute] menu.

Execute Selected Subtask

Click the button to place the currently selected subtask in queue and execute it in order. For more details, see "Execute Selected Subtask" in the [Execute] menu.

Record

Click the button to toggle recording ON/OFF in the filmstrip. For more details, see "Record" in the [Execute] menu.

Save Image

Click the button to open the [Image Save Settings] dialog. You can save the image currently displayed in the [Image Viewer]. For more details, see "Save Image" in the [Execute] menu.

Reset

Click the button to reset the device.

(4) Utilities/System

You can use the utilities to check the communication status and log data, or switch accounts.

Industrial Ethernet Communication Monitor

Click the button to display the Industrial Ethernet Communication Monitor. You can check the communication status of I/O signals of the industrial Ethernet communications on the device. For more details, see "Utilities" - "Industrial Ethernet Communication Monitor".

Timing Chart Monitor

Click the button to display the [Timing Chart Monitor] dialog. You can check the status change (ON/OFF) of the device terminals, the execution status of each tool, and the execution status of command instructions from connected devices in the form of a timing chart. For more details, see "Utilities" - "Timing Chart Monitor".

Change Account

Click the button to display the [Login] dialog. To change the account, enter [User Name] and [Password]. For more details, see "System" - "Change Account".

(5) Help

Displays the manual, user support site, and so on.

Manual

Click the button to display the VS Creator User's Manual (this document).

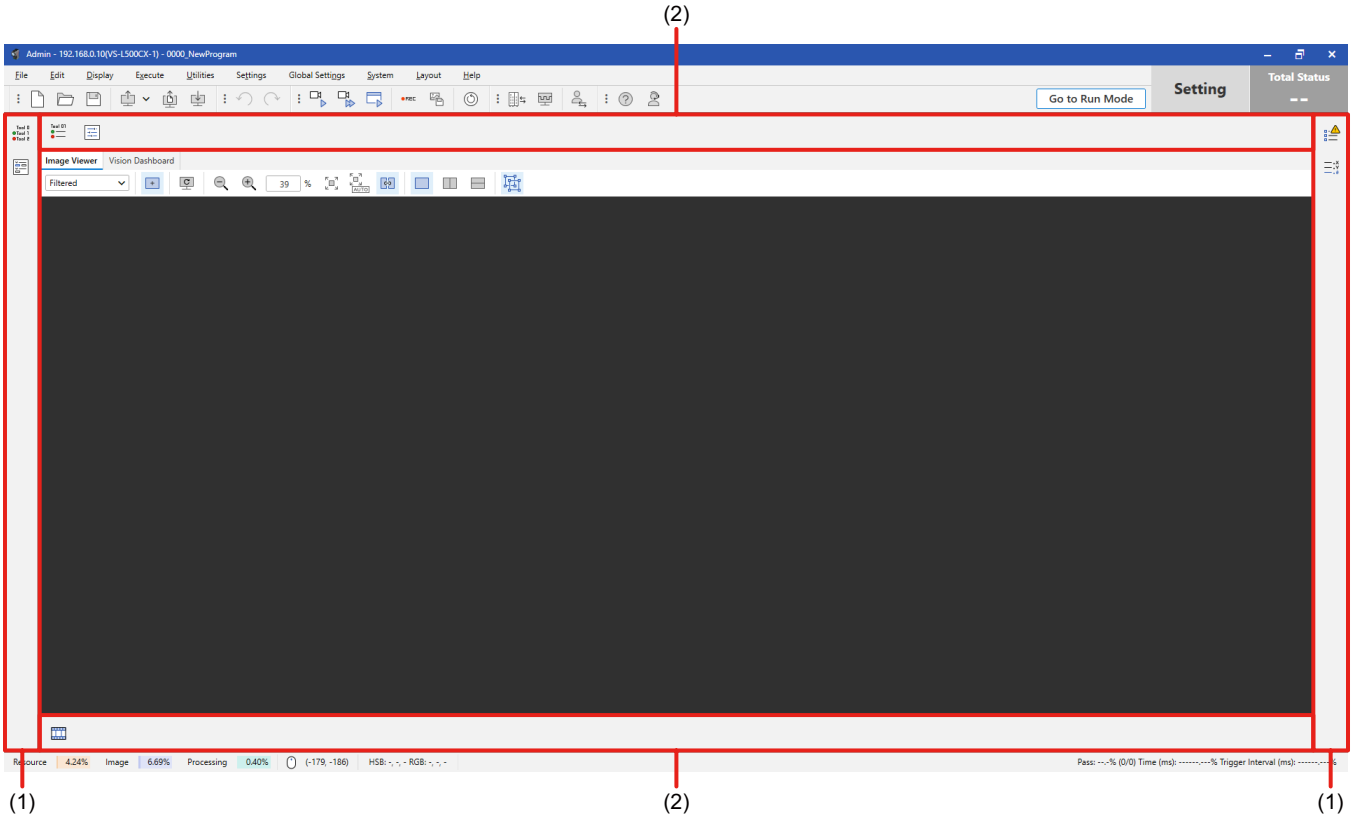
User Support

Click the button to display our user support site via the Internet.

Sidebar

#D005

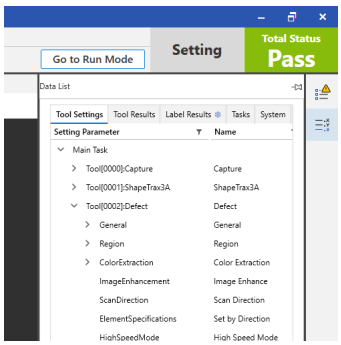
If the main screen becomes cluttered with multiple views, you can temporarily hide the views by moving them to the sidebar. To move views to the sidebar, set View status to "Auto-hide". Views in the "auto-hide" state are moved to the "Left and Right Sidebars" if they are positioned on the left or right side of the main screen; and they are moved to the "Top and Bottom Sidebars" if positioned on the top or bottom edge of the main screen.



Reference For details about how to customize the view display, see "Layout" .

(1) Left and Right Sidebars

Clicking the (Auto-hide) icon in the upper right corner of each view will close the view and display the view's icon in the sidebar.
The sidebar will not be displayed if there is no hidden view. When there are more than one hidden view icons, they will be displayed vertically stacked.
Clicking an icon displays the view again. Click anywhere outside the view to hide it.

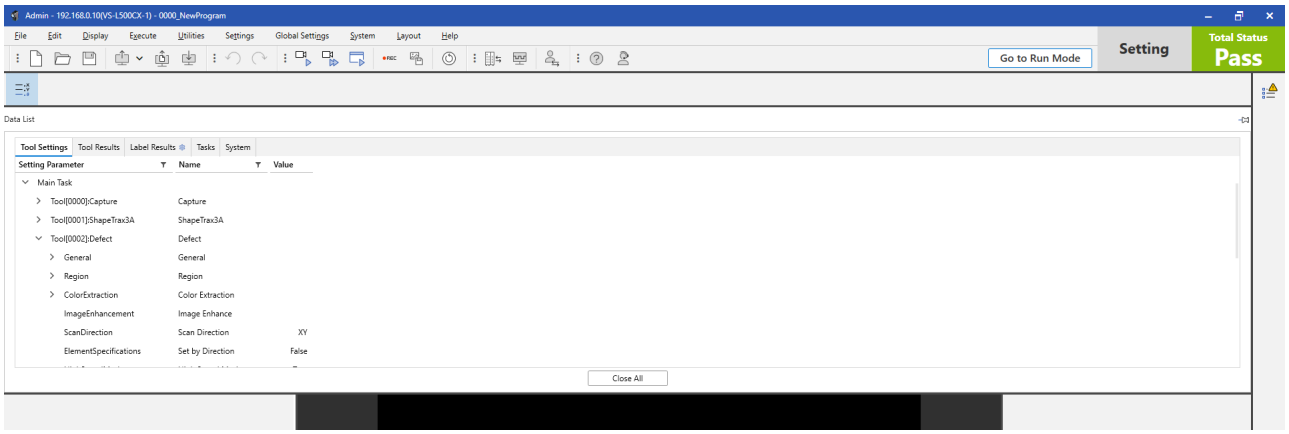


(2) Top and Bottom Sidebars

When you drag a floating view to the top or bottom of the main screen, a translucent blue rectangle will appear. When you drop the view in that position, the view will be docked to fill the entire width of the screen.

Clicking the (Auto-hide) icon in the upper right corner of the view will close the view and display the view icon in the sidebar.

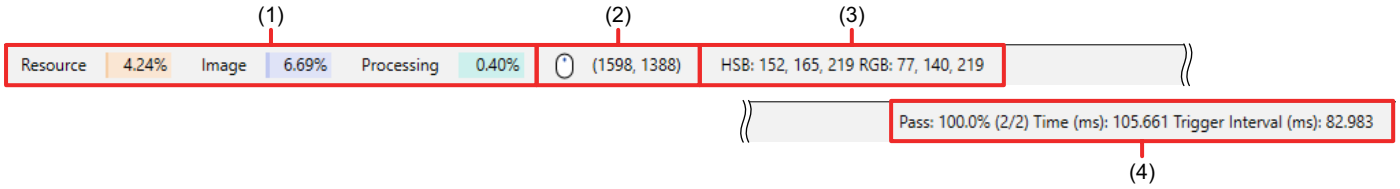
Clicking the view icon will show the view again. Click the (Auto-hide) icon to return the view to the docked state.



Status Bar

#D006

Indicates the current device status.



(1) Memory Usage

The resource memory, image memory, and processing memory usage of the program setting are displayed in color bars and numerical values (%).

Point The values turn red when the usage exceeds 100%.

(2) Cursor Coordinates

Displays the coordinates (X, Y) of the cursor position in the [Image Viewer]. The origin (0, 0) is the upper left corner of the image.

(3) Color Information

Displays the HSB and RGB values of the image at the cursor position.

(4) Overall Task Results

Displays the overall results of the main task.

- **Total Status Result**: Pass Count/Execution Count
  Example "Pass: 99.0% (99/100)"
- **Execution Time (ms)**: Task execution time
- **Trigger Interval (ms)**: Estimate of the shortest possible trigger input interval based on the most recent execution result using the current settings (main task only)

Views

#D007

There are ten types of views as described below.

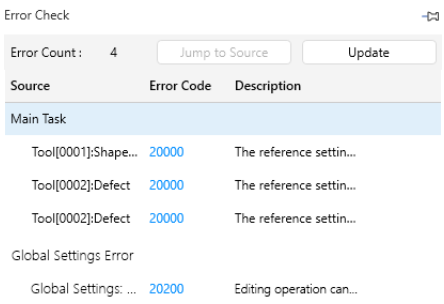
Name	Function
[Task] View	You can add tools and create the program setting.
[Results Overview] View	The task and tool results are listed.
[Tool Results] View	The individual results of the tool selected on the [Task] view are displayed.
[Properties] View	The settings of tools, etc. are displayed.
[Image Viewer]	The input image associated with the tool selected on the [Task] view is displayed.
[Vision Dashboard] View	You can display the results of tools and/or perform calculations using the results. As with general spreadsheet software, you can also change the display format according to cell values as well as perform operations between cells using functions.
[Custom Screen] Viewer	Customize the operation screen. You can create pages to display camera images, result data, and others, and place buttons, drop-down menus, and others. You can also display pages created with the custom screen on a web browser.
[Data List] View	The tool setting parameters, tool/task result data, and system properties are listed.
[Filmstrip] View	The archived images of the tool selected on the [Task] view are displayed in thumbnails. You can also run simulations using images on your PC.
[Error Check] View	Setting errors that are currently occurring are listed.

Reference

- The [Data List] view and [Error Check] view are initially hidden in the Sidebar.
- Each view can be shown or hidden, or merged with other views to create a custom screen layout (Layout).

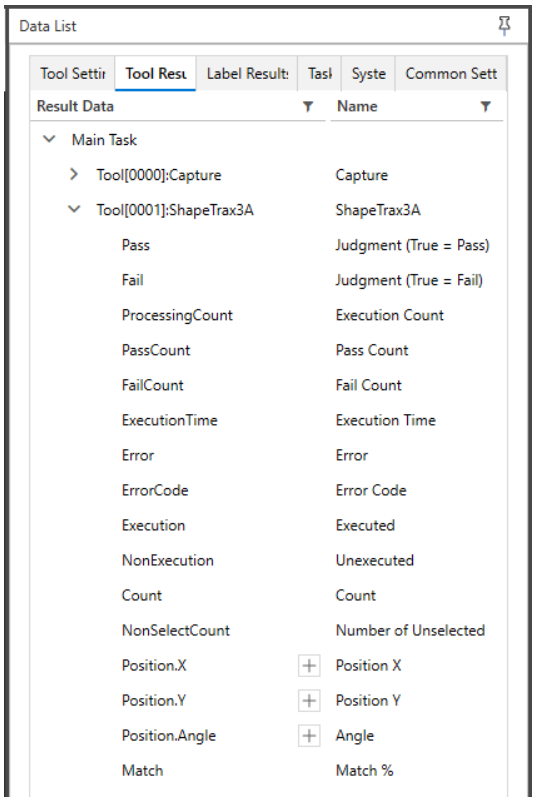
[Error Check] View

Setting errors that are currently occurring are listed in the [Error Check] view. You can check the source and details of setting errors, identify the tool that caused the error on the [Task] view, as well as jump from the error code to the appropriate section of the user's manual (this document). For more details, see "Error Check".



[Data List] View

The [Data List] view lists the setting parameters and result data for the tools and tasks currently placed on the [Task] view. You can easily drag and drop them from the data list to insert them into the tool settings in [Properties] View or cells in [Vision Dashboard] View.



View List

You can switch the tabs below to display the name and value of each data item.

- **Tool Settings**: Tool setting parameters/names/values
- **Tool Results**: Result data/names/values other than tool label results
- **Label Results**: Result data/names/values of tool label results
- **Tasks**: Result data/names/values of the main task and subtasks
- **System**: System properties/names/values
- **Common Settings**: Setting parameters/names/values

The setting parameters under [Tool Settings] are displayed in a tree structure.

Filter

Click the ▼ icon in the header row of the list view to display the dialog. Select the check boxes of the tools you wish to filter and click the [Execute] button.

Reference
- If you wish to filter more precisely, you can set the filter conditions in [Filter].
- Click the [Clear] button to reset the filter criteria.

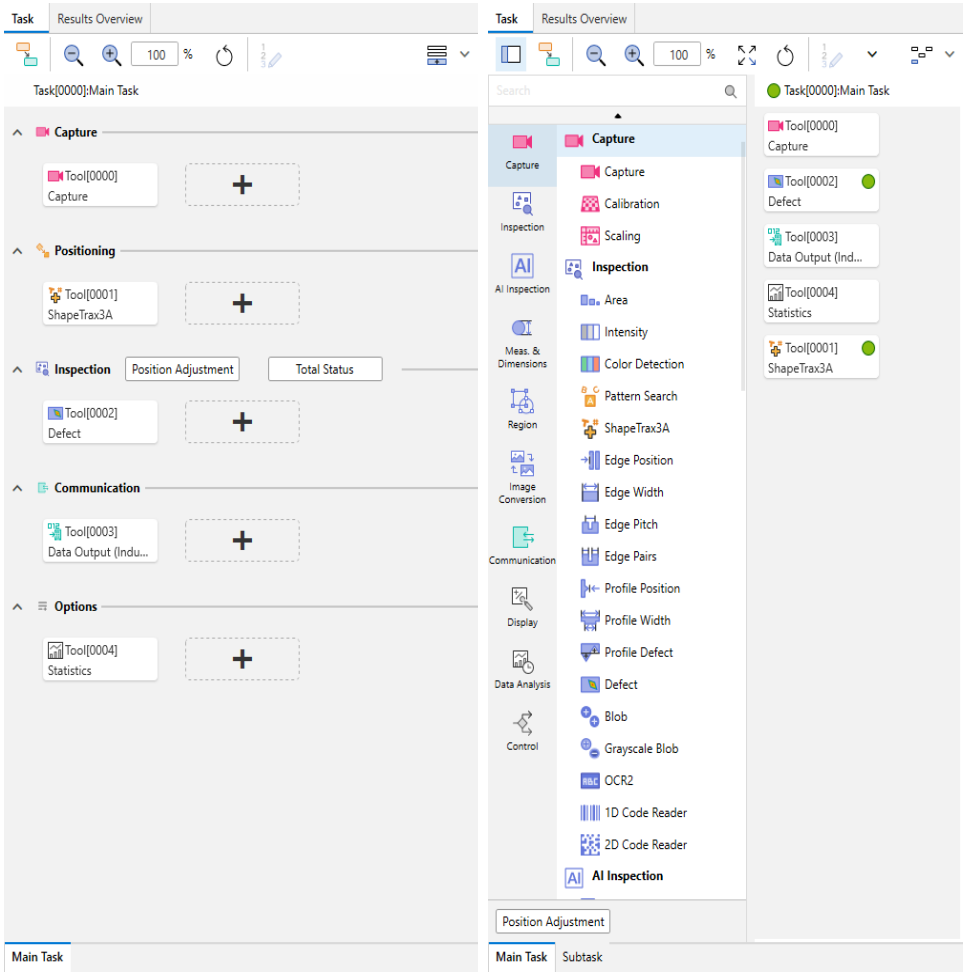
Close All

Click the button to close all trees.

[Task] View

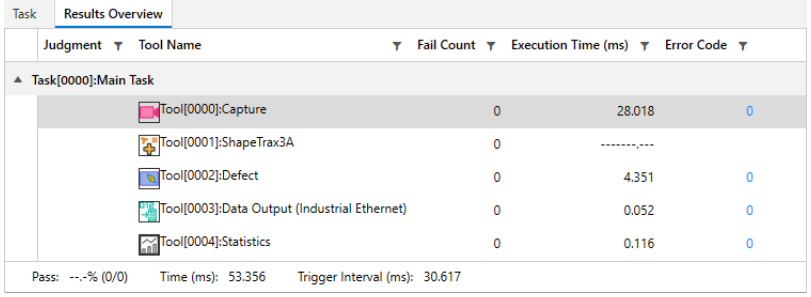
The [Task] view is used to create tasks (main task and subtasks) by placing the capture tool and measurement tools, for example. You can edit task and tool settings in the [Properties] View. You can view the execution results of the entire task in the [Results Overview] View, or check the execution results of individual tasks and tools in the [Tool Results] View. For more details, see "Task".

Two Types of Layouts (Step Layout/Free Layout)



[Results Overview] View

The [Results Overview] view displays the overall results of the main task and subtasks that you created in [Task] View, and the overall results of the tools comprising the tasks, respectively.



Overall Task Results

Displays the task results in the header and footer.

- **Header**
  - **Task Name**: Names of the main task and subtasks
- **Footer**
  - **Total Task Status**: Task OK Ratio (%) and OK Count/Execution Count
  - **Time (ms)**: Task execution time
  - **Trigger Interval (ms)**: Estimate of the shortest possible trigger input interval based on the most recent execution result using the current settings (main task only)

Overall Tool Results

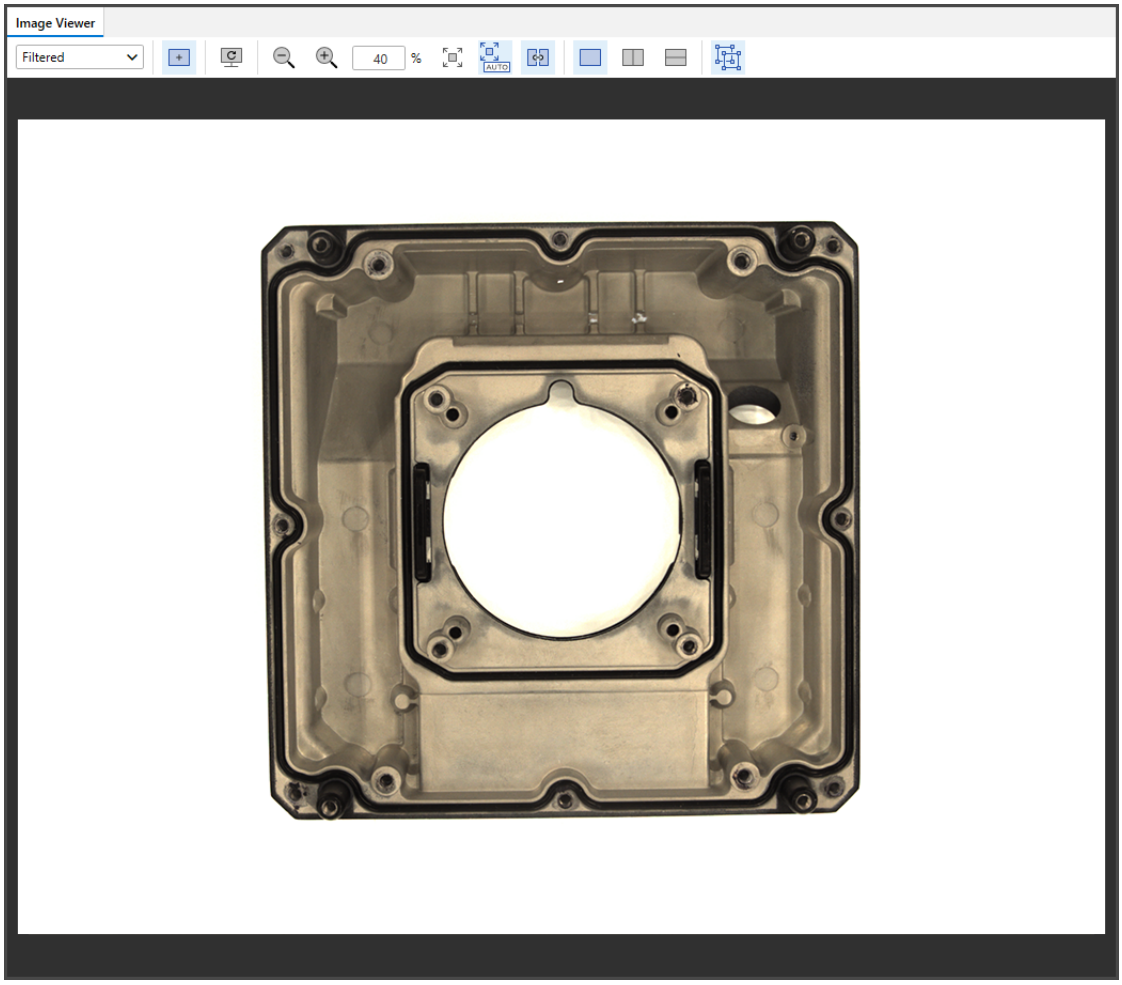
Displays the tool results row by row. In the pop-up that appears when you right-click the heading, you can choose whether to show or hide each item.

Column	Description
Judgment	Judgment result icon
Tool ID*1	Tool ID
Tool Name	Tool Type Icon and Tool Name
Execution Order*1	The tool execution order is displayed. The order determined by the current settings will be displayed instead of the order after execution.
Execution Count*1	Cumulative Execution Count
Pass Count*1	Cumulative Pass Count
Fail Count	Cumulative Fail Count
Execution Time	Execution Time (unit: msec)
Error Code	Error codes for runtime errors If there is no error, "0" is displayed. Hovering the cursor over an error code displays a tooltip containing the error message. Click the error code to view the error message and an explanation about its cause and countermeasure. → "Appendix" - "Error Code List"
Position Adjustment*1	Tool ID of the position adjustment reference tool • It will be blank if [Position Adjustment] is set to "None". • "Specify Individually" will be displayed if it is specified individually in [Position Adjustment].
Group*1	Name of the group to which the tool belongs

*1:It is not displayed by default.

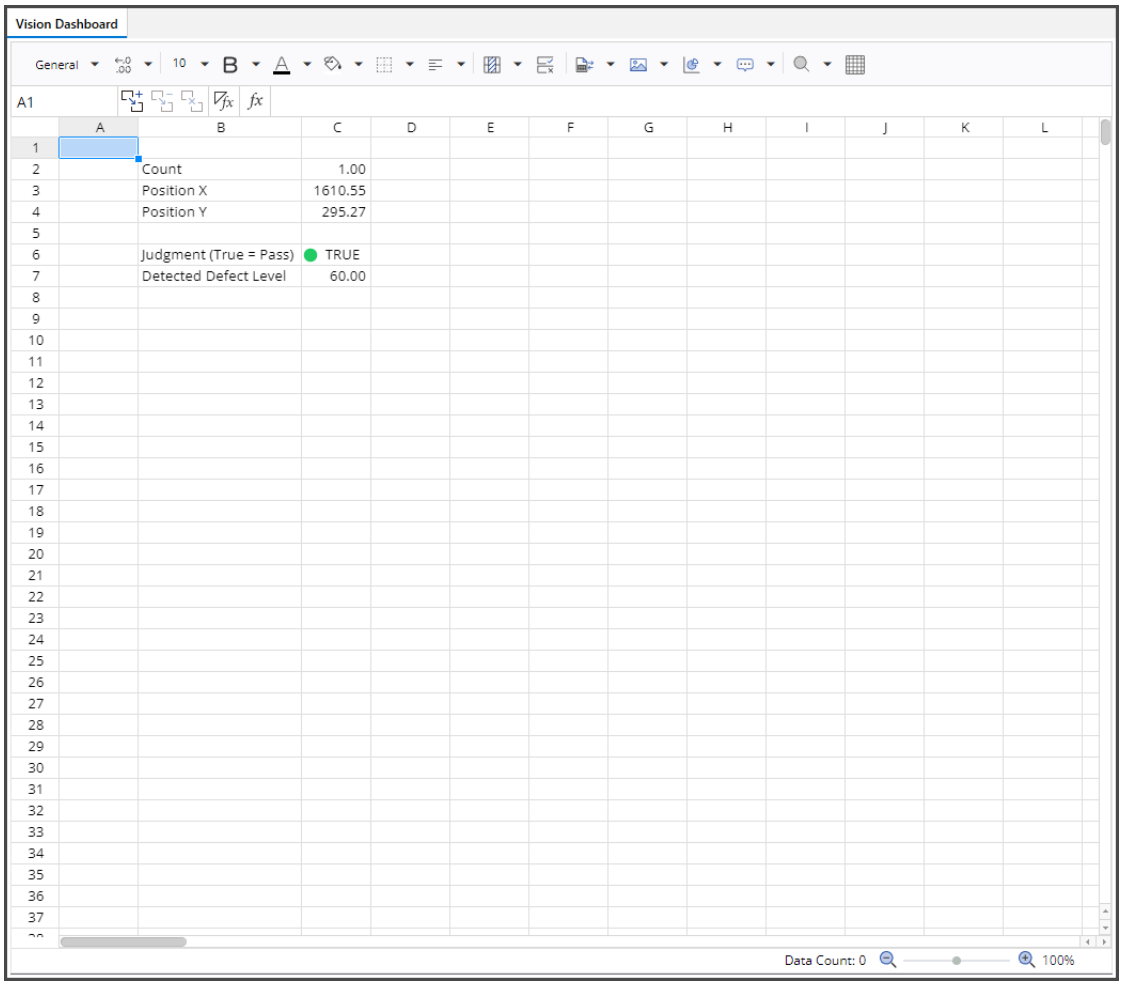
[Image Viewer]

The [Image Viewer] is used to display input images associated with the tool selected on the [Task] view, the inspection region, as well as graphics of the processing result (such as the defect position, detected line, detected circle, and so on). You can edit the region directly in the [Image Viewer], and change the display image type to check the processing result. For more details, see ."Image Viewer"



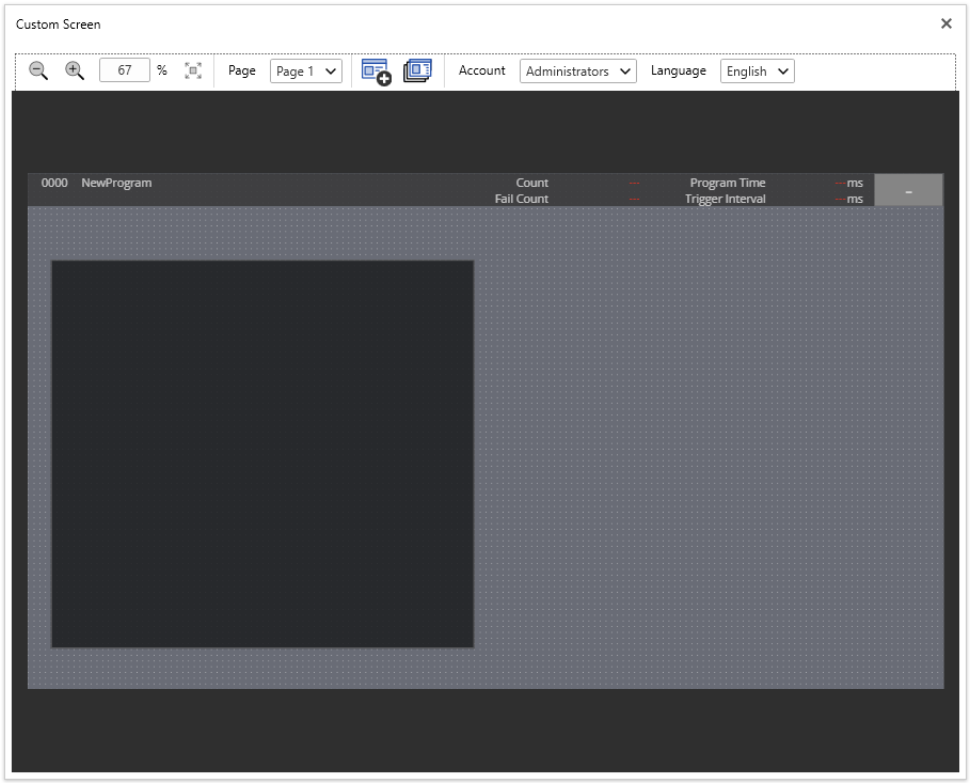
[Vision Dashboard] View

In the [Vision Dashboard] view, you can use the tool results to create tables and graphs, and perform spreadsheet and function calculations with the tool results data. It can be used in a variety of ways, such as creating tables and graphs from the processing results of multiple tools for production control, or using functions to calculate the tool processing results and use the calculation results as tool settings. You can input the items you wish to use directly into cells or drag & drop them from the [Data List] View, [Properties] View, or [Tool Results] View.
For more details, see "Vision Dashboard".


Vision Dashboard
General
10
A1
Count 1.00
Position X 1610.55
Position Y 295.27
Judgment (True = Pass) TRUE
Detected Defect Level 60.00
Data Count: 0
100%

[Custom Screen] Viewer

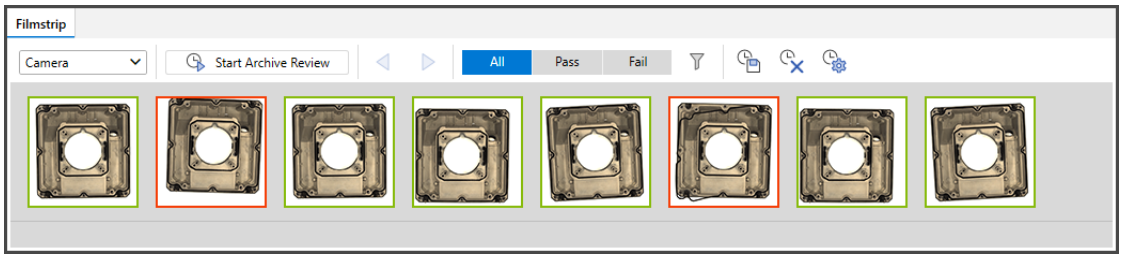
Customize the operation screen. You can create pages to display camera images, result data, and others, and place buttons, drop-down menus, and others. You can also display pages created with the custom screen on a web browser. For details, see "Custom Screen".



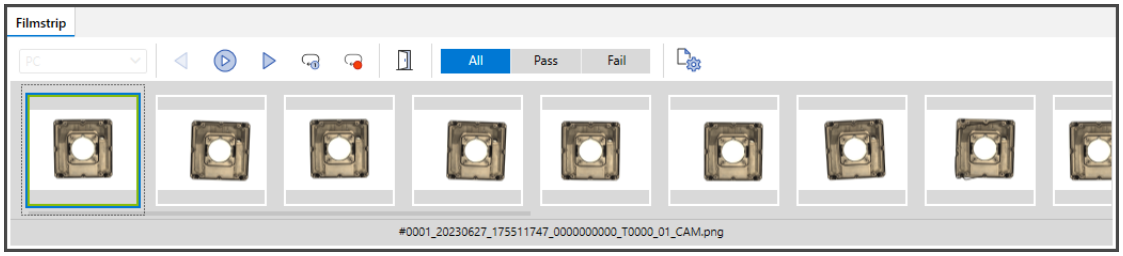
[Filmstrip] View

In the [Filmstrip] view, you can display archived images to review inspection results (Archive Review), or you can display specified images to execute a simulation (Simulation Execution). For more details, see "Filmstrip".

"Archive Review" Display

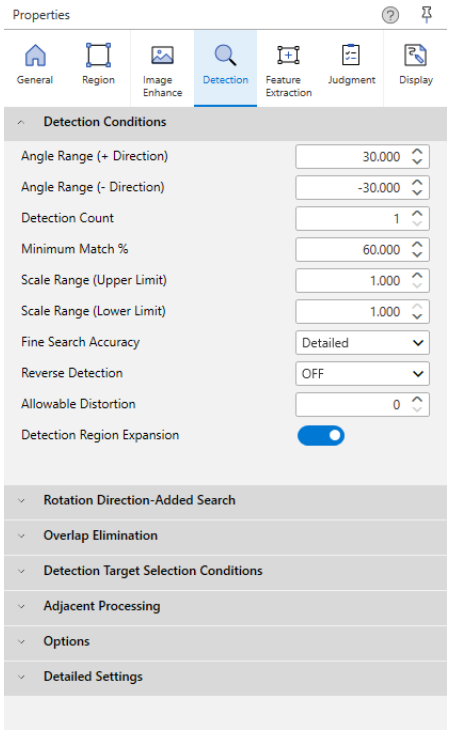


"Simulation Execution" Display



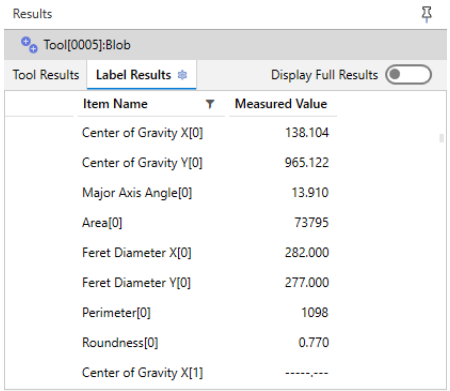
[Properties] View

The [Properties] view is where you configure tools, tasks, groups, and other settings that you have added to the [Task] View. The [Properties] view displays the setting parameters of the currently selected tool. You can adjust the setting parameters to set the program details. Various setting parameters can be made to reference other setting parameters by dragging & dropping them from the [Data List] View or to reference the calculation results in the [Vision Dashboard] View. For more details, see "Properties".



[Tool Results] View

The individual results of the currently selected tool are displayed.



Point If a runtime error has occurred, the error number and message are displayed at the position of the tool name.

Display Full Results

Sets whether all results displayed in the [Data List] view are displayed in the [Results] view (default: OFF).

Tool Results/Label Results

Label results are displayed if the selected tool has label results. Click on the tabs to toggle the display.

In the Case of Tool Results

- Judgment: Judgment Result icon
- Item name: Tool Results (other than Label Results)
  - Execution time: Execution Time (unit: msec)
  - Error code: Error code of the runtime error. If there is no error, "0" is displayed. Hovering the cursor over the error code displays a tooltip containing the error message. Click the error code to display "Appendix" - "Error Code List".

  Other tool results vary depending on the tool.
- Measured value: Displays the measured value of each item in the color corresponding to the judgment.
  Pass: Green
  Fail: Red
  No judgment: Normal color

In the Case of Label Results

- Item name: Measurement item and label number
- Measured value: Measured value of each item
  Click the button on the [Label Results] tab to display the [Label Display Settings] dialog. You can set [Starting Index] and [Count].

Point When you drag and drop an item onto the vision dashboard, the cell is populated with a formula that references the selected result.

File

By the [File] menu on the menu bar, you can perform operations related to Setting Files using the VS Creator. See "Function overview" for details of the operation.

Setting Files and Folder Configuration

#D008

Settings of the VS series are maintained in different files of individual purposes. The VS series has the setting data files listed below.

- Vision system programs, which are the core of the setting data, are maintained in individual *program settings*. The intended processing can be made by opening an appropriate program setting and loading it.
- Some setting files are maintained for individual program settings, and some of them are shared across different program settings in each device.

Point Do not change the file names and folder names of setting data files other than those that you configured. Most of the file names and folder names are given automatically. Therefore, if you change a file name directly by Windows Explorer or other tools, the data may become unusable.

Setting Files

Global Settings Files

- Global Settings File (Environment.vse)
- Hardware information file (HardwareInfo.hin)
- Device specific information file (DeviceInfo.din)
- Account Settings File (Account.acc)

Settings Files Shared Across Program Settings

- Library File (<name>. lbr, <name>. albr)
- ZoomTrax File (<three-digit number>_ZoomTrax.opt)
- Scaling Coefficient File (CAM_<name>.scl)
- Calibration Settings File (CAM_<name>.clb)
- Startup program setting file (StartupProgram.stp)
- Robot Calibration Settings File (<name>.rclb)
- Cell Values Shared File (<number>_<name>.vdcv)

Files Related to Program Settings

- Program setting (folder) (<4-digit number>_<name>)
- Program setting (Text Format) (Inspection.vsit)
- Program setting (Binary Format) (Inspection.vsib)
- Model image (<3-digit number>_<name>.png)
- Pattern data (Pattern Search) (PatternSearch.ptnp)
- Pattern data (ShapeTrax3A) (ShapeTrax3A.ptns)
- Pattern data (Subtraction Filter) (SubtractionFilter.sbt)
- Pattern data (Image Region (Model Image)) (ImageRegion.ptni)
- Eraser Tool (ShapeTrax3A) (ShapeTrax3A.ers)

- Inference model (AI Classification: AiClassification.mdlc, AI Detection: AiDetection.mdld, AI Segmentation: AiModel.mdl)
- Dataset Image file (<name>.png)

Folder Configuration

The VS Creator maintains these setting files in different folders in the internal storage of the device or the microSD card. Manage files in devices by [File] - [Manage Files] from the menu bar of the main screen.

Point For a simulator, folders and files are created directly under the simulator base path that has been configured by [System] - [VS Creator Settings] from the menu bar of the [Connect to Device] screen.

Folder structure of the device

[Example]
Tool ID 0001: Pattern Search
Tool ID 0002: ShapeTrax3A
Tool ID 0003: Subtraction Filter
Tool ID 0004: Image Region (Model Image)
Tool ID 0005: AI Classification
Tool ID 0006: AI Detection
Tool ID 0007: AI Segmentation

```
VS camera
├─ [EM]
│  └─ [VS]
│     ├─ Environment.vse (Global settings file)
│     ├─ HardwareInfo.hin (Hardware information file)
│     ├─ DeviceInfo.din (Device specific information file)
│     ├─ Account.acc (Account setting file)
│     └─ [Camera]
│        └─ [Programs]
│           ├─ Library0.lbr/Library0.albr (Library file)
│           ├─ 000_ZoomTrax.opt (ZoomTrax file)
│           ├─ CAM_Scale0.scl (Scaling coefficient file)
│           ├─ CAM_CalibrationModel0.clb (Calibration settings file)
│           ├─ StartupProgram.stp (Startup Program Setting File)
│           ├─ 00_VisionDashboardCellValues.vdcv (Cell values shared file)
│           ├─ RobotCalibrationModel0.rclb (Robot calibration settings file)
│           ├─ [0000_NewProgram]
│           │  ├─ Inspection.vsit (Program setting (Text format file))
│           │  ├─ ProgramComponents.proj (Project components file)
│           │  ├─ DataSetCollection.dsc (Dataset management file)
│           │  ├─ [ModelImages]
│           │  │  └─ 000_Model.png (Model image)
│           │  ├─ [SoftwareSettings]
│           │  │  └─ [Page00]
│           │  ├─ [AiDataset]
│           │  │  ├─ [Folder name defined by GUID]
│           │  │  │  └─ Image file name.png (Dataset image file)
│           │  │  └─ [Annotation]
│           │  │     └─ [Folder name defined by GUID]
│           │  │        └─ Image file name.png (Annotation image file)
│           │  ├─ [SimulationImages]
│           │  │  └─ Image file
│           │  ├─ [T001]
│           │  │  └─ PatternSearch.ptnp (Pattern data (Pattern Search))
│           │  ├─ [T002]
│           │  │  ├─ ShapeTrax3A.ptns (Pattern data (ShapeTrax3A))
│           │  │  └─ ShapeTrax3A.ers (Eraser tool (ShapeTrax3A))
│           │  ├─ [T003]
│           │  │  └─ SubtractionFilter.sbt (Pattern data (Subtraction Filter))
│           │  ├─ [T004]
│           │  │  └─ ImageRegion.ptni (Pattern data (Image Region (Model Image)))
│           │  ├─ [T005]
│           │  │  └─ AiClassification.mdlc (Inference model (AI Classification))
│           │  ├─ [T006]
│           │  │  └─ AiDetection.mdld (Inference model (AI Detection))
│           │  └─ [T007]
│           │     └─ AiModel.mdl (Inference model (AI Segmentation))
│           └─ [0001_NewProgram]
│              ├─ Inspection.vsib (Program setting (Binary format file))
│              │  ├─ SoftwareSettings
│              │  │  ├─ VisionDashboard.json (Vision Dashboard information file)
│              │  │  ├─ image*.bmp (Vision Dashboard image file)
│              │  │  └─ Version.json (Version information file)
│              │  └─ SimulationImage (Simulation image file)
│              ├─ ProgramComponents.proj (Project components file)
│              └─ [ModelImages]
│                 └─ 001_Model.png (Model image)
└─ [SD]
   └─ [VS]
      └─ [Camera]
         ├─ [Programs]
         │  ├─ [0000_NewProgram]
         │  └─ [0001_NewProgram]
         ├─ [Images]
         │  ├─ Image000.png
         │  └─ Image001.png
         └─ [Results]
```

Function overview

#D009

With the [File] menu, you make operations such as storing, transferring, exporting, and importing different types of files handled by the VS Creator such as program settings, images, and ZoomTrax settings. Also, you make operations on the internal storage and microSD card that store files. Selecting [File] from the menu bar displays the submenu that is commensurate to the permission level of your account. For details of each menu item, see the referenced content.

Menu items		Operational permissions based on account permission levels		
		Full control	Edit	View only
Create New Program Setting		✓	–	–
Open Program Setting		✓	✓*1	–
Save		✓	✓*1	–
Save As		✓	✓*1	–
Convert File Format and Save		✓	✓*1	–
Rename Program Setting		✓	–	–
Delete Program Setting		✓	–	–
Convert Program Setting to Latest Version		✓	–	–
Open Program Setting Backup Folder		✓	✓*1	–
Transfer File	Program Settings	✓	–	–
	Images and Other Files	✓	–	–
Export Settings		✓	–	–
Import Settings		✓	–	–
Manage ZoomTrax Settings		✓	–	–
Manage Model Images		✓	–	–
Manage Files		✓	–	–
Remove SD Card		✓	✓	✓
Exit		✓	✓	✓

*1:Depends on settings.

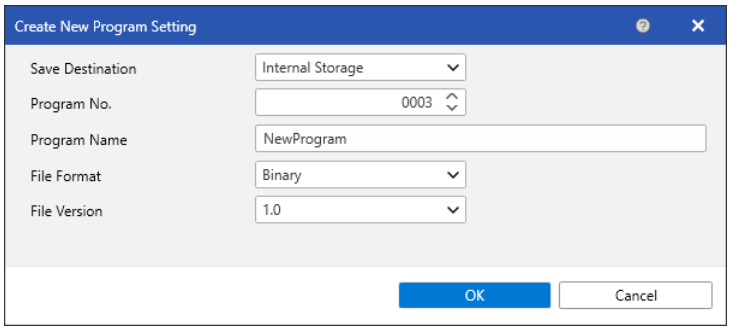
Create New Program Setting

#D010

Selecting [File] - [Create New Program Setting] from the menu bar displays the [Create New Program Setting] dialog. Set the storage location, name, and other properties of the program setting that you will create.
The new program setting that you have just created is not configured for measurement, so you need to place tools in the [Task] view and configure properties.

[Create New Program Setting] dialog

You can set the following items in this dialog.



Save Destination

From the drop-down list, select a storage location for the program setting that you will create.

- **Internal Storage** (default): The program setting is stored in the internal storage of the device.
- **SD Card**: The program setting is stored in the microSD card. This is not displayed when no microSD card is inserted to the device.

Program No.

Set a number for the program setting that you will create. By default, the smallest unused number is displayed. You cannot set a number that is already used.

Program Name

Set a name for the program setting that you will create (default: NewProgram).

File Format

Select a file format (Text or Binary) for the program setting that you will create. By default, this field displays the file format of the currently loaded program setting. Select [Text] if you want to check the setting content or compare it with a different one to find difference.

Point

If you enable any of the following functions, the program setting is stored in the [Binary] format.

- Tool Protection
- Vision Dashboard Protection
- Program Setting Protection

File Version

Select the file version of the program setting to be created from the drop-down list.

Point The upper limit file version that can be set is the lower of the firmware of the device being connected or the VS Creator software.

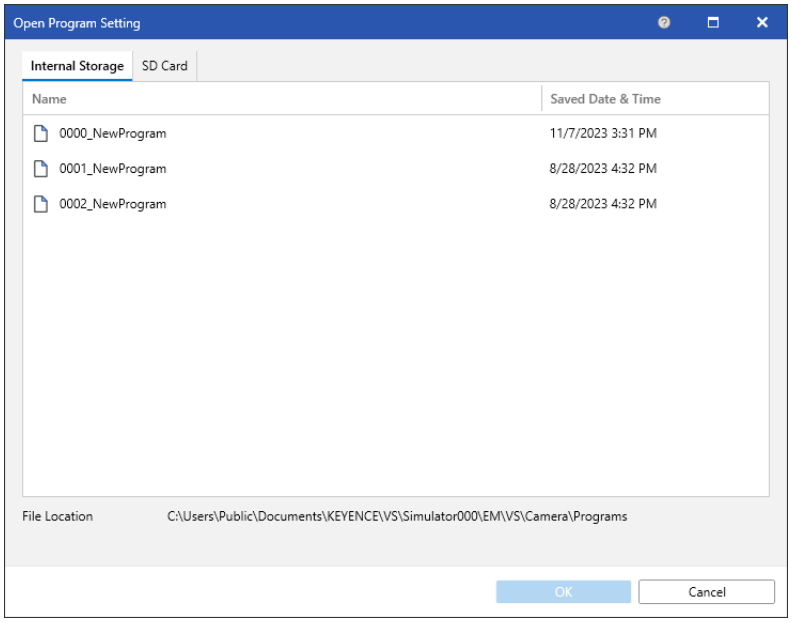
Open Program Setting

#D011

Switch from the currently displayed program setting to a different one.
Selecting [File] - [Open Program Setting] from the menu bar displays the [Open Program Setting] dialog. Select the target program setting. You can switch program settings also in Run Mode.

[Open Program Setting] dialog

You can set the following items in this dialog.



Internal Storage / SD Card

Point The [SD Card] tab is not displayed when no microSD card is inserted to the device.

Switch between storage locations of the program setting using the tabs. By default, the storage location of the currently loaded program setting is selected. If no program setting is loaded, the [Internal Storage] tab is selected.

Reference In the case of a simulator, select a folder from the drive of the simulator.

List of program settings

Program settings are listed with their names and dates and times of update. Select a program setting and click the [OK] button to switch to the program setting.

Point If the current program setting is being edited when you click the [OK] button, a message appears asking if you want to save the program setting. If you select the [Save a Backup on the PC] check box, a backup of the program setting is saved in the computer.

Reference

- You can change the name of the selected program setting by clicking it again.
- You can also switch to another program setting by double-clicking it.
- Clicking [Name] or [Saved Date & Time] sorts the list by name or update date and time.

File Location

Displays the full path of the storage location of the currently listed program settings.

Save

#D012

Selecting [File] - [Save] from the menu bar overwrites the program setting file with the setting content currently edited. If you want to save the edited setting content as a different program setting, save it with a different name. (See "Save As".)

Point

- A message is displayed asking if you want to save the setting. If you select the [Save a Backup on the PC] check box, a backup of the program setting is saved in the backup folder. (See "Open Program Setting Backup Folder".)
- If you enable any of the following functions, the program setting is stored in the [Binary] format.
  - –Tool Protection
  - –Vision Dashboard Protection
  - –Program Setting Protection

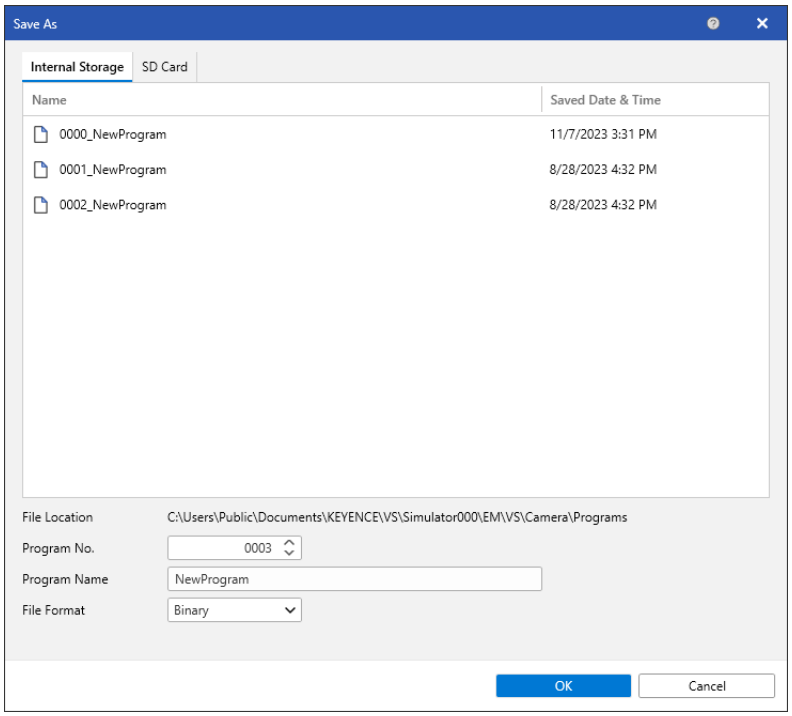
Save As

#D013

Save the currently displayed program setting with a different name. Use this function to store the currently edited setting while retaining the original program setting.
Selecting [File] - [Save As] from the menu bar displays the [Save As] dialog. Save the program setting with any name (Program No. Program Name). Then, the currently loaded program setting is replaced by the saved program setting.

[Save As] dialog

You can set the following items in this dialog.



Internal Storage / SD Card

Point The [SD Card] tab is not displayed when no microSD card is inserted to the device.

Switch between storage locations of the program setting using the tabs. By default, the storage location of the currently loaded program setting is selected. If no program setting is loaded, the [Internal Storage] tab is selected.

Reference In the case of a simulator, select a folder from the drive of the simulator.

List of program settings

The name of the program setting and the date and time of the update are displayed.

Reference
- Click [Name] or [Saved Date & Time] to change the sort order.
- You can change the name of the selected program setting by clicking it again.

File Location

Displays the full path of the storage location of the currently listed program settings.

Program No.

Set a number for the program setting. By default, the smallest unused number is displayed. You cannot set a number that is already used.

Program Name

Set a name for the program setting (default: NewProgram).

File Format

Select a file format (Text or Binary) for the program setting. By default, this field displays the file format of the currently loaded program setting. Select [Text] if you want to check the setting content or compare it with a different one to find difference.

Point If you enable any of the following functions, the program setting is stored in the [Binary] format.

- Tool Protection
- Vision Dashboard Protection
- Program Setting Protection

Convert File Format and Save

#D014

The program setting file can be in the text format or the binary format.

- **Text format**: You can view the setting content by a tool such as a text editor. The text format takes more time to load the program setting than the binary format.
- **Binary format**: You cannot view the setting content by a tool such as a text editor. The binary format is faster in loading the program setting than the text format.

You can use one of these file formats for program settings to suit the purpose of use or the environment.
Selecting [File] - [Convert File Format and Save] from the menu bar displays a submenu. When you select a file format to convert to in the submenu, the file format of the currently displayed program setting changes accordingly.

Point

- [Convert File Format and Save] is grayed out and cannot be selected when one of the following functions is enabled.
  - –Tool Protection
  - –Vision Dashboard Protection
  - –Program Setting Protection
- If you change the format of a program setting and save it, the program setting file in the previous format is deleted.

Convert to Text Format

This is displayed when the current program setting is saved in the binary format. Selecting this saves the program setting in the text format without changing the name (Inspection.vsit).

Convert to Binary Format

This is displayed when the current program setting is saved in the text format. Selecting this saves the program setting in the binary format without changing the name (Inspection.vsib).

Rename Program Setting

#D015

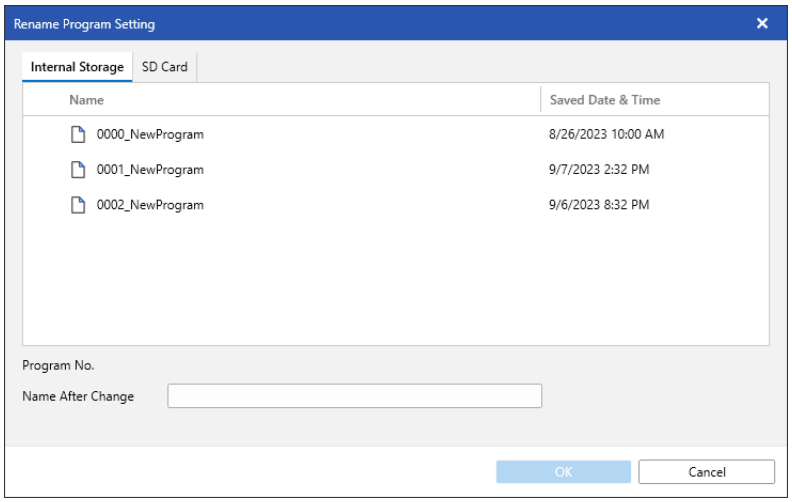
On the menu bar, select [File] - [Rename Program Setting] to open the [Rename Program Setting] dialog. The name for existing program settings can be changed.

Point If the name of the program setting is changed, the name of the folder containing the file to be linked will change and the file path will not be recognized.
When setting up the following folders, select [Default Folder] in [How to specify the destination folder] to continue to recognize the file path even if the program setting is renamed:

- Save destination folder for [Recording/Simulation Image Settings] - [Recording Settings].
- Folder from which to load [Recording/Simulation Image Settings] - [Simulation Image Settings].
- Folder from which to load [Simulation Image Detailed Settings].
- Save destination folder for [Export Archived Images].
- Save destination folder for [Image Save Settings].

[Rename Program Setting] dialog

Set the below items.



Internal Storage / SD Card

Point The [SD Card] tab is not displayed if no microSD card is inserted into the device.

Switch between storage locations of the program setting using the tabs. The tab for the storage location of the currently loaded program setting is selected by default.

Reference For a simulator, select the folder for the drive on the simulator.

List of program settings

The name of the program setting and the date and time of the update are displayed.

Reference Click [Name] or [Saved Date & Time] to change the sort order.

Program No.

The number for the currently selected program setting is displayed.

Name After Change

Sets the new name for the program setting.

Delete Program Setting

#D066

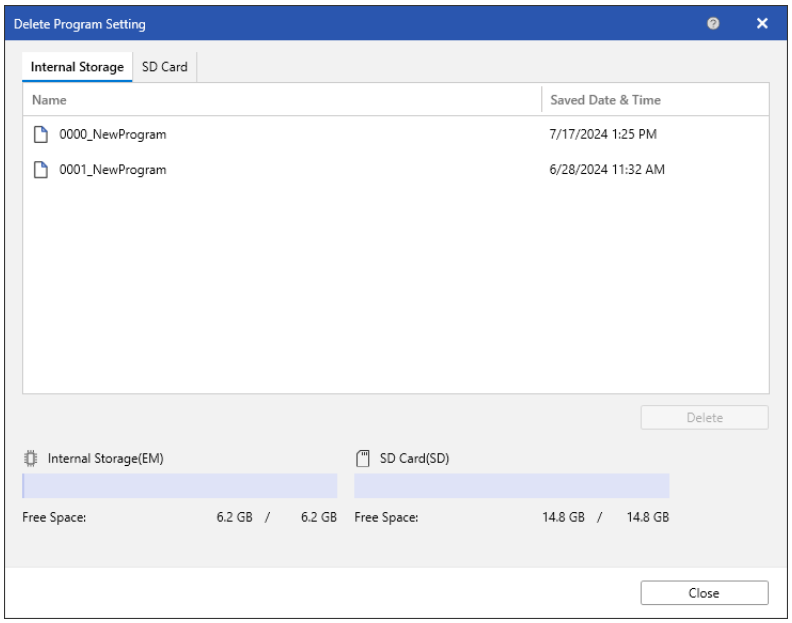
On the menu bar, select [File] - [Delete Program Setting] to open the [Delete Program Setting] dialog. The existing program settings can be deleted.

Point

- Simulation images stored on the computer are not deleted even when the program settings on the device are deleted.
- Simulation images stored on the computer will also be deleted when the program settings on the simulator are deleted.
- The program settings that are being edited cannot be deleted.

[Delete Program Setting] dialog

The registered program settings can be deleted.



Internal Storage / SD Card

Point

The [SD Card] tab is not displayed if no microSD card is inserted into the device.

Switch between storage locations of the program setting using the tabs. The tab for the storage location of the currently loaded program setting is selected by default.

List of program settings

The name of the program setting and the date and time of the update are displayed.

Reference Click [Name] or [Saved Date & Time] to change the sort order.

Drive Capacity

For devices only, the free space and entire space capacity on the internal storage and microSD card (in MB/GB/TB) are displayed.

Point

[SD Card] will not be displayed if no microSD card is inserted into the device.

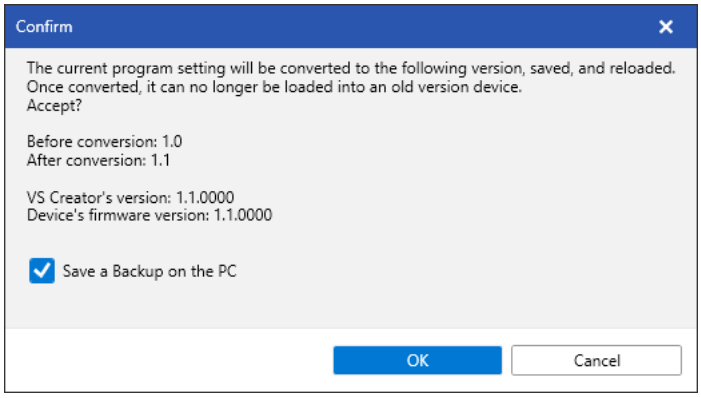
Convert Program Setting to Latest Version

#D016

On the menu bar, select [File] - [Convert Program Setting to Latest Version] to open the [Confirm] dialog. Click the [OK] button to convert and save the currently displayed program setting as the latest file version.

Point

- File versions that can be converted are the lower of the firmware of the device being connected or the VS Creator software.
- If the displayed program setting is the latest file version, the menu item will be greyed out.



- **Before conversion**: The file version for the currently displayed program setting is displayed.
- **After conversion**: The converted file version is displayed.
- **VS Creator’s version**: The software version of VS Creator currently running.
- **Device's firmware version**: The firmware version of the currently connected device.
- **Save a Backup on the PC.** : Selecting the check box backs up the program setting before converting the file version.

Open Program Setting Backup Folder

#D017

By making a backup of the program setting, you can restore the version of a certain point in time in the case when a problem occurs during the creation of the program setting.
Selecting [File] - [Open Program Setting Backup Folder] from the menu bar opens Windows Explorer. Windows Explorer displays the folder that stores the backup file of the current program setting.

- In the case of a device
  <simulator base path>\<MAC address>\EM\VS\Camera\BackupFiles\<settingNumber_settingName>

  Point: When the target program setting is stored in a microSD card, “EM” in the above path becomes “SD”.

- In the case of a simulator
  <simulator base path>\<simulator name>\EM\VS\Camera\BackupFiles\<settingNumber_settingName>

Timing of backing up a program setting

You can make a backup file of a program setting in the following timings:

- When you save a program setting overwriting the stored file
- When you save a program setting with a different file format (Text or Binary)
- When you switch from the Setup Mode to Run Mode after modifying a program setting
- When you modify a program setting and then switch from the program setting to another program setting
- When you modify a program setting and then create another new program setting
- When you modify a program setting and then close the main screen

Point

- The backup file is not saved in the following cases:
  –When saving a program setting specifying its name
  –When saving a program setting by the PS command (including command tools)
  –At restart
- The backup file has the same configuration as files created by the "Export Settings" function. By using a backup file with the "Import Settings" function, you can restore the setting of a VS camera or a simulator.
- A maximum of 20 backup files can be stored for each program setting. When this maximum is exceeded, the oldest one is deleted.

At any of the above timings, a message is displayed asking if you want to save the setting. If you select the [Save a Backup on the PC] check box, the backup file (<settingNumber_settingName>_yyyymodd_hhmiss.zip) is saved in the backup folder. A backup contains the following files:

- All files contained in the program setting folder
- Settings files shared across programs settings
- Global Settings File (environment setting, device specific information, hardware information, and account information)

Transfer File

#D018

Files can be transferred between the computer and devices. You can transfer a program setting file created by the VS Creator to a device to run it. Also, you can transfer a program setting file being used by a device to the computer to adjust setting parameters. You can also use a captured image for simulation and share an Global Settings File between devices via the computer.

Overview of Functions

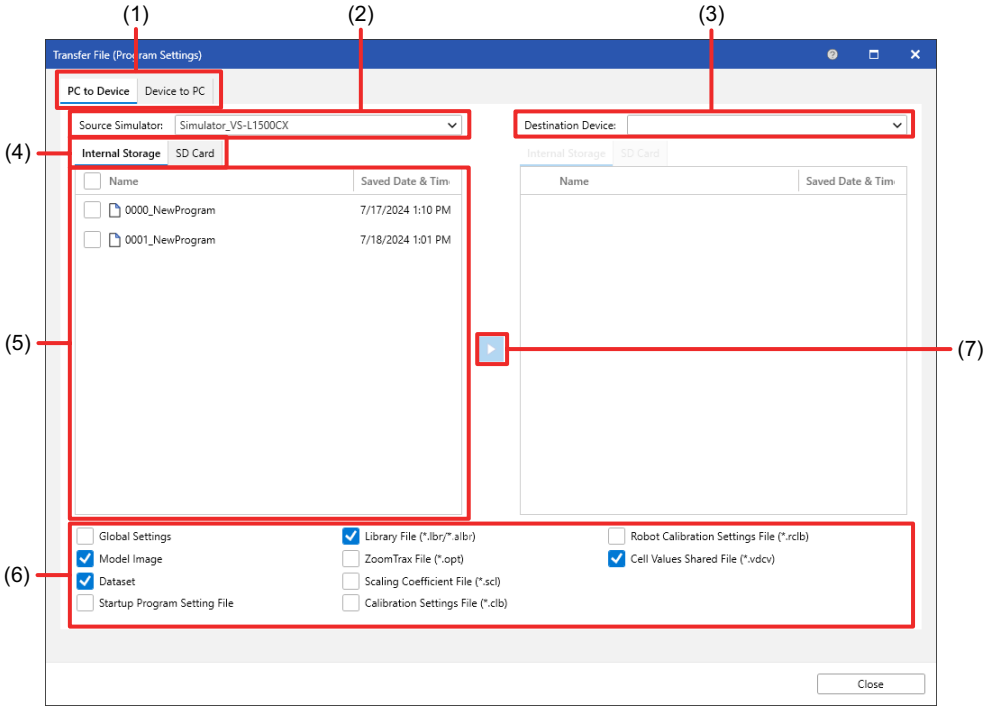
The VS Creator can handle two types of files: setting files (program settings), which have a fixed storage location, and files (images, and other files) that do not have a fixed storage location. When transferring a file between the computer and a device, transfer it in the way suitable for the type of the file.
Selecting [File] - [Transfer File] from the menu bar displays a submenu. Select the target file from the menu (Program Settings or Images and Other Files).

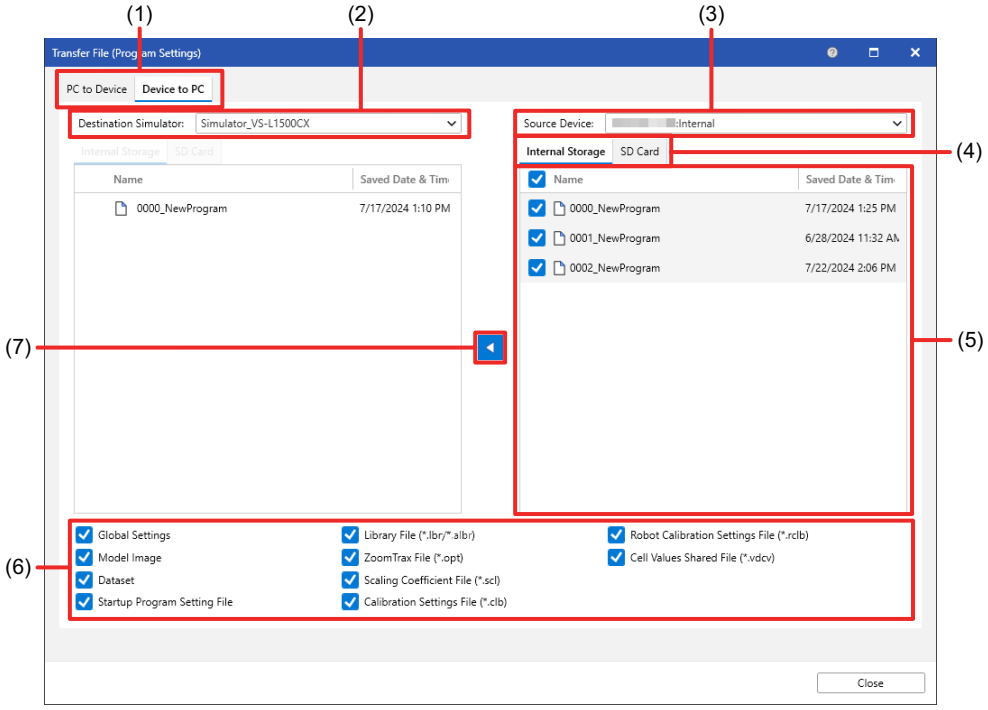
Program Settings

Selecting [File] - [Transfer File] - [Program Settings] from the menu bar displays the [Transfer File (Program Settings)] dialog. Transfer a program setting between the computer and a device.
For the procedure of transferring files, see "Transferring files from the computer to a device" or "Transferring files from a device to the computer".

Screen Details

In the [Transfer File (Program Settings)] dialog, the storage location in the computer is displayed on the left side and the storage location in the device is displayed on the right side, although the screen configuration differs slightly depending on the transfer direction of program settings.





(1) PC to Device / Device to PC

Click either tab to select the transfer direction.

- **PC to Device**: Transfer a setting file from a simulator on the computer to a device.
- **Device to PC**: Transfer a setting file from a device to a simulator on the computer.

(2) Transfer Source Simulator / Transfer Destination Simulator

This field displays [Transfer Source Simulator] when the [PC to Device] tab is selected and [Transfer Destination Simulator] when the [Device to PC] tab is selected.
Select the target simulator from the drop-down menu (default: currently connected simulator).

Reference In the case of [Transfer Destination Simulator], [Create New Simulator] is displayed in the drop-down menu. Select this item to add a simulator. For details, see "Adding from [Transfer File (Program Settings)] Dialog."

(3) Transfer Destination Device / Transfer Source Device

This field displays [Transfer Destination Device] when the [PC to Device] tab is selected and [Transfer Source Device] when the [Device to PC] tab is selected.
Select the target device (IP address : device name) from the drop-down menu (default: currently connected device).

(4) Internal Storage / SD Card

Use these tabs to switch between the storage locations of program settings (Programs folder) in the transfer source simulator/device (default: Internal Storage). The storage location in the transfer destination switches in accordance with the transfer source.

(5) List of program settings

Program settings are listed with their names and dates and times of update. In the transfer source simulator/device, select the check box of the program setting to transfer.

Reference
- Clicking [Name] or [Saved Date & Time] sorts the list by name or update date and time.
- Selecting the [Name] check box selects all program settings.

(6) Shared settings file

Configure the shared settings file to be transferred together with the program setting. Select the check boxes for the files to be transferred.

Point If the program settings are to be overwritten at the transfer destination, the model images and datasets are transferred after once deleting the data in each folder. Take note of this if you want to keep the existing data at the transfer destination separately.

- **Global Settings**
  The global settings file (Environment.vse) and the account settings file (Account.acc) in the VS folder of the internal storage are transferred.

  Point Device-specific information files and hardware information files are not included.
- **Model Image**
  Model images in the ModelImages folder of the program settings folder are transferred.
- **Dataset**
  The dataset in the AiDataset folder of the program settings folder is transferred.
- **Startup Program Setting File**
  The file (StartupProgram.stp) specifying the program setting to be run at start-up in the Programs folder of the internal storage is transferred.
- **Library File (*.lbr/*.albr)**
  Library files (*.lbr, *.albr) in the Programs folder of the internal storage are transferred.
- **ZoomTrax File (*.opt)**
  The ZoomTrax settings file (*.opt) in the Programs folder of the internal storage is transferred.
- **Scaling Coefficient File (*.scl)**
  The scaling coefficient file (*.scl) in the Programs folder of the internal storage is transferred.

- **Calibration Settings File (*.clb)**
  The calibration settings file (*.clb) in the Programs folder of the internal storage is transferred.
- **Robot Calibration Settings File (*.rclb)**
  The robot calibration settings file (*.rclb) in the Programs folder of the internal storage is transferred.
- **Cell Values Shared File (*.vdcv)**
  The cell values shared file (*.vdcv) in the Programs folder of the internal storage is transferred.

The default value of the check for each shared settings file depends on the transfer direction.

Transferred files	Default setting	
	PC to Device	Device to PC
Global Settings	OFF	ON
Model Image	ON	ON
Dataset	ON	ON
Startup Program Setting File	OFF	ON
Library File (*.lbr/*.albr)	ON	ON
ZoomTrax File (*.opt)	OFF	ON
Scaling Coefficient File (*.scl)	OFF	ON
Calibration Settings File (*.clb)	OFF	ON
Robot Calibration Settings File (*.rclb)	OFF	ON
Cell Values Shared File (*.vdcv)	ON	ON

(7) ◁ / ▷

Clicking these buttons transfers the program settings selected in the transfer source to the transfer destination.

Point

- Program settings are transferred one by one, and transfer is stopped when the space is exhausted in the destination.
- If there is a file in the destination having the same name as a transferred file, the file in the destination is overwritten.
- If [Global Settings] is ON, a message is displayed at the completion of PC-to-device transfer, prompting you to reboot the device.
- In the following cases, a message is displayed at the completion of transfer, prompting you to reload the program setting.
  –When a program setting is transferred from a device to overwrite the program setting being run on the simulator that is connected from the main screen
  –When a program setting is transferred from a simulator to overwrite the program setting being run on a device

Transferring files from the computer to a device

Transfer program setting files from the computer to a device in the following steps:

1 Click the [PC to Device] tab.

2 Select the target simulator from the [Transfer Source Simulator] drop-down menu.

3 Click the [Internal Storage] tab or the [SD Card] tab.

4 Select the check boxes of the program settings to transfer.

5 Select the check boxes for the shared settings files to be transferred if necessary.

6 From the [Transfer Destination Device] drop-down menu, select the target device.

7 Click the ▷ button.
The program setting files are transferred.

Transferring files from a device to the computer

Transfer program setting files from a device to the computer in the following steps

1 Click the [Device to PC] tab.

2 From the [Transfer Source Device] drop-down menu, select the target device.

3 Click the [Internal Storage] tab or the [SD Card] tab.

4 Select the check boxes of the program settings to transfer.

5 Select the check boxes for the shared settings files to be transferred if necessary.

6 Select the target simulator from the [Transfer Destination Simulator] drop-down menu.

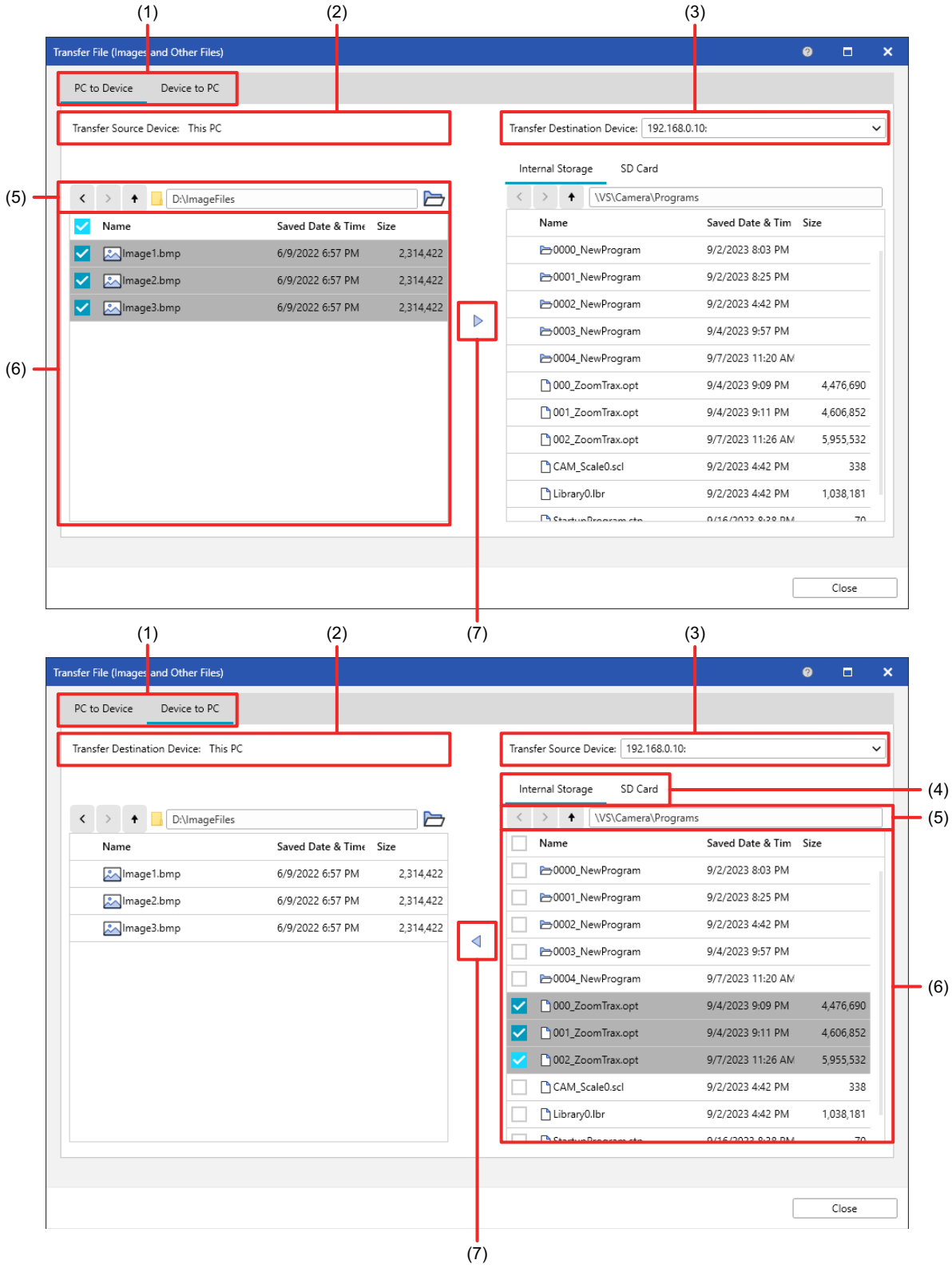
7 Click the ◁ button.
The program setting files are transferred.

Images and Other Files

Selecting [File] - [Transfer File] - [Images and Other Files] from the menu bar displays the [Transfer File (Images and Other Files)] dialog.
For the procedure of transferring files, see "Transferring files from the computer to a device" or "Transferring files from a device to the computer".

Screen Details

In the [Transfer File (Images and Other Files)] dialog, the storage location in the computer is displayed on the left side and the storage location in the device is displayed on the right side, although the screen configuration differs slightly depending on the transfer direction of program settings.



(1) PC to Device / Device to PC

Click either tab to select the transfer direction.

- **PC to Device**: Transfer files from the computer to a device.
- **Device to PC**: Transfer files from a device the computer.

(2) Transfer Source Device: This PC / Transfer Destination Device: This PC

This field displays [Transfer Source Device: This PC] when the [PC to Device] tab is selected and [Transfer Destination Device: This PC] when the [Device to PC] tab is selected.

(3) Transfer Destination Device / Transfer Source Device

This field displays [Transfer Destination Device] when the [PC to Device] tab is selected and [Transfer Source Device] when the [Device to PC] tab is selected.
Select the target device (IP address : device name) from the drop-down menu (default: currently connected device).

(4) Internal Storage / SD Card

Use these tabs to switch between storages to be displayed in the device file list view (default: Internal Storage).

(5) Path bar

- [<] (Back) button: Moves back to the path previously specified on the path bar.
- [>] (Forward) button: Moves forward to the next path of the path currently displayed on the path bar.
- [↑] (Up): Moves up to the parent folder of the path currently displayed on the path bar.
- Path: Displays the folder path of the displayed file list.
- button: Clicking this button for Transfer Source Device: This PC / Transfer Destination Device: This PC displays the [Select Folder] dialog. You can select a desired folder.

(6) File list

Displays the folder name as well as the name, update date, and size for each file. In the case of the transfer source, select the check boxes of the files and folders to be transferred. If you select the check box of a folder, all files in the folder are transferred.

Reference
- Clicking [Name], [Saved Date & Time], or [Size] sorts the list by the clicked title.
- Clicking the [Name] check box selects all files and folders displayed in the file list.
- You can make the following operations from the context menu:
  - [Delete]: Deletes the selected files and folders.
  - [Create New Folder]: Creates a new folder (default: NewFolder).
  - [Rename]: Changes the name of the selected file or folder.

(7) ◁ / ▷

Clicking these buttons transfers the files selected in the transfer source to the transfer destination.

Point
- Files are transferred one by one, and transfer is stopped when the space is exhausted in the destination.
- If there is a file in the destination having the same name as a transferred file, the file in the destination is overwritten.

Transferring files from the computer to a device

Transfer files from the computer to a device in the following steps:

1 Click the [PC to Device] tab.

2 Select a file storage location on the path bar of [Transfer Source Device: This PC].

3 Select the check boxes of the files to transfer.

4 From the [Transfer Destination Device] drop-down menu, select the target device.

5 Click the [Internal Storage] tab or the [SD Card] tab.

6 Select a file storage location on the path bar of [Transfer Destination Device].

7 Click the ▷ button.
The files are transferred.

Transferring files from a device to the computer

Transfer files from a device to the computer in the following steps

1 Click the [Device to PC] tab.

2 From the [Transfer Source Device] drop-down menu, select the target device.

3 Click the [Internal Storage] tab or the [SD Card] tab.

4 Select a file storage location on the path bar of [Transfer source Device].

5 Select the check boxes of the files to transfer.

6 Select a file storage location on the path bar of [Transfer Destination Device: This PC].

7 Click the ◁ button.
The files are transferred.

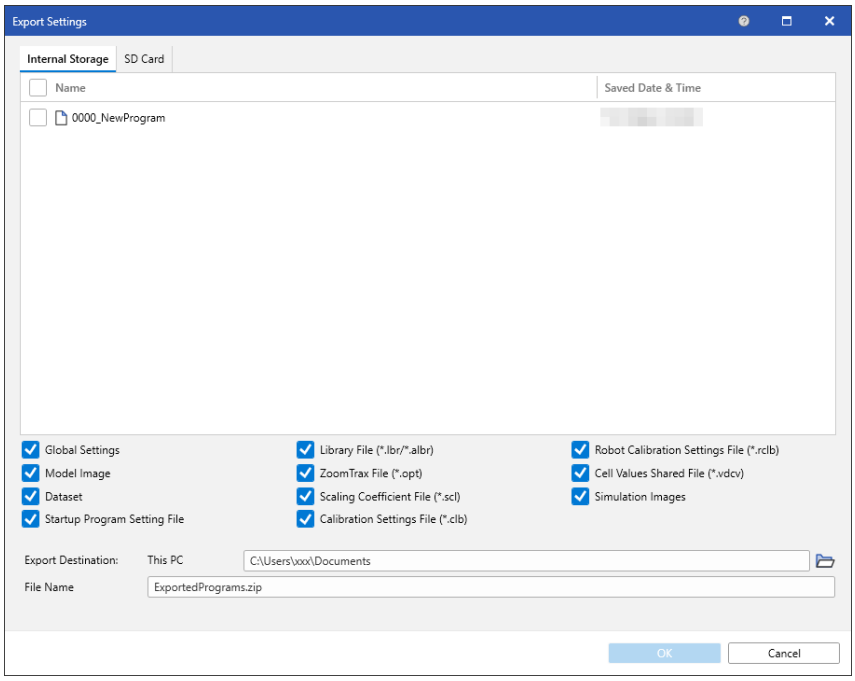
Export Settings

#D019

By compressing a program setting file and related files together into a compressed file, you can reproduce a local fault situation on your computer or share settings of a computer with a different computer.
Selecting [File] - [Export Settings] from the menu bar displays the [Export Settings] dialog.

[Export Settings] dialog

Configure the settings related to the export of program setting files.



Internal Storage / SD Card

Use these tabs to switch between the storage locations of the program settings (Programs folder) (default: Internal Storage).

Reference In the case of a simulator, select a folder from the drive of the simulator.

List of program settings

Program settings are listed with their names and dates and times of update. Select the check boxes of the program settings.

Reference
- Clicking [Name] or [Saved Date & Time] sorts the list by name or saved date and time.
- Selecting the [Name] check box selects all program settings.

Shared settings file

Configure the shared settings file to be exported together with the program setting. Select the check boxes for the files to be exported (default: ON).

Point All startup program setting files and cell values shared files (*.vdcv) are exported.

- **Global Settings**
  The following files in the VS folder of the internal storage are exported.
  – Global Settings File (Environment.vse)

  - Device Specific Information File (DeviceInfo.din)
  - Hardware Information File (HardwareInfo.hin)
  - Account Settings File (Account.acc)
- **Model Image**
  Model images in the ModelImages folder of the program settings folder are exported.
- **Dataset**
  The dataset in the AiDataset folder of the program settings folder is exported.
- **Startup Program Setting File**
  The file (StartupProgram.stp) specifying the program setting to be run at start-up in the Programs folder of the internal storage is exported.
- **Library File (*.lbr/*.albr)**
  Library files (*.lbr, *.albr) in the Programs folder of the internal storage are exported.
- **ZoomTrax File (*.opt)**
  The ZoomTrax settings file (*.opt) in the Programs folder of the internal storage is exported.
- **Scaling Coefficient File (*.scl)**
  The scaling coefficient file (*.scl) in the Programs folder of the internal storage is exported.
- **Calibration Settings File (*.clb)**
  The calibration settings file (*.clb) in the Programs folder of the internal storage is exported.
- **Robot Calibration Settings File (*.rclb)**
  The robot calibration settings file (*.rclb) in the Programs folder of the internal storage is exported.
- **Cell Values Shared File (*.vdcv)**
  The cell values shared file (*.vdcv) directly under the Programs folder of the internal storage is exported.
- **Simulation Images**
  For simulator program settings, simulation images in the SimulationImages folder of the program settings folder are exported.
  In the case of program settings for a device (or a simulator linked to a device), the simulation images in the virtual folder of the device (folder whose name is the MAC address folder), which is created directly under the simulator base path, are exported.

Export Destination: This PC

Set the export destination folder with the full path (default: My Documents of the logged-in user).

Clicking the button opens the [Select Folder] dialog. You can select a desired folder.

File Name

Specify the file name of the program setting to be exported (default: ExportedPrograms). The files selected above are compressed to a zip file with the specified file name and the folder configuration of the simulator.

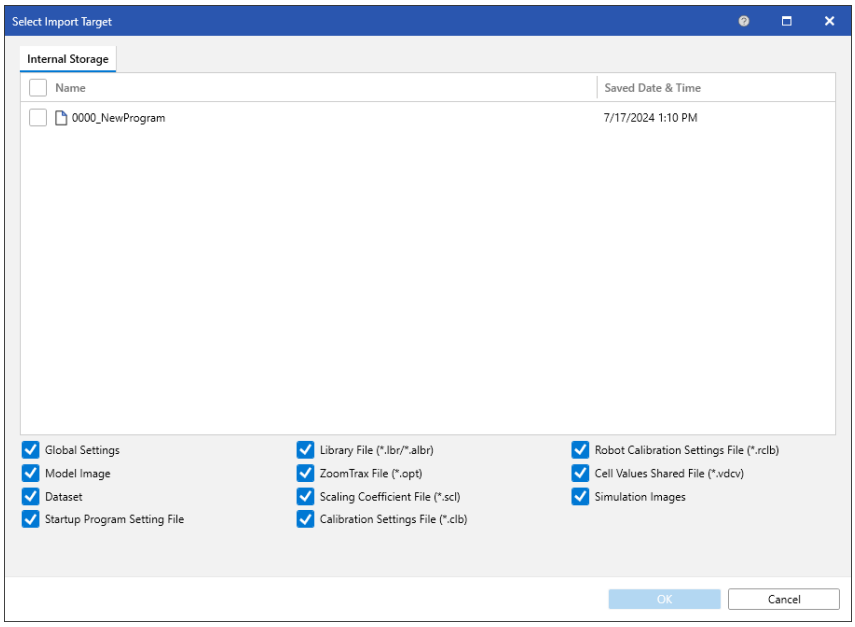
Import Settings

#D020

By importing program settings, you can reproduce a local fault situation or share settings between different computers.
Selecting [File] - [Import Settings] from the menu bar displays the [Import Settings] dialog. Select the program setting file (extension: zip) to be imported and click the [Open] button to display the [Select Import Target] dialog.

[Select Import Target] dialog

You can specify whether or not to import related files in addition to the program settings.



Internal Storage / SD Card

Point The [SD Card] tab is not displayed if the specified program setting file (extension: zip) does not contain a program setting exported from a microSD card.

Use these tabs to switch between the storage locations of the program settings (Programs folder) (default: Internal Storage).

List of program settings

Program settings are listed with their names and dates and times of update. Select the check boxes of the program settings.

Reference
- Clicking [Name] or [Saved Date & Time] sorts the list by name or saved date and time.
- Selecting the [Name] check box selects all program settings.

Shared settings file

Configure the shared settings file to be imported together with the program setting. Select the check boxes for the files to be imported.

- **Global Settings**
  The global settings file (Environment.vse) and the account settings file (Account.acc) in the VS folder of the internal storage are imported.

  Point Device-specific information files and hardware information files are not imported.

- **Model Image**
  Model images in the ModelImages folder of the program settings folder are imported.
- **Dataset**
  The dataset in the AiDataset folder of the program settings folder is imported.
- **Startup Program Setting File**
  The file (StartupProgram.stp) specifying the program setting to be run at start-up in the Programs folder of the internal storage is imported.
- **Library File (*.lbr/*.albr)**
  Library files (*.lbr, *.albr) in the Programs folder of the internal storage are imported.
- **ZoomTrax File (*.opt)**
  The ZoomTrax settings file (*.opt) in the Programs folder of the internal storage is imported.
- **Scaling Coefficient File (*.scl)**
  The scaling coefficient file (*.scl) in the Programs folder of the internal storage is imported.
- **Calibration Settings File (*.clb)**
  The calibration settings file (*.clb) in the Programs folder of the internal storage is imported.
- **Robot Calibration Settings File (*.rclb)**
  The robot calibration settings file (*.rclb) in the Programs folder of the internal storage is imported.
- **Cell Values Shared File (*.vdcv)**
  The cell values shared file (*.vdcv) directly under the Programs folder of the internal storage is imported.
- **Simulation Images**
  When importing program settings to a simulator, simulation images in the SimulationImages folder of the program settings folder are imported.
  When importing program settings to a device (or a simulator linked to a device), the simulation images in the folder in the same parent folder as the EM/SD folder of the zip file are imported. The SimulationImages folder of the program settings folder in the EM/SD folder is not imported.

The default value of the check for each shared settings file depends on the import destination.

Import target files	Default settings by the import destinations	
	Device	Simulator
Global Settings	OFF	ON
Model Image	ON	ON
Dataset	ON	ON
Startup Program Setting File	OFF	ON
Library File (*.lbr/*.albr)	ON	ON
ZoomTrax File (*.opt)	OFF	ON
Scaling Coefficient File (*.scl)	OFF	ON
Calibration Settings File (*.clb)	OFF	ON
Robot Calibration Settings File (*.rclb)	ON	ON
Cell Values Shared File (*.vdcv)	ON	ON
Simulation Images	OFF	ON

Point

- Importing is stopped when the space is exhausted in the import destination.
- If there is a file in the destination having the same name as an imported file, the file in the destination is overwritten.
- If **[Global Settings]** is ON, a message is displayed at the completion of import, prompting you to reboot the device.

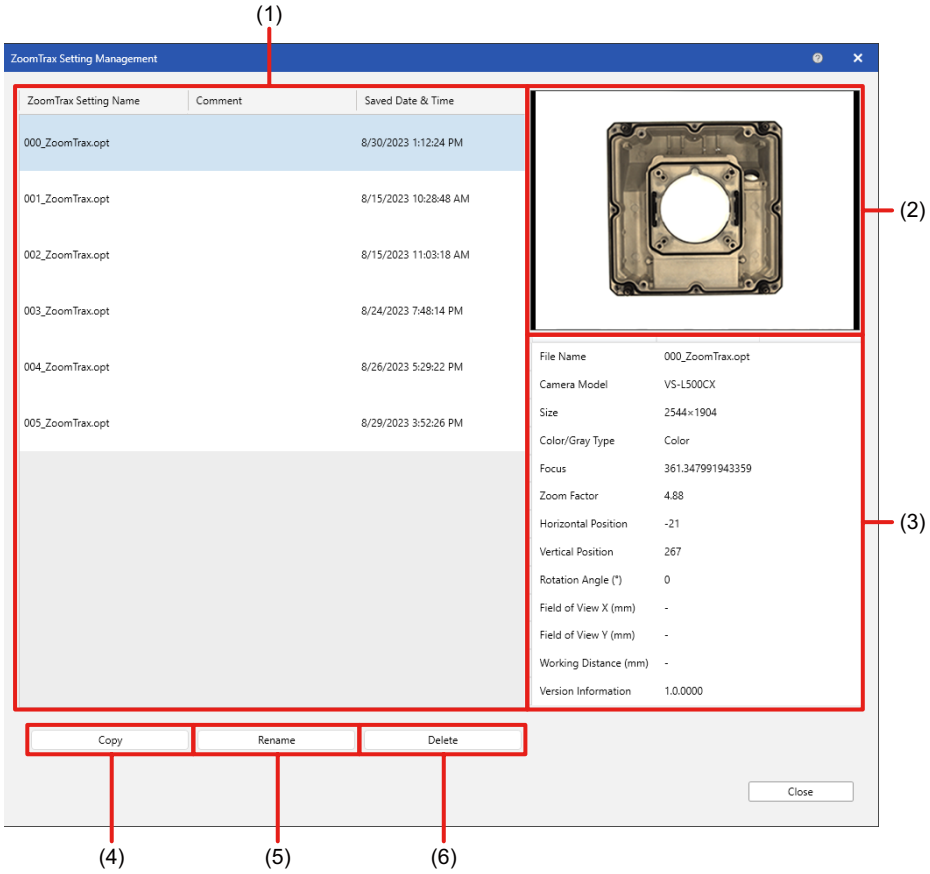
Manage ZoomTrax Settings

#D021

ZoomTrax settings include image settings such as focusing and zooming as well as camera attitude settings. By managing them independently from program settings, you can share and customize them when you add a camera. For details of ZoomTrax settings, see “Measurement” - “Capturing” - “[ZoomTrax Settings] Dialog.”
Selecting [File] - [Manage ZoomTrax Settings] from the menu bar displays the [Manage ZoomTrax Settings] dialog.

[Manage ZoomTrax Settings] dialog

In this dialog, you can copy, rename, and delete ZoomTrax Files.



(1) List of ZoomTrax settings

In the list, ZoomTrax Files are listed with their names, memos, and update dates and times. You can manipulate files by the context menu or the drag-and-drop operation.

Reference
- Click [ZoomTrax Setting Name], [Comment], or [Saved Date & Time] to sort the list in the order of the clicked title.
- The ZoomTrax setting list is updated when a ZoomTrax File is added or deleted.

Operation by context menu

You can copy, rename, and delete a ZoomTrax setting by its context menu. These operations are the same as clicking the [Copy] button, [Rename] button, or [Delete] button after selecting a ZoomTrax setting

Dragging and dropping

Dragging and dropping a ZoomTrax File into the list of ZoomTrax settings adds the ZoomTrax setting in the list.

(2) Preview

If the ZoomTrax setting selected from the List of ZoomTrax settings includes an image, its preview is displayed. If an image is not included, the image area is blacked out.

(3) Detailed information

The following information is displayed about the ZoomTrax File selected from the List of ZoomTrax settings.

- **File Name**: The name of the ZoomTrax File is displayed.
- **Camera Model**: The camera model code included in the ZoomTrax setting file is displayed.
- **Size**: The resolution is displayed for the image included in the ZoomTrax File.
- **Color/Gray Type**: The color/Grayscale indicator is displayed.
- **Focus**: The focus value is displayed.
- **Zoom Factor**: The zoom factor is displayed.
- **Horizontal Position**: The horizontal position of the field of view is displayed.
- **Vertical Position**: The vertical position of the field of view is displayed.
- **Rotation Angle (°)**: The rotation angle of the field of view is displayed.
- **Installation Distance (mm)**: The distance which is measured by the simple measuring distance is displayed.
- **Field of View X (mm)**: The width of the field of view is displayed.
- **Field of View Y (mm)**: The length of the field of view is displayed.
- **Working Distance (mm)**: The distance measured by simple ranging is displayed.
- **Version Information**: The version information of the ZoomTrax setting is displayed.

(4) [Copy] button

In the List of ZoomTrax settings, selecting a ZoomTrax setting and clicking this button displays the [Copy] dialog. You can add the copied ZoomTrax setting by specifying a ZoomTrax Setting Name and clicking the [OK] button.

ZoomTrax Setting Number

The smallest unused number is displayed. This setting cannot be changed.

ZoomTrax Setting Name

The name of the ZoomTrax File that was copied is displayed. Specify any name in this field.

(5) [Rename] button

In the List of ZoomTrax settings, selecting a ZoomTrax setting and clicking this button displays the [Rename] dialog. You can change the display name of the ZoomTrax setting by specifying a ZoomTrax Setting Name and clicking the [OK] button.

ZoomTrax Setting Name

The current name of the ZoomTrax File is displayed. Specify any name in this field.

(6) [Delete] button

In the List of ZoomTrax settings, selecting a ZoomTrax setting and clicking this button displays a confirmation message. Click the [OK] button to delete the selected ZoomTrax setting from the list.

Manage Model Images

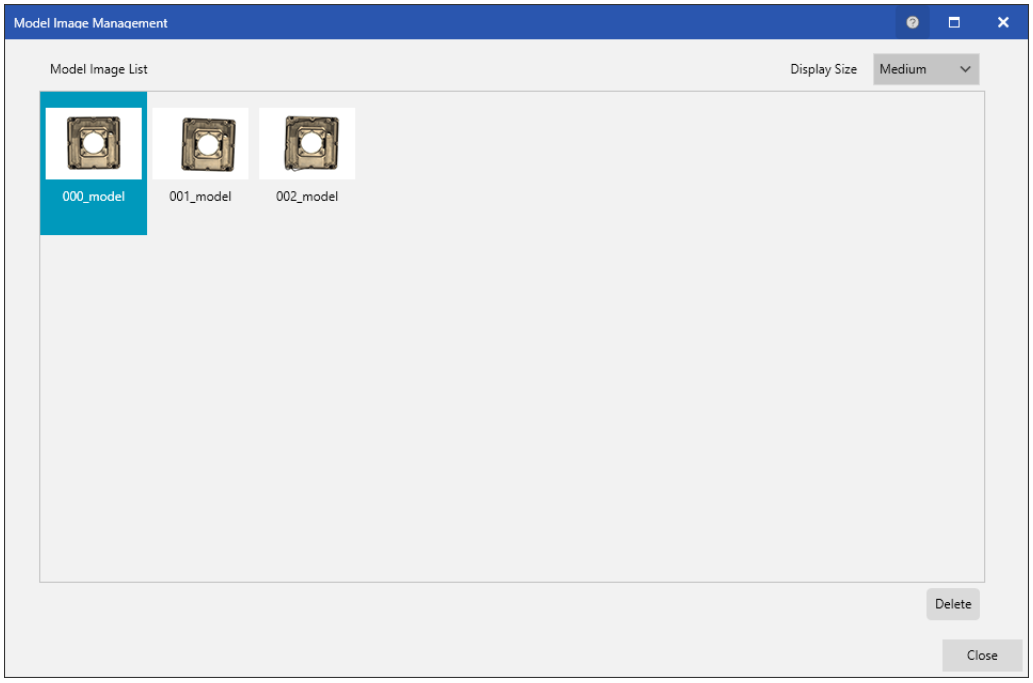
#D022

A model image is a reference image used by the Pattern Search tool, the ShapeTrax3A tool, and the Subtraction Filter tool to compare it with input images. Model images are managed in total to prevent inadvertent deletion because one model image may be used by multiple tools.
Selecting [File] - [Model Image Management] from the menu bar displays the [Model Image Management] dialog.

Point Before you delete a model image, check its status in the [Model Image Management] dialog because the deletion affects tools that use it.

[Model Image Management] dialog

In this dialog, you can view and delete model images.



Model Image List

Model images are listed in thumbnails. The name (file name) of the image is indicated under each thumbnail, and thumbnails are listed in the order of image names.

Point
- If the input image is a multi-spectrum image, one of the selectable source images is displayed.
- A file that is inaccessible due to corruption, security, or other reasons is not displayed.

Reference Placing the cursor over a thumbnail displays a tooltip that shows the file size, image size, color depth, and other information.

Display Size

Select a display size of thumbnails (unit: pixel).

- **Large**: 244 x 229
- **Middle**: 90 x 84
- **Small**: 45 x 42

[Delete] button

Selecting a model image and clicking this button deletes the model image.

Point

- If there is a tool that has been using the deleted model image, the pattern information of the tool is deleted.
- If you delete a multi-spectrum image, all source images linked from the selected image are deleted.
- You cannot delete a model image in the following cases:
  –When your account does not have deletion permission for the file (folder)
  –When the microSD card is protected

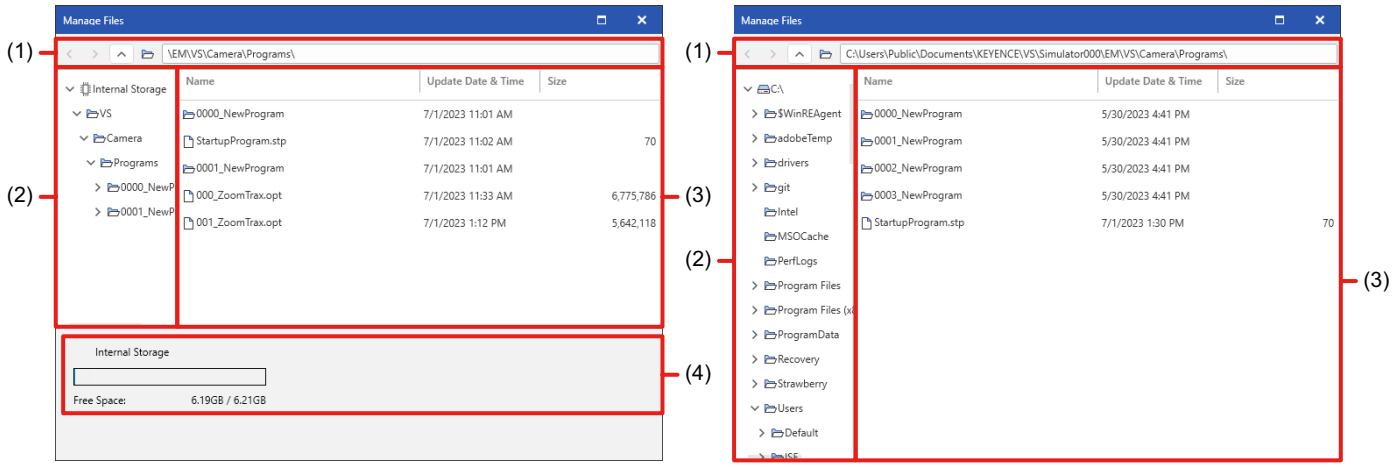
Manage Files

#D023

You can view the list of the files stored in the computer or a device. (See "Setting Files and Folder Configuration".)
Selecting [File] - [Manage Files] from the menu bar displays the [Manage Files] dialog. You can use the dialog to view and manipulate files as you do with Windows Explorer.

[Manage Files] dialog

"Drive capacity" in the [Manage Files] dialog shows differently between devices and simulators.
You can set the following items in this dialog.



(1) Path bar

Set the full path of a folder to include it in the List. The path bar setting and the Folder tree setting are interlocked.
In display mode, in which a path bar is not selected, the drive name is displayed in the configured language (e.g., “Internal Storage” for English). In editing mode, in which a path bar is selected, the actual path is displayed in English (e.g., “EM”). To specify a drive, enter its English name.
Here are button operations of the path bar.

- [<] (Back) button: Moves back to the path previously specified on the path bar.
- [>] (Forward) button: Moves forward to the next path of the path currently displayed on the path bar.
- [^] (Up): Moves up to the parent folder of the path currently displayed on the path bar.

(2) Folder tree

Drives and folders are displayed in a tree format. For a device, a tree for [Internal Storage] and a tree for [SD Card] are displayed.

Point [SD Card] is not displayed when no microSD card is inserted to the device.

For a simulator, the file configuration of the computer is displayed.
You can make the following operations from the context menu of a drive:

- **Format**: Formats the selected drive.
- **Check**: Checks the file system of the selected drive for any damage.
- **Remove**: Remove the selected drive. The drive cannot be selected in [Internal Storage].

Point In [Run Mode], [Format] or [Check] cannot be selected.

(3) List

Files and folders in the folder specified by Path bar are displayed. You can make the following operations from the context menu of a file or folder: Short cuts are shown in parentheses.

- **Open Folder** (Enter / Double-click): Opens the selected folder.
- **Cut** (Ctrl + x): Cuts the selected file or folder.
- **Copy** (Ctrl + c): Copies the selected file or folder to the clipboard.
- **Paste** (Ctrl + v): Pastes the cut or copied file or folder on the currently opened folder.
- **Rename** (F2): Changes the name of the selected file or folder. You can also change the extension of a file.
- **Create New Folder** (Ctrl + Shift + n): Creates a new folder in the currently opened folder (default: NewFolder).
- **Delete** (Delete / Ctrl + d): Deletes the selected file or folder.

(4) Drive capacity

Only for devices, available spaces and total capacities of the internal storage and the microSD card are displayed (unit: MB, GB, or TB).

Point [SD Card] is not displayed when no microSD card is inserted to the device.

Remove SD Card

#D024

If you remove a microSD card or turn off the power of a device when the microSD card is being accessed, data in the microSD card or the microSD card itself may be damaged. You can remove a microSD card safely in the following steps while the device power is ON:

1. Select [File] - [Remove SD Card] from the menu bar.
   A confirmation message appears.

2. Click the [OK] button.
   The microSD card can now be removed.

Exit

#D025

When you finish creating a program setting or switch cameras, selecting [File] - [Exit] from the menu bar closes the main screen.
If you have changed a program setting after starting the main screen, a message appears asking if you want to save the setting. Click [Yes] to save the edited program setting, overwriting the stored one.
After the main screen is closed, the [Connect to Device] screen appears.

Utilities

[Utilities] on the menu bar provides functions useful for creation and debugging of program settings. See the explanation of each item for more details.

- ZoomTrax Setting Difference Comparison: Compares the current camera installation condition with the camera installation condition at the time when the ZoomTrax setting was made by a capture tool.
- Industrial Ethernet Communication Monitor: Displays a list of transferred data and the communication status between the VS camera and the PLC when using the industrial Ethernet communication.
- Non-Procedural Communication Monitor: Displays a list of the data transferred between the VS camera and the PC/ PLC when using the Ethernet non-procedural communication.
- Terminal I/O Monitor: Displays the state changes of the input and output terminals of the VS camera.
- Error Log Viewer: Displays a list of the errors (system errors, execution errors, command errors) that have occurred with the VS camera.
- Timing Chart Monitor: Displays a timing chart that shows state changes of the VS camera terminals, command control from the PLC, and running states of different tools.
- Print Calibration Pattern: Prints calibration patterns that are used for teaching performed by a calibration tool.
- OPC UA Monitor: Displays a list of nodes when using the OPC UA server function.

List of utilities

Selecting [Utilities] from the menu bar displays the submenu that are commensurate to the permission level of your account. For details of each menu item, see the referenced content.

Menu items	Operational permissions based on account permission levels		
	Full control	Edit	View only
ZoomTrax Setting Difference Comparison	✓	✓	–
Industrial Ethernet Communication Monitor	✓	–	–
Non-Procedural Communication Monitor	✓	✓	–
Terminal I/O Monitor	✓	✓	–
Error Log Viewer	✓	✓	✓
Timing Chart Monitor	✓	–	–
Print Calibration Pattern	✓	–	–
OPC UA Monitor	✓	✓	–

ZoomTrax Setting Difference Comparison

#D026

"ZoomTrax Setting Difference Comparison" is a function for comparing the current camera installation condition with the camera installation condition at the time when the ZoomTrax setting was made by a capture tool. You can check whether the installation condition has changed during operation. Target cameras are only zoom cameras.

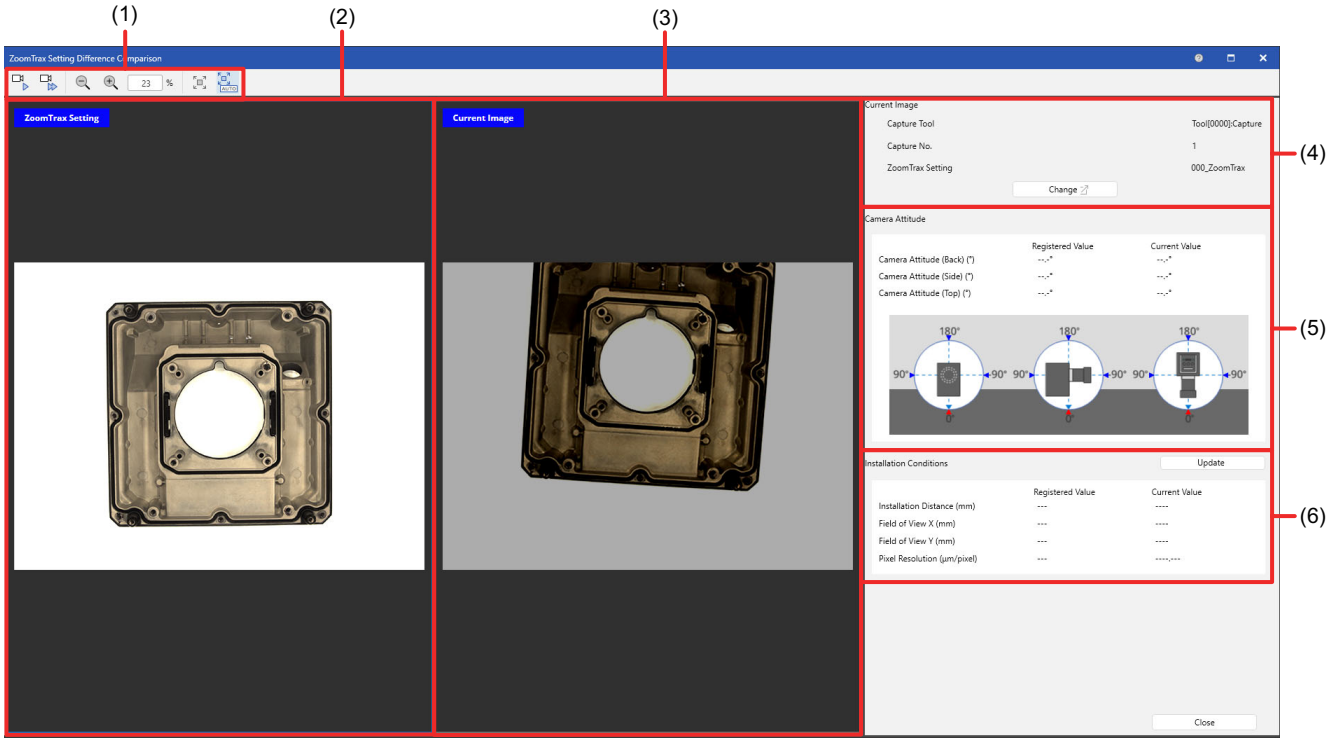
Overview of Functions

Selecting [Utilities] - [ZoomTrax Setting Difference Comparison] from the menu bar displays the [ZoomTrax Setting Difference Comparison] dialog. About the ZoomTrax configuration used by the selected capture tool, this dialog shows the camera installation conditions (images and distance measurement results) at the time of setting and at present.

Point You cannot change the ZoomTrax setting in "ZoomTrax Setting Difference Comparison". If you need to change it, use the [ZoomTrax Settings] Dialog of the capture tool.

Screen Details

This section explains the details of the [ZoomTrax Setting Difference Comparison] dialog.



(1) Toolbar

Toolbar for camera image operation.

- **(Trigger / Continuous Trigger)**: Clicking the button inputs a trigger.
- **(Zoom Out/Zoom In / Zoom setting)**: Clicking the button allows you to change the zoom rate. You can also set the zoom rate by specifying a value.

- **(Fit / Auto Fit)**: Click this button to adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.

(2) [ZoomTrax Setting] screen

This screen is the camera image in which the reference image used when the ZoomTrax setting was made by a capture tool is displayed. If there is no reference image, the screen is blacked out.

(3) [Current Image] screen

This screen displays camera images captured with trigger inputs.

(4) Current Image

This area displays the setting information of the current image displayed.

- **Capture Tool**: Displays the name of the currently selected capture tool.
- **Capture No.**: If the selected capture tool can capture images multiple times, this item displays the number of the instance of capturing (1 to 10).
- **ZoomTrax Setting**: Displays the currently selected ZoomTrax setting. If not selected, "---" is displayed.
- **Change**: Clicking this button opens the [Current Image Selection] dialog. You can change the capture tool and the number of the instance of capturing. After editing the content, click the [OK] button to reflect the edited content to the [Current Image] screen.

Point To change ZoomTrax Settings, use the [ZoomTrax Settings] Dialog of the capture tool.

(5) Camera Attitude

Displays numbers and icons that indicate the camera attitude (Top, Back, and Side view).

- **Registered Value**: Displays the camera attitude information that is saved in the ZoomTrax Setting.
- **Current Value**: Displays the attitude information of the camera that is currently connected.

(6) Installation Conditions

Displays the result of distance measurement (Installation Distance (mm), Field of View X (mm), Field of View Y (mm)), and Pixel Resolution (µm/pixel).

- **Registered Value**: Displays the information that is saved in the ZoomTrax Setting.
- **Current Value**: Clicking the [Update] button displays the current distance measurement result (default: ---).

Industrial Ethernet Communication Monitor

#D027

"Industrial Ethernet Communication Monitor" is a function for monitoring the input/output status between the VS camera and the PLC. You can check the list of transmitted and received data (bit data / byte data) and the status of the industrial Ethernet communication.

Overview of Functions

Selecting [Utilities] - [Industrial Ethernet Communication Monitor] from the menu bar displays the [Industrial Ethernet Communication Monitor] dialog. The dialog lists the data exchanged by the currently effective protocol between the VS camera and the PLC.

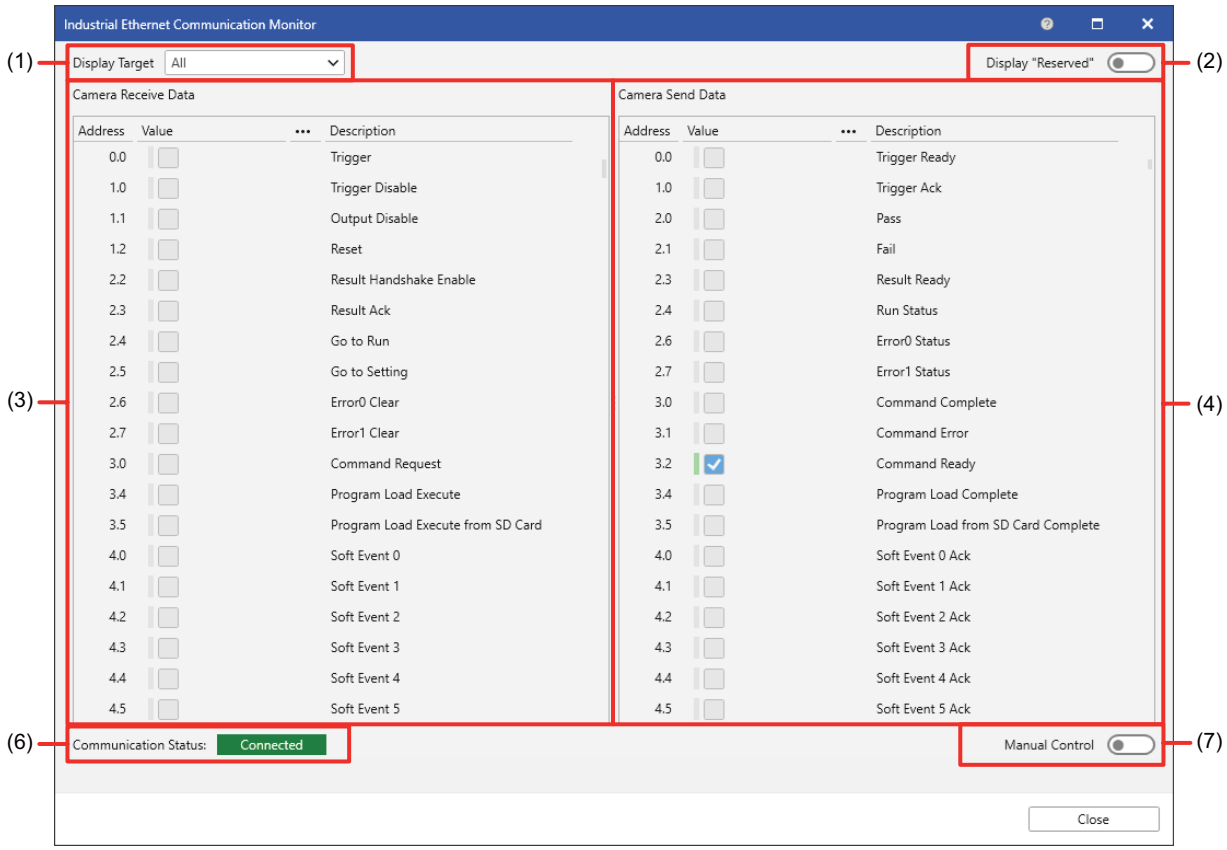
Reference

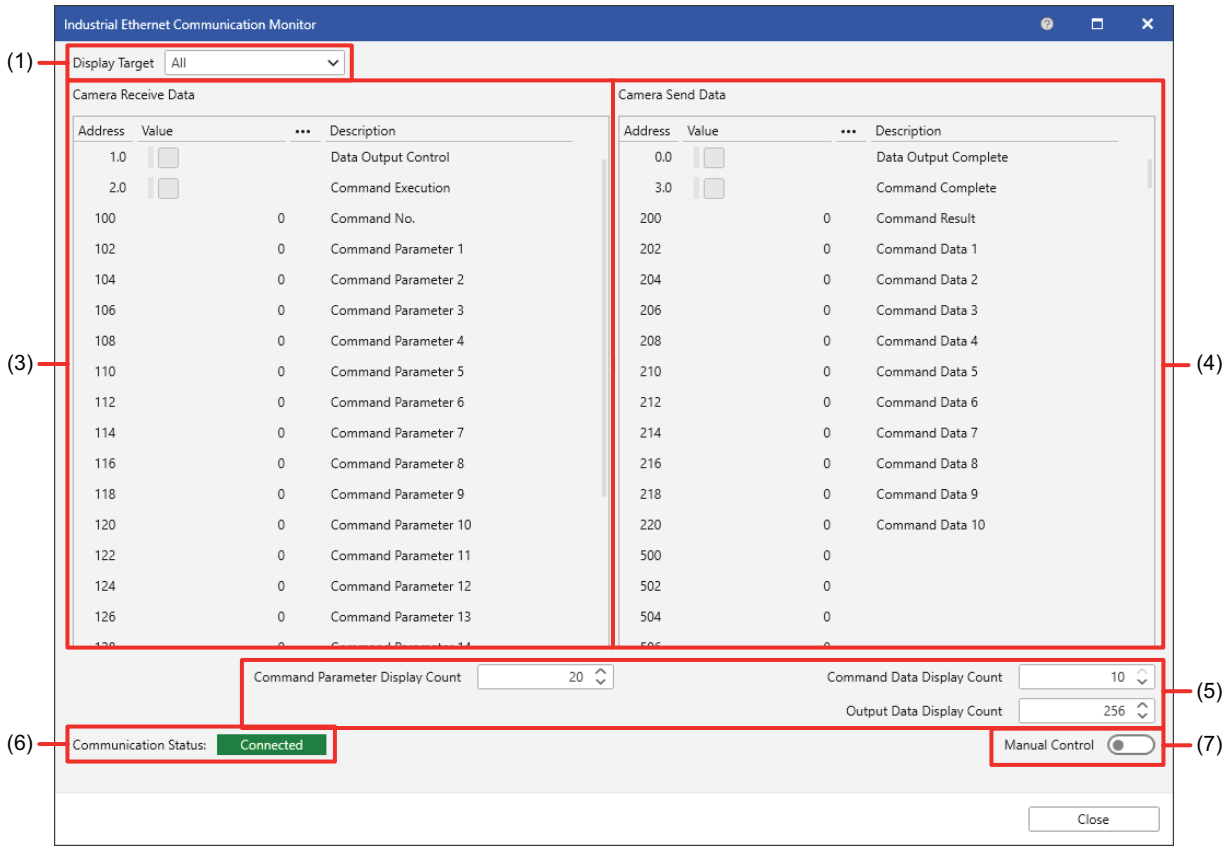
- You can also display the dialog by clicking the following buttons. The dialog name varies depending on where you called the dialog from.
  - –The [Send/Receive-Data Assignment] button of the [Industrial Ethernet Settings] dialog that is displayed by selecting [Global Settings] - [Industrial Ethernet Settings] from the menu bar
  - –The (Industrial Ethernet Communication Monitor) button on the toolbar
  - –The [Communication Monitor] button in the [Input Data] tab of the [Properties] view of the Data Input (Industrial Ethernet) tool
  - –The [Communication Monitor] button in the [Bit Data Output] tab or the [Communication Monitor] button in the [Byte Data Output] tab of the [Properties] view of the Data Output (Industrial Ethernet) tool
- The dialog is displayed when a communication protocol (EtherNet/IP, PROFINET, PLC-Link) is enabled in [Global Settings] - [Industrial Ethernet Settings] selected from the menu bar. If the communication protocol is disabled, the menu item and buttons for displaying the dialog are rendered inactive.
- To switch communication protocols, use [Global Settings] - [Industrial Ethernet Settings] from the menu bar.

Screen Details

This section describes the details of the [Industrial Ethernet Communication Monitor] dialog.

Reference The dialog name varies depending on where you called the dialog from and the protocol used.





(1) Display Target

From the drop-down menu, select the data to be displayed in [Camera Receive Data] and [Camera Send Data].

- **All** (default): Command data, and input/output data between the VS camera and the PLC
- **Command Input and Output**: Command data

- **Data Input (Tool)**: Data that is input from the PLC to the VS camera (data to be loaded on the data input tool)
- **Data Output (Tool)**: Data that is output from the VS camera to the PLC (data from the data output tool)

Point The [Data Input (Tool)] can be selected when the communication protocol is EtherNet/IP or PROFINET.

(2) Display "Reserved"

When turned ON, Reserved send/receive data will be displayed in [Camera Receive Data] and [Camera Send Data] (default: OFF).

Point Displayed when the communication protocol is EtherNet/IP or PROFINET.

(3) Camera Receive Data

This area displays information (address, value, and description) of the bit data and byte data that the VS camera received from the PLC.

Reference
- The width of the [Address], [Value], and [Description] columns can be changed.
- You can change the width of the entire [Camera Receive Data] area by dragging its border with the [Camera Send Data] area.

Address

For bit data

The address (0.0 to 7.7) is displayed. The fractional portion indicates a bit (0 to 7).

For byte data

The address (8 to 9999) is displayed.

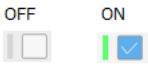
Value

For bit data

Indicates ON/ OFF of each data block.

– OFF: The indicator is gray, and the check box is not selected.

– ON: The indicator is green, and the check box is selected.



For byte data

The default display mode varies depending on the data type configured by the tool. You can change the display mode to any format.

Data type setting by tool	Display Mode (default setting)
Bit	Binary
8-bit Integer	Decimal (Signed)
8-bit Unsigned Integer	Decimal (Unsigned)
16-bit Integer	Decimal (Signed)
16-bit Unsigned Integer	Decimal (Unsigned)

Data type setting by tool	Display Mode (default setting)
32-bit Integer	Decimal (Signed)
64-bit Integer	Decimal (Signed)
32-bit Floating-point Number	Floating-point Number
String	String

If an array type data is set by the tool, the individual elements of the array are assigned to different addresses.

Reference
- If one line contains multiple data blocks, the data type of the data block at the smallest address is applied. If multiple tools write data at the same address, the data type of the tool of the smallest tool ID is applied.
- Putting the cursor over a data block displays the [...] icon. If you click the [...] icon and then click [Display Mode], the [Display Mode] dialog appears. From the [Display Mode] drop-down menu, you can change the display mode (Binary, Decimal (Signed), Decimal (Unsigned), Hexadecimal, Floating-point Number, ASCII, and String).

Description

Displays the assigned function name. The function name varies depending on the target data selected in [Display Target].

When [Command Input and Output] is selected

EtherNet/IP, PROFINET	PLC-Link
• Command Request • Command Number • Command Parameter x (x: natural number)	• Command Execution • Command No. • Command Parameter x (x: natural number)

When [Data Input (Tool)] is selected

EtherNet/IP, PROFINET *1	PLC-Link
• Input Data x (x: natural number. Displayed for addresses for which a function is assigned.)	• Not selectable.

*1:For a bit data block having no function assigned, "Assignable" is displayed. If a byte data block is user data, the function name assigned by the data input tool is displayed. For details on the assignment of functions, see "Global Settings" - "Industrial Ethernet Settings."

When [Data Output (Tool)] is selected

EtherNet/IP, PROFINET	PLC-Link
• Result Handshake Enable • Result Ack	• Data Output Control

(4) Camera Send Data

This area displays information (address, value, and description) of the bit data and byte data that the VS camera sends to the PLC.

Reference
- The width of the [Address], [Value], and [Description] columns can be changed.
- You can change the width of the entire [Camera Send Data] area by dragging its border with the [Camera Receive Data] area.

Address

For bit data

The address (0.0 to 11.7) is displayed. The fractional portion indicates a bit (0 to 7).

For byte data

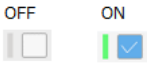
The address (12 to 9999) is displayed.

Value

For bit data

Indicates ON/ OFF of each data block.

– OFF: The indicator is gray, and the check box is not selected.
– ON: The indicator is green, and the check box is selected.



For byte data

The default display mode varies depending on the data type configured by the tool. You can change the display mode to any format.

Data type setting by tool	Display Mode (default setting)
Bit	Binary
8-bit Integer	Decimal (Signed)
8-bit Unsigned Integer	Decimal (Unsigned)
16-bit Integer	Decimal (Signed)
16-bit Unsigned Integer	Decimal (Unsigned)
32-bit Integer	Decimal (Signed)
64-bit Integer	Decimal (Signed)
32-bit Floating-point Number	Floating-point Number
String	String

If an array type data is set by the tool, the individual elements of the array are assigned to different addresses.

Reference

- If one line contains multiple data blocks, the data type of the data block at the smallest address is applied. If multiple tools write data at the same address, the data type of the tool of the smallest tool ID is applied.
- Putting the cursor over a data block displays the [...] icon. If you click the [...] icon and then click [Display Mode], the [Display Mode] dialog appears. From the [Display Mode] drop-down menu, you can change the display mode (Binary, Decimal (Signed), Decimal (Unsigned), Hexadecimal, Floating-point Number, ASCII, and String).

When [Manual Control] is ON, you can change the [Value] of the following data types:

– Integer (signed, decimal): -2147483648 to 2147483647
– Integer (unsigned, decimal): 0 to 4294967295
– Integer (hexadecimal): 00000000 to FFFFFFFF
– String: any value

Point

- When [Display Mode] is [String], the maximum length of the value that you can enter is 4 bytes. If the length of the entered string is less than 4 bytes, the string is padded with NULL (0x00) to make it 4 bytes.
- A data item that is configured as a 64-bit integer type in the tool is treated as two 4-byte data blocks. Each of these data blocks can be changed to a value of 4 bytes. The data item is treated as the original 8-byte data block after you turn [Manual Control] OFF.

Description

Displays the assigned function name. The function name varies depending on the target data selected in [Display Target].

When [Command Input and Output] is selected

EtherNet/IP, PROFINET	PLC-Link
• Command Complete • Command Error • Command Ready • Command Result • Command Data x (x: natural number)	• Command Complete • Command Result • Command Data x (x: natural number)

When [Data Output (Tool)] is selected

EtherNet/IP, PROFINET *1	PLC-Link
• Pass • Fail • Result Ready • Tool Judge *2 • Error0 Code *3 • Error1 Code *3 • Program Number *3 • Total Count *3 • Trigger Disable *3 • Output Disable *3 • Reset *3 • Program Load Execute from SD Card *3 • Program Load Execute *3 • Soft Event *3 • Image Capture Buffer Clear *3 • Reset Output Data *3 • Tool Buffer Clear *3 • Output Data *2	• Data Output Complete

*1:If no function assigned, "Assignable" is displayed. For details on the assignment of functions, see "Global Settings" - "Industrial Ethernet Settings".

*2:An output item name is displayed only for addresses to which an output item is configured.

*3:Displayed only if the item is assigned.

(5) Display Count

Set the number of command parameters, command data, and output data to display. The set value is retained until the main screen is closed.

Command Parameter Display Count

Set the number of command parameter addresses to display (1 to 130, default: 20).

Command Data Display Count

Set the number of command data addresses to display (1 to 10, default: 10).

Output Data Display Count

Set the number of output data addresses to display (1 to 1000, default: 256).

(6) Communication Status

Displays the communication status between the VS camera and the PLC. The status display is updated periodically.

- When communication has been established: Connected
- When communication has not been established: Not Connected

(7) Manual Control

By setting this item ON, you can output the data of any address of [Camera Send Data] (default: OFF). You can edit [Value] in Setup Mode, but it is reset in the following events:

- When [Manual Control] is turned OFF
- When the [Industrial Ethernet Communication Monitor] dialog is closed

Non-Procedural Communication Monitor

#D028

"Non-Procedural Communication Monitor" is the function that monitors the input/output status between the VS camera and the PC/PLC. The transferred data in the Ethernet non-procedural communication can be checked, and the checked transferred data can be selected, copied, and pasted into a notepad.

Overview of Functions

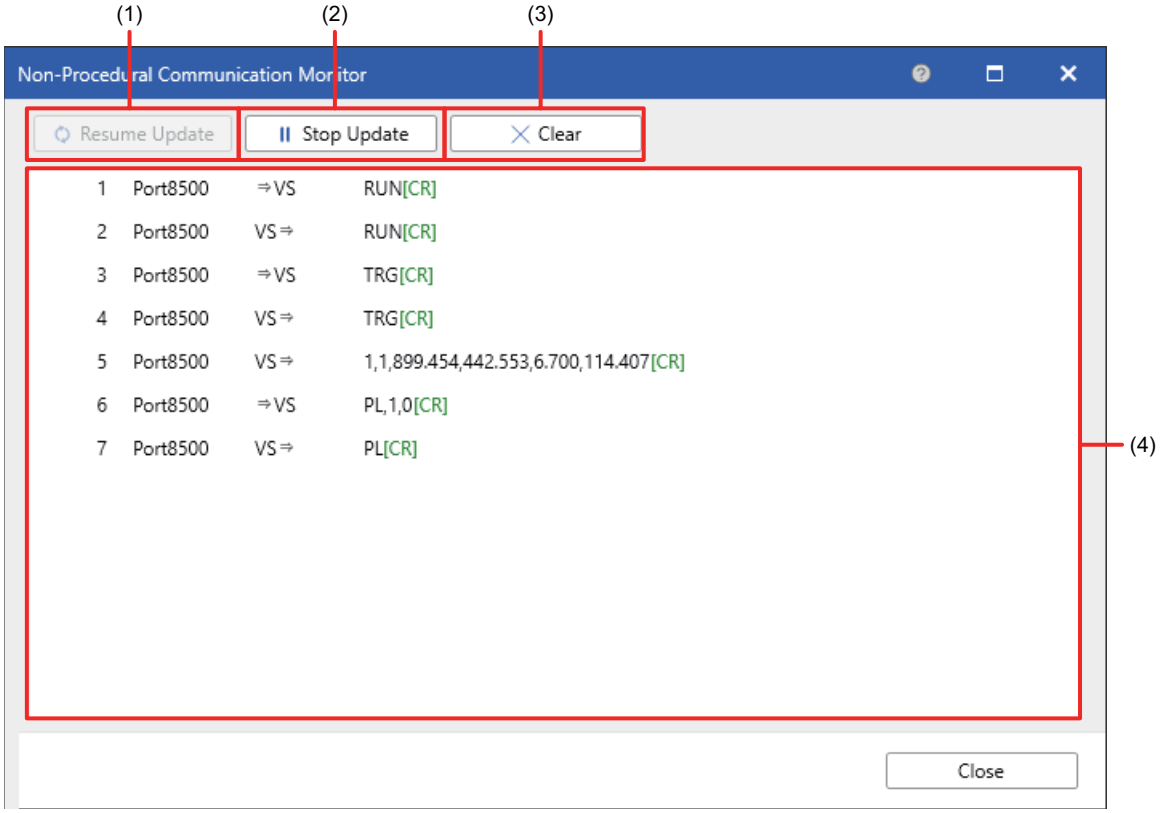
Select [Utilities] - [Non-Procedural Communication Monitor] from the menu bar to display the [Non-Procedural Communication Monitor] dialog. The dialog lists the data exchanged between the VS camera and the PC/PLC.

Reference You can also display the dialog by clicking the following buttons:

- The [Communication Monitor] button in the [Input Data] tab of the [Properties] view of the Data Input (Non-Procedural) tool
- The [Communication Monitor] button in the [Output Data] tab of the [Properties] view of the Data Output (Non-Procedural) tool

Screen Details

This section describes the details of the [Non-Procedural Communication Monitor] dialog.



(1) Resume Update

Resumes the update of the monitor screen that has been stopped. Click the [Stop Update] button to make it clickable.

(2) Stop Update

Stops the update of the monitor screen. Click it to gray out the button and stop the update. Click the [Resume Update] button to make it clickable again.

(3) Clear

Clears the communication log.

Reference If a client clears the communication log while multiple clients are connected to the same VS camera, the communication log will be cleared at the other clients as well.

(4) Communication Log

This lists the data exchanged between the VS camera and the PC/PLC.

- **Column 1**: Displays the line number.
- **Column 2**: Displays the port number used for communication.
- **Column 3**: Displays the input/output direction of the data. "⇒ VS" indicates the input to the VS camera and "VS ⇒" indicates the output from the VS camera.
- **Column 4**: Displays the input/output data.

Reference If the VS camera already has a communication log when opening the [Non-Procedural Communication Monitor] dialog, opening the dialog will display the communication log up to that point.

Terminal I/O Monitor

#D029

"Terminal I/O Monitor" is the function that displays input and output signals of the VS camera. With this function, you can check the current status of the input and output terminals.

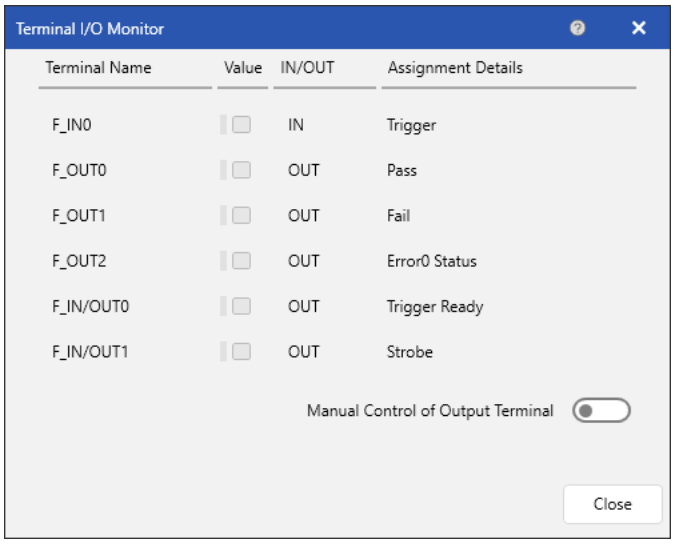
Point If you want to check instantaneous status changes of terminals, use the "Timing Chart Monitor".

Overview of Functions

Selecting [Utilities] - [Terminal I/O Monitor] from the menu bar displays the [Terminal I/O Monitor] dialog.

[Terminal I/O Monitor] dialog

For each terminal of the connected VS camera, ON or OFF, IN or OUT, and Assignment Details are displayed.



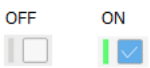
Terminal Name

Displays the terminal names of the VS camera that is connected.

Value

Indicates ON/ OFF of each terminal.

- OFF: The indicator is gray, and the check box is not selected.
- ON: The indicator is green, and the check box is selected.



Point If [Assignment Details] is [Flash] and [Manual Control of Output Terminal] is OFF, the indicator and check box are not displayed.

If [Manual Control of Output Terminal] is ON, you can manually turn on/off the check boxes of output terminals.

IN/OUT

Indicates whether each terminal is an input terminal (IN) or an output terminal (OUT).

Assignment Details

Indicates the function assigned to each terminal. For details on the assignment of functions, see "Global Settings" - "Terminal I/O Settings".

Manual Control of Output Terminal

If this item is OFF (default), the current status of the function assigned to each terminal is output. If you turn this item ON in Setup Mode, you can temporarily change the status of [Value] of output terminals manually. [Value] of each output terminal is OFF just after you turn this item ON. Select the check boxes of terminals from which to make output. This item is reset to OFF when Terminal I/O Monitor is closed.

Error Log Viewer

#D030

"Error Log Viewer" is the function that saves errors that have occurred with the VS camera as an error log file and allows you to check the error history. The error history can be checked in chronological order.

Overview of Functions

Select [Utilities] - [Error Log Viewer] from the menu bar to display the [Error Log Viewer] dialog. The dialog displays a list of the errors that have occurred with the VS camera up to that point.

The following three errors are included in the error log:

- System error
- Execution error
- Command error

The error log will be saved as a file on the VS camera when an error occurs.

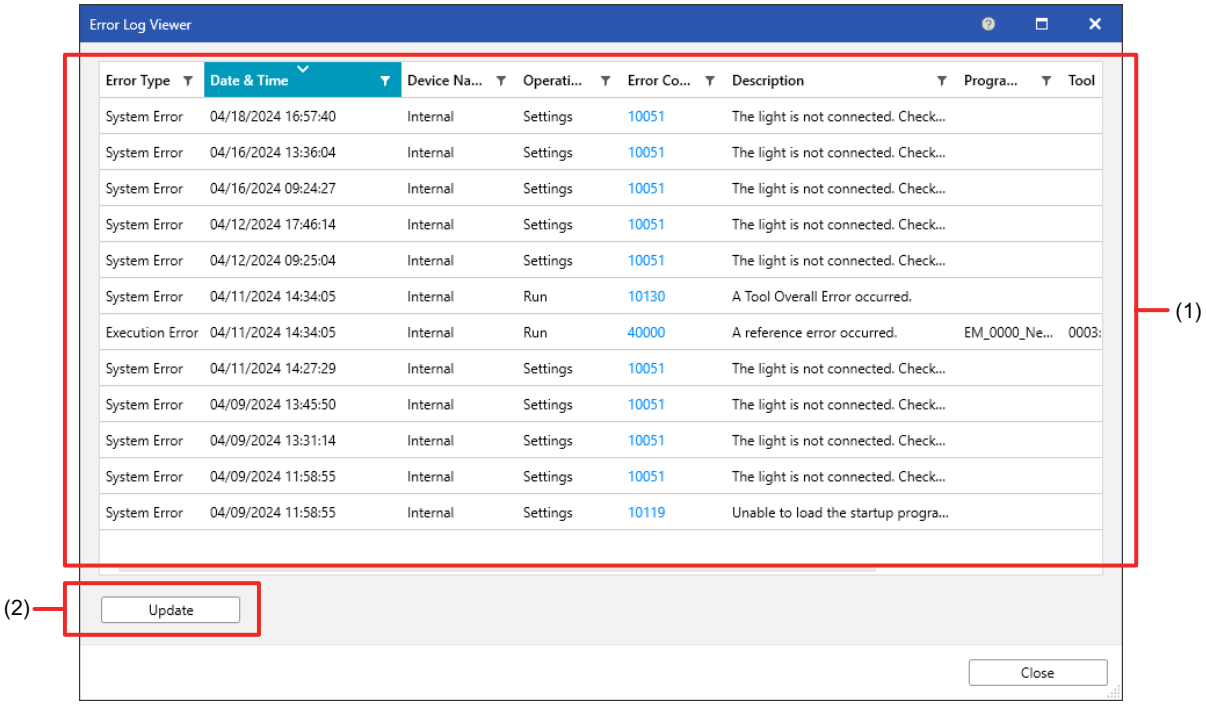
- Save destination folder: EM/VS/Logs
- Error log file: ErrorLog.csv

Reference

- The error log is retained even when the VS camera is not connected to the VS Creator.
- The error log is retained regardless of whether the VS camera is in Run Mode or Setup Mode.
- If an error occurs when an error log file (ErrorLog.csv) already exists, the error will be appended to the existing error log file.
- The error log will not be deleted even if the VS camera is reset or rebooted. To clear the error log, delete the error log file from [Manage Files].
- The error log file (ErrorLog.csv) can be exported together with the program setting file from [Main Screen] - [Help] - [Export Settings (For Debugging)]. The error log file can also be directly retrieved by specifying it from [File] - [Transfer File] - [Images and Other Files].

Screen Details

This section describes the details of the [Error Log Viewer] dialog.



(1) Error Log

Lists the errors that have occurred with the VS camera up to that point.

Reference If the VS camera already has an error log when opening the [Error Log Viewer] dialog, opening the dialog will display the error log up to that point.

Error Type

Displays the type of the error (system error, execution error, command error).

Reference In the error log file, it is displayed as [ErrorType] (0: system error, 1: execution error, 2: command error).

Date & Time

Displays the date and time when the error occurred.

Device Name

Displays the device name set in [Global Settings] - [Device Name Setting]. It will be blank if it is not set.

Operation Mode

Displays the operation mode (Setup/Run) at the time when the error occurred.

Reference In the error log file, it is displayed as [Mode] (0: Setup, 1: Run).

Error Code

Displays the error code.

Description

Displays the description of the error.

Program Setting

Displays the program setting in which the error has occurred ([Storage]_[Program Setting No.]_[Program Name]) when the error type is execution error.

Tool

Displays the tool in which the error occurred ([Tool ID]:[Tool Type]) when the error type is execution error.

Measurement Count

Displays the measurement count in which the error occurred when the error type is execution error.

Command Executed

Displays the specified command when the error type is command error.

(2) Update

Click this button to update the error list.

Timing Chart Monitor

#D031

"Timing Chart Monitor" is the function that displays a timing chart that shows state changes of the VS camera terminals, command control from the PLC, and running states of different tools. By examining timing chart data collected from the production line, you can efficiently find points of timing mismatch between flow execution and external control and the processing bottleneck that consumes time.
While the Industrial Ethernet Communication Monitor is used to check the current status, the Timing Chart Monitor enables you to check status changes during a specified period and to open a file to check status changes in a past period. Also, while the Terminal I/O Monitor only allows you to check status changes at the displayed timing, the Timing Chart Monitor enables you to check instantaneous status changes during a specified period.

Overview of Functions

Selecting [Utilities] - [Timing Chart Monitor] from the menu bar displays the [Timing Chart Monitor] dialog. The Timing Chart Monitor displays the following information in a timing chart:

- Execution results of the capture tool and measurement tool in the [Task] view
- Communication data exchanged with the PLC by the industrial Ethernet communication protocol
- Data exchanged with the PLC by the input and output terminals

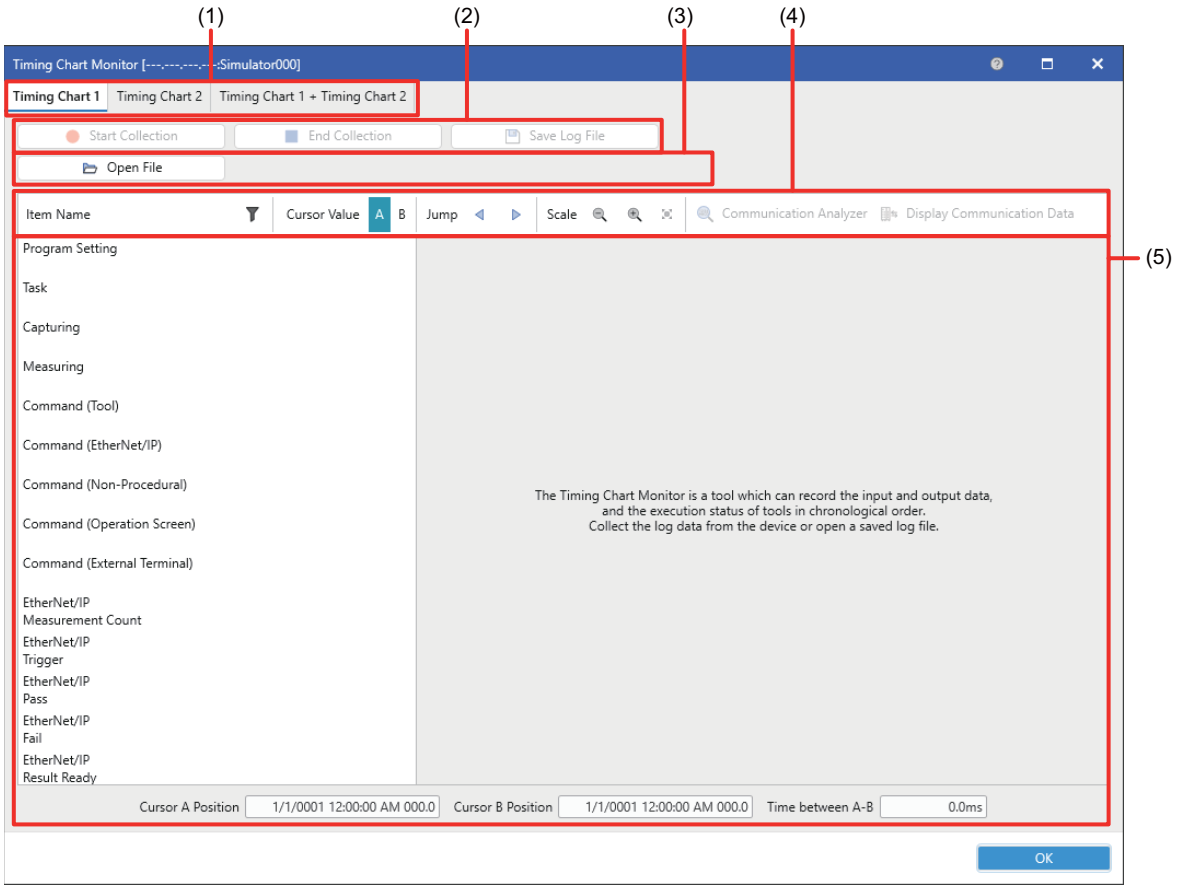
Point Only one Timing Chart Monitor can be displayed at a time.

Reference

- You can also display the Timing Chart Monitor by clicking the (Timing Chart Monitor) icon on the toolbar.
- To change protocols, use [Global Settings] - [Industrial Ethernet Settings] from the menu bar.

Screen Details

This section explains the details of the [Timing Chart Monitor] dialog.
The device name (IP address : Device name) is displayed on the right of the dialog name.



(1) Timing Chart 1 / Timing Chart 2 / Timing Chart 1 + Timing Chart 2

You can display two different timing chart data by switching tabs. For example, you can display the data collected from the connected VS camera in the [Timing Chart 1] tab, and the data loaded from a file in the [Timing Chart 2] tab.

Point You cannot collect data on both tabs simultaneously. Data is collected only on the currently selected (i.e., active) tab.

If you select the [Timing Chart 1 + Timing Chart 2] tab, the data of [Timing Chart 1] tab is displayed in the upper area of Chart Display Area and the data of [Timing Chart 2] tab is displayed in the lower area.

(2) Start Collection / End Collection / Save Log File

Start Collection

When you click this button, the VS camera starts collecting data for the timing chart. The title bar displays "Collecting Log {x}..." (x: 1 or 2).

Point
- You cannot start data collection in Setup Mode.
- If you switch from Run Mode to Setup Mode while data collection is running, data collection stops.
- You cannot collect data if another client connected to the VS camera has already started data collection.

End Collection

When you click this button, the VS camera stops collecting data for the timing chart, and displays the timing chart data in the Chart Display Area.

Save Log File

Click this button to display the [Save As] dialog. You can save the collected timing chart data in a file of the Timing Chart Monitor format (extension: tcd).

(3) Open File

Click this button to display the [Open] dialog. Selecting a file (extension: tcd) displays its timing chart data in the Chart Display Area. Also, the full path of the file is displayed on the right of the button.

Point
The timing chart data saved with a newer version of the VS Creator may not be able to be opened with an older version of the VS Creator.

(4) Toolbar

The toolbar has operation buttons for the Chart Display Area.

Item Name

Displays data items collected as timing chart data. The following data items can be collected.
- Program Setting
- Task
- Capturing
- Measuring
- Command
- Terminal
- Industrial Ethernet Communication Bit Data

The collection target data items actually displayed vary depending on the settings in [Global Settings] on the menu bar.
- Functions assigned to individual terminals in [Terminal I/O Settings]
- Communication protocol enabled in [Industrial Ethernet Settings]

From the collected data items, you can select the data items to be displayed in the timing chart.
Click the ▼ (Display Target Selection) button to display the [Display Target Selection] dialog. Select the check boxes of the data items to be displayed. The selected data items are displayed in the Chart Display Area.

Point The collected data for the timing chart also includes information on changes in global settings, such as send/receive-data assignment and user-defined region. The item names and others of the communication data are displayed according to the global settings. Some items may not be displayed with an older version of the VS Creator.

Reference Instead of the [Display Target Selection] dialog, you can also use the context menu to change the displayed data items. The change is immediately reflected.

- **Display All**: All data items are displayed.
- **Hide**
  - **Selected Items Only**: Only selected items are hidden.
  - **All Items That Had No Value Change**: Data items without change in the timing chart data are hidden.

Cursor Value

The Timing Chart Monitor has cursor A (red) and cursor B (blue). Clicking [A] or [B] displays the values and statuses at the respective cursor position of the chart in the Chart Display Area.

Jump

Clicking the ◀ or ▶ button makes the cursor selected by [Cursor Value] jump to the point of the previous or next event (point of change).

Scale

You can change the lateral (time axis) magnification of the timing chart.

- (Zoom out): The timing chart is zoomed out by 1% each time the button is clicked. You can also zoom out by rotating the mouse wheel toward you.
- (Zoom in): The timing chart is zoomed in by 1% each time the button is clicked. You can also zoom in by rotating the mouse wheel away from you.
- (Fit): Click the button to fit the timing chart in the available width.

Communication Analyzer

Click this button to display [Communication Analyzer] at the bottom of the [Timing Chart Monitor] dialog. You can analyze the collected communication log to check the point of occurrence of errors and the error details. For details, see "Analyzing Communication Issues".

Display Communication Data

Click this button to display the [Communication Data Display] dialog. You can check the address and content of transmitted and received data blocks (bit data / byte data).

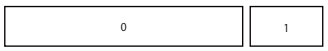
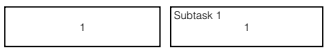
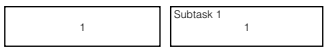
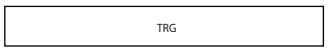
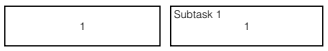
Point While communication data is displayed, operations such as [Start Collection], [End Collection], [Save Log File], and [Open File] are not available.

Reference Communication data can be displayed for each of Timing Chart 1 and Timing Chart 2. The dialog title will show either "Timing Chart 1" or "Timing Chart 2" accordingly.

(5) Chart Display Area

This area displays the timing chart data of the collected data items that are selected in [Item Name].

- **Item Name**: Displays the item name of the collection target selected in [Item Name].
- **Cursor Value**: Displays the status at the position of the cursor selected in [Cursor Value].
- **Chart**: Displays a rectangle or a chart

Item Name	Cursor Value	Chart example
Program Setting	Storage type + program setting No. Example: Internal Storage 0001	
Task	Task ID "0" for the main task, and a natural number for a subtask	
Capturing	Processing count A natural number for the main task, and "Subtask x" + processing count "y" for a subtask (x, y: natural number)	
Measuring	Processing count A natural number for the main task, and "Subtask x" + processing count "y" for a subtask (x, y: natural number)	
Command	Command name and command description	
Terminal	ON/OFF	
Industrial Ethernet Protocol (Measurement Count)	Processing count A natural number for the main task, and "Subtask x" + processing count "y" for a subtask (x, y: natural number)	
Industrial Ethernet Protocol (Flags)	ON/OFF	

The chart of [Measuring] is displayed as a red frame when the Total Status is Fail. Right-clicking the chart and selecting [Display Profile] from the context menu displays the [Display Profile] dialog. In the dialog, you can find chart details including the chart start/end time, tool IDs, the judgment value, and the execution time.

Reference For other rectangle charts, placing the cursor on the chart displays a tooltip. You can find timing chart details such as the start/end time.

At the bottom of the chart display area, the positions (points of time) of cursors A and B and their distance of time are displayed.

- **Cursor A Position / Cursor B Position**: Year, Month, Day, Hour, Minute, Second and Millisecond (YYYY.MM.DD hh:mm:ss ms)
- **Time between A-B**: Time difference between cursor A and cursor B (unit: ms)

Analyzing Communication Issues

If a communication issue occurs during operation, you can collect the timing chart data of a period around the time of its occurrence for analysis. You can find the error No. and error location with search keys that describe "what (Analysis Target) experienced what (Issue to Analyze)."

1 After collecting timing chart data, click the [Communication Analyzer] button.
[Communication Analyzer] is displayed at the bottom of the [Timing Chart Monitor] dialog.

2 From the [Analysis Target] drop-down menu, select an analysis target (trigger, command, or data output).

3 From the [Issue to Analyze] drop-down menu, select the issue to analyze regarding the analysis target selected.

Analysis Target	Issue to Analyze
Trigger (Terminal)	Not Accepted
Trigger (Industrial Ethernet *1)	
Command (Industrial Ethernet *1)	Not Accepted
	Results in Error
	Not Completed
Command (Non-Procedural)	Results in Error
Data Output (Industrial Ethernet *1)	Not Output

*1:The effective communication protocol is displayed.

4 Click the [Execute Analysis] button.
If a relevant event is found, the Chart Display Area focuses on the relevant item, and cursor A (red) moves to the point (timing) of the communication issue. Also, the event overview and the error No. are displayed in [Analysis Result].

Analysis Target	Issue to Analyze	Event causing the communication issue	Content of [Analysis Result]
Trigger (Terminal) Trigger (Industrial Ethernet)	Not Accepted	Trigger was input when Trigger Ready was OFF.	Trigger was input when no Trigger can be accepted. This trigger was rejected.
		Trigger Ready was always not ON during the collection of timing chart data.	Trigger Ready remained in OFF state during the collection of timing chart data. Check if Trigger input is in disabled state.
		Trigger Ready is not assigned to a terminal.	By assigning Trigger Ready to an output terminal, whether Trigger can be accepted or not will be recorded and the range of analysis will be expanded.
		Trigger Ready was ON for a certain period during the collection of timing chart data, but Trigger did not switch from OFF to ON even once.	Trigger had not been input even once. Please check that the external device is connected and that signals are output from the external device. By using the (Communication / Terminal I/O) monitor, input signals to the device can be checked.
		Other	Problem cannot be determined by this analysis.

Analysis Target	Issue to Analyze	Event causing the communication issue	Content of [Analysis Result]
Command (Industrial Ethernet)	Not Accepted	Command Request was input when Command Ready was OFF.	Command Request was input at a time when Command Request cannot be accepted. This Command Request was rejected.
		Command Ready was ON for a certain period during the collection of timing chart data, but the Command Request flag did not switch from OFF to ON even once.	There had never been a Command Request input during the collection of timing chart data. Please check that the external device is connected and that signals are output from the external device. By using the (Communication / Terminal I/O) monitor, input signals to the device can be checked.
		Other	Problem cannot be determined by this analysis.
	Results in Error	The rectangle display of an input/output command has an error.	An error was detected. Please check the corresponding error in the manual based on the error number.
		Other	Problem cannot be determined by this analysis.
	Not Completed	When Command Request was turned OFF, Command Complete was already OFF.	Command Request turned off before Command Complete turned on. In order to detect the completion of command execution, keep Command Request in ON state until Command Complete turns on.
		Other	Problem cannot be determined by this analysis.
Command (Non-Procedural)	Results in Error	The rectangle display of an input/output command has an error.	An error was detected. Please check the corresponding error in the manual based on the error number.
		Other	Problem cannot be determined by this analysis.

Analysis Target	Issue to Analyze	Event causing the communication issue	Content of [Analysis Result]
Data Output (Industrial Ethernet)	Not Output	Result Ready did not turn ON even once during the collection of timing chart data.	Result Ready remained in OFF state during the collection of timing chart data. Check whether the measurement processing is performed and whether the output is in disabled state.
		During the period in which Result Handshake Enable was ON, Result Ack did not change from OFF to ON even once even though Result Ready was ON.	The data output handshake is enabled. Turn on Result Ack when the reading of the data has been completed.
		There was a period of Result Ack being ON and it did not change from ON to OFF even once.	The next data output is not performed when Result Ack is left in ON state. When Result Ready turns off, turn off Result Ack as well.
		Result Ack was turned ON when Result Ready was OFF.	The data may have been read at an improper timing because Result Ack turned on when Result Ready is in OFF state. Read data when Result Ready is in ON state.
		Result Ready was turned ON again when it was ON.	Output data may have been missed because Result Ready turned on again from ON state. Turn on Result Ack when the output data has been read. To ensure that all data are read, enable the handshake function.
		Other	Problem cannot be determined by this analysis. Switch to Setup Mode and try forced output of data using the Manual Control of the communication monitor.

Reference

- If multiple communication issues were found, you can switch between analysis results by the ◁ and ▷ buttons.
- If no relevant communication issue was found, [Analysis Result] displays "Problem cannot be determined by this analysis."

Print Calibration Pattern

#D032

"Print Calibration Pattern" is the function for configuring the type and interval of the calibration pattern and printing the calibration pattern. Capture the printed calibration pattern by a camera when you teach by a calibration tool. (See "[Teaching] Dialog".)

Overview of Functions

Selecting [Utilities] - [Print Calibration Pattern] from the menu bar displays the [Print Calibration Pattern] dialog. Configure the type and interval of the calibration pattern.

Printing a calibration pattern

This section explains the steps to configure and print a calibration pattern using the [Print Calibration Pattern] dialog.

1. Select a pattern type (chessboard or dot grid) from the [Pattern Type] drop-down menu (default: Chessboard).

2. In [Pattern Interval], configure a pattern interval (0.100 to 999.999, default: 10.000).

3. If [Pattern Type] is [Dot Grid], set the ratio of the pattern interval and the dot diameter (dot size, 1 to 99) in percentage terms in [Ratio of Pattern Interval to Dot Diameter] (default: 30).

4. Click the [Preview] button.
   The [Print preview] dialog appears. Check the print preview of the calibration pattern.

5. Click the [Page Setup] button.
   The [Page Setup] dialog appears. Perform page setting for printing.

6. Click the [Print] button.
   The [Print] dialog appears. Specify the destination printer, the number of copies, etc.

7. Click the [Print] button.
   The calibration pattern is printed.

OPC UA Monitor

#D070

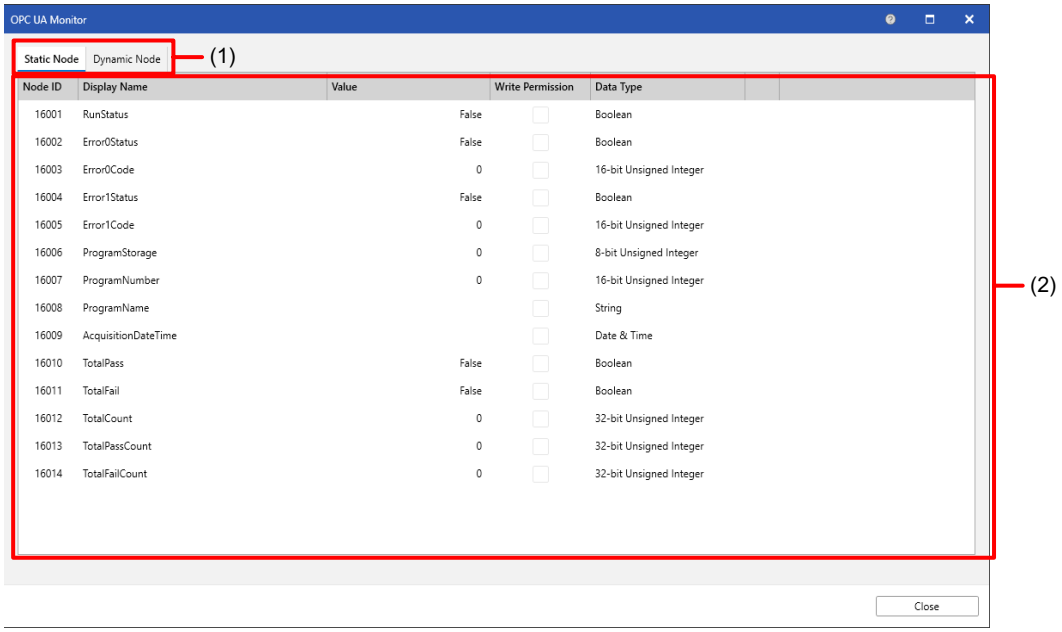
The "OPC UA Monitor" is a function that displays a list of the published nodes when using the OPC UA server. You can use the tabs to switch between displaying the list of nodes predefined in the system (static nodes) and the list of user-selected data (dynamic nodes).

Overview of Functions

Selecting [Utilities] - [OPC UA Monitor] from the menu bar displays the [OPC UA Monitor] dialog. A list of static/dynamic nodes published on the OPC UA server is displayed.

Screen Details

This section describes the details of the [OPC UA Monitor] dialog.



(1) Static/Dynamic Node Tab

[Static Node] Tab

Displays a list of static nodes such as the operation status and measurement count.

[Dynamic Node] Tab

Displays a list of dynamic nodes such as setting parameters and result data.

(2) Static/Dynamic Node List

Displays the value and the data type of static/dynamic nodes. For details on each item, see "[OPC UA I/O Data Settings] Dialog".

Settings

By [Settings] on the menu bar, you can configure the following settings for the program setting. See the explanation of each item for more details.

- Total Status Settings: Set the judgment target(s) (tools and/or cell) for the main task.
- Execution Error Settings: Set whether to issue an execution error when the value being referenced by the tool is invalid.
- Position Adjustment Reference Settings: Create a setting so that, when you add a measurement tool, the position adjustment of a different tool is automatically applied to the measurement tool.
- Archive Condition Settings: Set the archiving conditions.
- OPC UA I/O Data Settings: Set the details of the data to be input/output using OPC UA communication.
- Recording/Simulation Image Settings: Specify the save destination folder for the recorded images, the folder from which the simulation images are loaded, and detailed settings for the loaded images.
- Settings Protection: Set to restrict edits to be made for the tools and the Vision Dashboard, and allow only a restricted set of VS cameras to use the program setting.

Overview of Functions

#D033

Selecting [Settings] from the menu bar displays the submenus that match the permission level of your account. For details of each menu item, see the referenced content.

Menu items	Operational permissions based on account permission levels		
	Full control	Edit	View only
Total Status Settings	✓	–	–
Execution Error Settings	✓	–	–
Position Adjustment Reference Settings	✓	–	–
Archive Condition Settings	✓	–	–
OPC UA I/O Data Settings	✓	–	–
Recording/Simulation Image Settings	✓	✓	–
Settings Protection	✓	–	–

Total Status Settings

#D034

The [Judgment Settings] dialog will appear when you select [Settings] - [Total Status Settings] from the menu bar. Set the judgment target(s) (tools and/or cell) for the total judgment of the main task.

Reference This dialog is the same as the one displayed when you select [Options] - [Judgment Settings] from the [Task] tab of the main task properties.

In the case of tools, the judgment result of the task becomes Fail if any one of the selected tools is judged Fail. In the case of the cell, the judgment result of the specified cell becomes the judgment result of the task.
For details on the settings, see "Task" - "Edit Task" - "Task" - "Options" - "Judgment Settings".

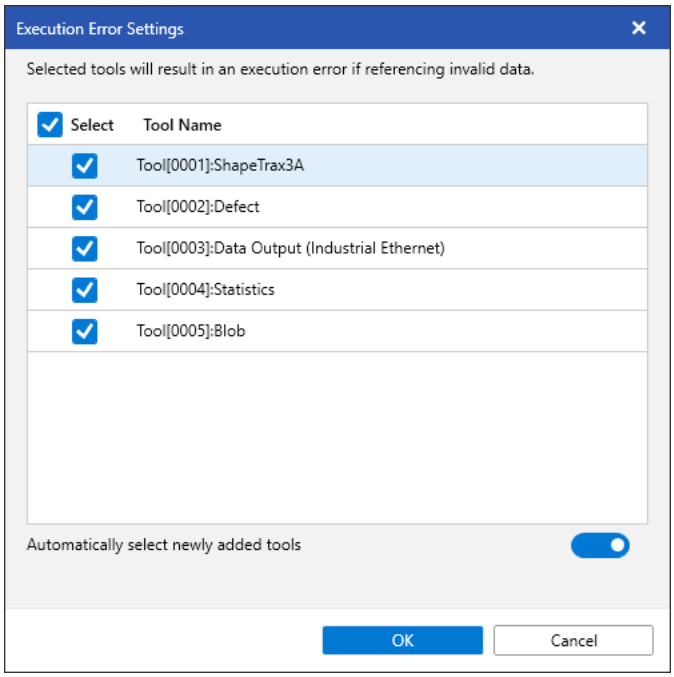
Execution Error Settings

#D035

For each tool placed in the Task, you can set whether to issue an execution error when the value being referenced is invalid. The [Execution Error Settings] dialog will appear when you select [Settings] - [Execution Error Settings] from the menu bar.

[Execution Error Settings] dialog

Select the tool(s) for which to issue an execution error when the value being referenced is invalid.



Select

An execution error is issued when a tool selected by the check box references invalid data. You can select all tools by selecting the check box at the top.

- When not selected: Invalid data is ignored and zero is used for measurement. However, when the referenced input data is an image and it is invalid, it is taken as invalid data.
- When selected: An execution error is issued. The tool accepts the invalid data as it is.

Point If a setting parameter whose value cannot be set to 0 refers to invalid data, an execution error will occur even if it is unchecked.

Tool Name

The tool ID, and the tool name are listed in the order of the tool ID.

Automatically select newly added tools

Configure the default setting of the [Select] check box. When this switch is ON, the [Select] check box of an added tool is automatically selected.

Position Adjustment Reference Settings

#D036

You can make a setting so that, when you add a measurement tool, the position adjustment settings are automatically configured for the added tool. The [Default Position Adjustment Reference at Adding Measurement Tools] dialog will appear when you select [Settings] - [Position Adjustment Reference Settings] from the menu bar.

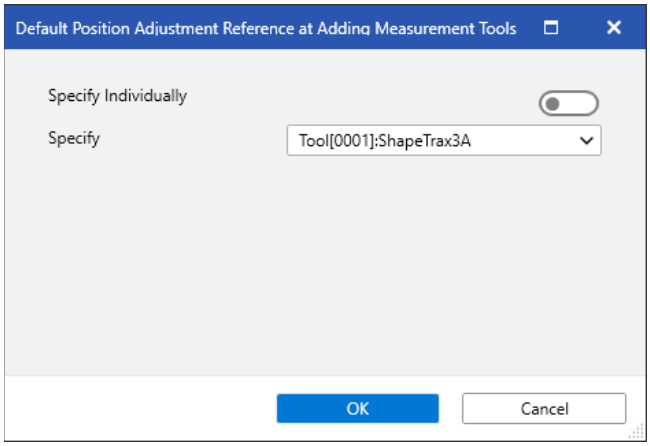
Reference You can also display the dialog by clicking the [Position Adjustment] button of the [Task] view.

- In Step Layout: The button is on the right of the title of the [Inspection] classification.
- In Free Layout: The button is at the bottom of the tool list in the task.

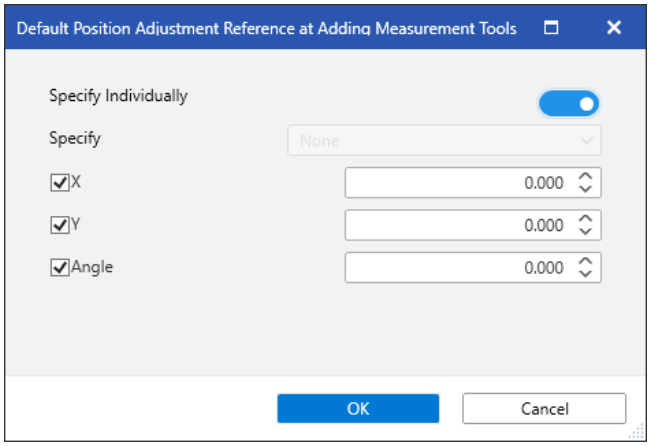
[Default Position Adjustment Reference at Adding Measurement Tools] dialog

You can configure whether to automatically apply the position adjustment of the tool specified here or automatically set the individual coordinate system references for the tool when a measurement tool is added.

[Specify Individually] : OFF



[Specify Individually]: ON



Specify Individually

- **ON**: Configure the coordinate system reference for the position adjustment target by [X], [Y], and [Angle].
- **OFF** (default): The position adjustment result of the tool selected in [Specify] is automatically applied to the added measurement tool.

Specify

If you have set [Specify Individually] to OFF, select the position adjustment tool to be applied from the drop-down menu.

- **None**: [X], [Y], and [Angle] are all set to 0.
- Referable tools: Among the tools in the task, the names of the referable tools are displayed. In the default condition, tools placed in the [Positioning] classification are displayed. In [X], [Y], and [Angle], the position adjustment results of the referenced tool are set. If the referenced tool is deleted, this field displays “None.”

X/Y/Angle

Specify any values for these items if you have set [Specify Individually] to ON.

Archive Condition Settings

#D037

Selecting [Settings] - [Archive Condition Settings] from the menu bar displays the [Archive Condition Settings] dialog.

Reference When you select [Camera] from the [Image Selection] drop-down menu in the [Filmstrip] view, the (Archive Condition Settings) button is displayed. You can also display the [Archive Condition Settings] dialog by clicking the button.

The configured archive conditions are listed. You can configure each archive condition individually. For setting details, see "Filmstrip" - "Archive Review" - "Archive Condition Settings".

OPC UA I/O Data Settings

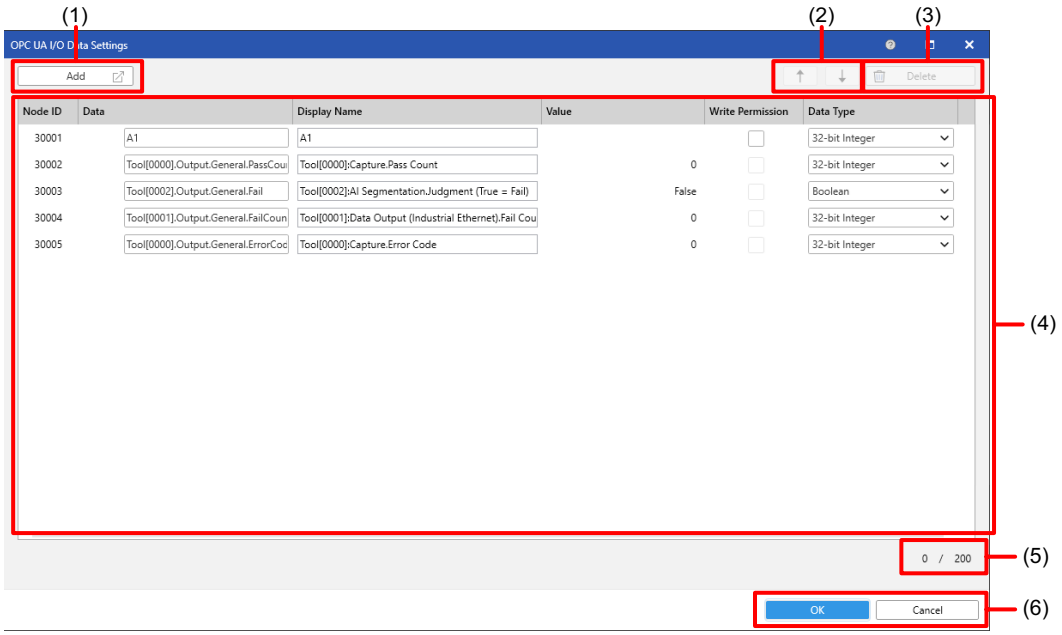
#D071

Selecting [Settings] - [OPC UA I/O Data Settings] from the menu bar displays the [OPC UA I/O Data Settings] dialog, which allows you to manage OPC UA nodes (elements that can be read and written to by the client).

Point

- [OPC UA I/O Data Settings] can be selected when the OPC UA server is enabled in the menu bar - [Global Settings] - [OPC UA Settings] - [Connection Settings].
- [OPC UA I/O Data Settings] will not be displayed if the version of any one of the VS camera, VS Creator, or Program Setting does not support OPC UA.

[OPC UA I/O Data Settings] Dialog



(1) Add

Click this to display the [Reference] dialog. Select an item in the data list or a cell in the Vision Dashboard to add (up to 200 items).

Point

- When adding array data, the [Array Data Detailed Settings] dialog is displayed. You can set the starting index and number of output data. Up to 100 array data items can be added, and up to 10 values will be displayed. String-type array data cannot be added.
- The maximum number of array elements is 1000 in total. For example, if each node has an array of 100 elements, the maximum number of nodes will be 10.

(2)

Switches the order of the selected nodes.

Reference The node IDs remain unchanged even if the order of the nodes is switched.

(3) Delete

Deletes the selected nodes.

(4) Node List

Displays a list of the nodes.

Reference For detailed specifications of each node, see "Reading and Writing/Controlling Nodes".

Node ID

Displays the real node ID of the node (30001 to 30200).

Data

Displays the data name of the setting parameter, result data, or system property that was added. Displays the cell number if the data is a cell.

Reference
- You can select multiple data and change the reference sources collectively. Even if you select more reference sources than the number of selected data, the missing nodes will not be added automatically.
- Data with a reference error will turn red.

Display Name

Enter the name to display when published on the OPC UA server (0 to 100 bytes, default: data name).

Value

Displays the data value, string, and the like.

Reference No value is displayed if an empty cell is added.

Write Permission

Set whether to allow clients to write to the published nodes.

Point
- Result data and system properties are read-only and cannot be enabled for writing.
- With regard to cells, only constant cells can be allowed to be written to. Formula cells cannot be allowed to be written to.
- Setting parameters can be allowed to be written to only if data referencing is possible.

Data Type

Set the data type of the data (default: based on the original data). Setting parameters and result data can also be changed.

- **Boolean**: Data that takes only two types, True or False.
- **32-bit Integer**: Numeric type data such as count values and codes. If no type is set for the original data, the default value will be a 32-bit integer.
- **32-bit Floating-point Number**: Numeric type data such as calculated values and coordinate values.
- **String**: String type data.

Point
- In the data output tool, a 32-bit integer is set even for Boolean type data.
- When the data whose original data is of Boolean type is set to numeric type, True is converted to 1 and False is converted to 0. Also, when the data whose original data is of numeric type is set to Boolean type, 0 is converted to False and anything other than 0 is converted to True.
- When the original data is a cell, all data types can be set. If a string whose original data is a value is set to the data type, it will be output as a string. When the original data is a string, it will be output as follows:
  –int: 0
  –float: nan
  –boolean: false
- The data type displayed on the OPC UA client side will be represented differently. For details, see "Data Type Notation".

Details

Placing the mouse cursor over a row whose data type is an array or string will display ··· in the column to the right of the data type. Clicking it and selecting the target to display will display a dialog where you can check the details of the data.

Reference The OPC UA Monitor can only display details for string data.

(5) Number of Added Items

Displays the "number of items added/maximum number of items that can be added".

(6) OK/Cancel

- **OK**: Saves the edited setting, and closes the dialog.
- **Cancel**: Discards the edited setting, and closes the dialog.

Point If an error is found in the set data type or reference, an error message will be displayed. The [OK] button cannot be clicked until the error is resolved.

Recording/Simulation Image Settings

#D038

The [Recording/Simulation Image Settings] dialog appears when you select [Settings] - [Recording/Simulation Image Settings] from the menu bar.

Reference When you select [PC] from the [Image Selection] drop-down menu in the [Filmstrip] view, the (Recording/Simulation Image Settings) button is displayed. You can also display the [Recording/Simulation Image Settings] dialog by clicking the button.

You can specify the save destination folder for recorded images and the loading folder from which simulation images are loaded, as well as detailed settings for loaded images. For more details, see "Filmstrip" - "Simulation Execution" - "Recording/Simulation Image Settings".

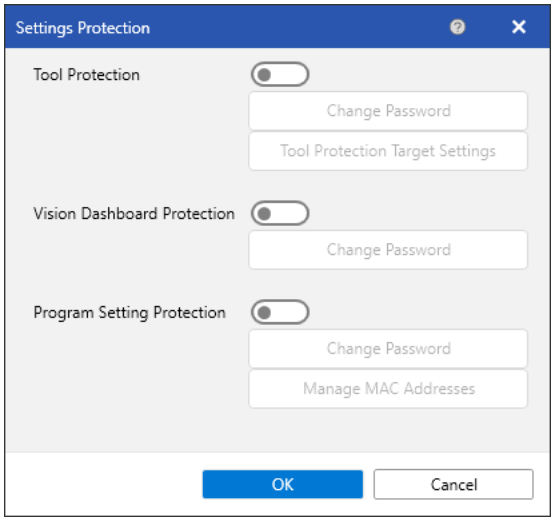
Settings Protection

#D039

Point Settings Protection can only be executed by an account which has the Full Control permission level.

The [Settings Protection] dialog will appear when you select [Settings] - [Settings Protection] from the menu bar. You can protect the following three types of settings:

- Tool Protection: Restrict the editing of tools by setting a password and selecting tools to protect.
- Vision Dashboard Protection: Restrict the editing of the Vision Dashboard by setting a password.
- Program Setting Protection: Restrict the VS cameras that can use the program setting by setting a password and the MAC addresses of the cameras to allow.



Tool Protection

Restrict the editing of tools by setting a password in order to prevent unauthorized modification of tools and leak of technical information. By protecting tools, you can hide them in the task and restrict editing via the context menu. Set one password for the set of tools that you selected. You can change or release it later.

The following information are not displayed for protected tools even if they are selected in the task.

- Tool properties in the [Properties] view
- Setting parameters in the [Data List] view

Operations allowed for protected tools in the task are only grouping and ungrouping. Other operations such as copying are not allowed in the task.

Point If Tool Protection is set, the entire program setting is encrypted, and the program setting file is stored in the binary format not in the text format. The program setting file can no longer be opened by a tool such as a text editor to view the setting content.

Setting [Tool Protection]

To set Tool Protection, turn the switch to ON (default: OFF). When you set the switch ON, the [Set Password] dialog appears. Enter a password and click the [OK] button. Then, the [Password Confirmation] dialog opens. Enter the password again and click the [OK] button.

Point
- The password uses an alphanumeric string of 4 to 32 characters.
- You also need to enter the password when you turn the Tool Protection switch OFF.

Change Password

Clicking this button opens the [Change Password] dialog. Enter the old password and a new password, and then click [OK].

Tool Protection Target Settings

Clicking this button opens the [Enter Password] dialog. Enter the password and click the [OK] button. Then, the [Tool Protection Target Settings] dialog opens. Select the check boxes of the target tools.

Point
- In the dialog, the tools placed in the task are displayed.
- The settings of the target tools are retained even after you turn the Tool Protection switch OFF.

– **Do Not Show the Target Tools on the Task View**: Selecting this check box hides the target tools in the task. Setting parameters and result data of the target tools are also hidden in the [Data List] view, [Results Overview] view, and [Results] view.

Vision Dashboard Protection

Restrict the editing of the Vision Dashboard by setting a password in order to prevent unauthorized modification of the Vision Dashboard and leak of technical information. Cell values are displayed, but formulas and functions are not displayed. Only one password can be set for the entire Vision Dashboard. You can change or release it later.

After setting Vision Dashboard Protection, the 🔒 (protected) icon is displayed beside the title of the [Vision Dashboard] view, and the toolbar and auxiliary bar are hidden. Also, even in Setup Mode, only the cell operations allowed in Run Mode are allowed.

Cell operation	Vision Dashboard Protection OFF		Vision Dashboard Protection ON
	Setup Mode	Run Mode	Setup Mode / Run Mode
Clearing or filling out a cell	✓	–	–
Editing a constant value cell	✓	✓	✓
Editing a formula cell	✓	–	–
Manipulating a UI part cell	✓	✓	✓
Editing a format	✓	–	–
Editing via context menu	✓	–	–
Display of the formula bar	✓	✓	–
Display of the menu bar	✓	–	–
Displaying a link	✓	✓	–
Dragging and Dropping	✓	–	–
Display a formula	✓	✓	–
Display a numerical value	✓	✓	✓

Setting [Vision Dashboard Protection]

To set Vision Dashboard Protection, turn the switch to ON (default: OFF). When you set the switch ON, the [Set Password] dialog appears. Enter a password and click the [OK] button. Then, the [Password Confirmation] dialog opens. Enter the password again and click the [OK] button.

Point
- The password uses an alphanumeric string of 4 to 32 characters.
- You also need to enter the password when you turn the Vision Dashboard Protection switch OFF.

Change Password

Clicking this button opens the [Change Password] dialog. Enter the old password and a new password, and then click [OK].

Program Setting Protection

To allow the use of a program setting saved in the computer only for a restricted set of VS cameras, set a password and the MAC addresses of the target VS cameras. Add the MAC addresses of the target VS cameras in the list in Manage MAC Addresses.
When you load a program setting to a VS camera whose MAC address is not registered in the MAC Address list, you need to enter the password. If the entered password is correct, the program setting is loaded.

Setting [Program Setting Protection]

To set Program Setting Protection, turn the switch to ON (default: OFF). When you set the switch ON, the [Set Password] dialog appears. Enter a password and click the [OK] button. Then, the [Password Confirmation] dialog opens. Enter the password again and click the [OK] button.

Point
- The password uses an alphanumeric string of 4 to 32 characters.
- You also need to enter the password when you turn the Program Setting Protection switch OFF.

Change Password

Clicking this button opens the [Change Password] dialog. Enter the old password and a new password, and then click [OK].

Manage MAC Addresses

Clicking this button opens the [Enter Password] dialog. Enter the password and click the [OK] button. Then, the [Manage MAC Addresses] dialog opens. Set the target MAC addresses (maximum of 100 MAC addresses).

– **Add**: Clicking this button opens the [Edit] dialog. Enter a 12-digit MAC address.
– **Delete**: Selecting a MAC address and clicking this button deletes the MAC address.
– **Edit**: When you double-click a MAC address or click the (edit) icon, the [Edit] dialog appears. Edit the MAC address.

Point
- Enter a MAC address of an alphanumeric string of 12 characters without [:] or [-]. In the [Manage MAC Addresses] dialog, the MAC addresses are displayed with [:] or [-] added.
- The Program Setting Protection will take effect after rebooting or after changing program settings.

Global Settings

By [Global Settings] on the menu bar of the main screen, you can configure settings related to the operating environment of the VS camera.

Setting items	Setting contents overview
Camera Settings	Sets camera-related setting items that should be retained by the system in common, regardless of program settings.
Light Configuration Settings	Registers/Deregisters the lights used in the inspection and changes the light ID of the registered lights.
Light Settings	Changes the settings related to turning on/off the lights used in inspections on a per-light basis.
Memory Allocation	Balances the allocation of an area of the camera memory between allocation to the image memory and allocation to the resource memory in accordance with the setting and the pixel count of the camera used for measurement.
Startup Mode Setting	Selects the Setup Mode or Run Mode, in which the device operates when turned on.
Date and Time Settings	Sets the date and time manually on the device or the time synchronization using PTP/SNTP.
Terminal I/O Settings	Assigns a function to each terminal of the VS camera.
Network Settings	Configures the network settings of the VS camera.
Device Name Setting	Sets the device name of the connected VS camera.
Industrial Ethernet Settings	Configures the settings for data input/output with external devices using industrial Ethernet protocols (EtherNet/IP, PROFINET, PLC-Link).
Non-Procedural Communication Settings	Configures the settings for inputting/outputting data with external devices using non-procedural communication.
Robot Connection Settings	Configures the settings related to the connection with the robot when using the vision-guided robotics function.
Target FTP Settings	Configures the settings related to the FTP server for outputting data or images from the [Data Output (FTP/Storage)] tool and [Image Output (FTP/Storage)] tool.
HTTP Settings	Configures the settings for communication between the VS camera's web server and the client.
Device's FTP Server Settings	Configures the settings to use this device as an FTP server.
OPC UA Settings	Configures the necessary settings to use the OPC UA server function.
DNS Server Settings	Configures the IP address of the preferred/alternate DNS server and checks the connection.
System Error Settings	Assigns Error0 or Error1 to each system error cause.
Account Settings	Manages the users and permission groups that use this device.

Point

The settings configured in the Global Settings are saved in the following file and applied in common to all program settings.

- Global settings file (Environment.vse)
- Device-specific information file (DeviceInfo.din)
- Account settings file (Account.acc)

→Setting Files and Folder Configuration

List of Global Settings

Menu items	Allowed operations by account permissions		
	Full Control	Edit	View Only
Camera Settings	✓	–	–
Light Configuration Settings	✓	–	–
Light Settings	✓	–	–
Memory Allocation	✓	–	–
Startup Mode Setting	✓	–	–
Date and Time Settings	✓	–	–
Terminal I/O Settings	✓	–	–
Network Settings	✓	–	–
Device Name Setting	✓	–	–
Industrial Ethernet Settings	✓	–	–
Non-Procedural Communication Settings	✓	–	–
Robot Connection Settings	✓	–	–
Target FTP Settings	✓	–	–
HTTP Settings	✓	–	–
Device's FTP Server Settings	✓	–	–
OPC UA Settings	✓	–	–
DNS Server Settings	✓	–	–
System Error Settings	✓	–	–
Account Settings	✓	–	–

Camera Settings

#D040

You can configure camera-related setting items that should be retained by the system in common, regardless of program settings.

- White Balance
- Status LED
- Lens Drive Time Limit

White Balance

Functional overview

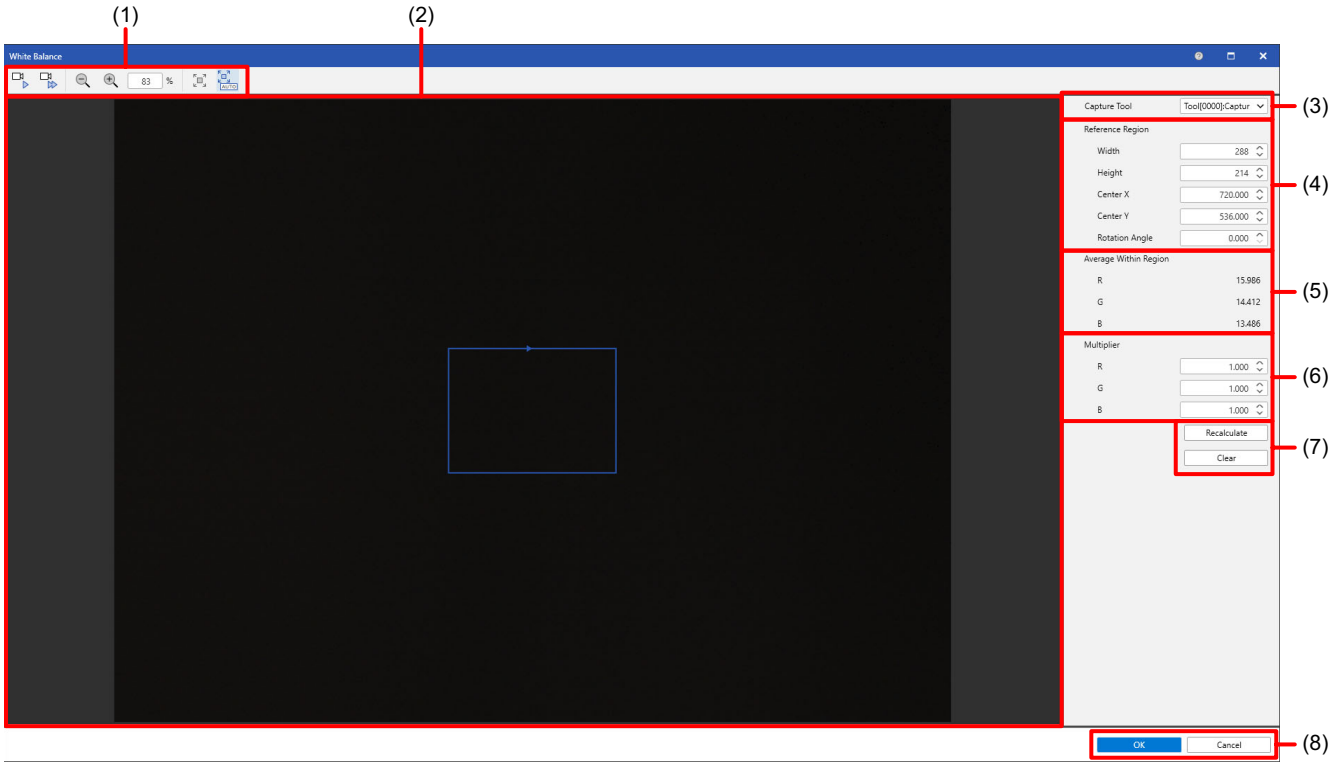
When a color camera is used, you can adjust the color balance to reproduce an exact white by correlating the illumination of the environment to a reference. Perform such adjustment when installing a new system or when changing cameras or lighting.
White balance is set in the [White Balance] dialog box that appears when you select [Global Settings] - [Camera Settings] - [White Balance] from the menu bar.
→Layout of the Screen

Point

- Adjustment of white balance may affect the state of color extraction, etc. that has been set based on the condition before the adjustment. If you have adjusted the white balance settings of a camera in use, make sure to check the operation of the program setting.
- When Multi-Capture is used, the white balance settings are the same for all capture numbers.

Layout of the Screen

This section describes the layout of the [White Balance] dialog box.



(1) Toolbar

(Trigger/Continuous Trigger)

Click to input the trigger.

25 % (Zoom Out/Zoom In/Scale Settings)

Click to change the display scale of the image. You can also set the display scale by specifying a numerical value.

(Fit/Auto Fit)

Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.

(2) Image Display

The captured image and the region to serve as a reference for measuring the white balance (reference region) are displayed. You can drag the reference region to resize it.

(3) Select Type

Specifies the image for setting the white balance.

Capture Tool

The capture tool on the task is displayed.

Capture No.

You can specify the capture No. to be used as the image for setting the white balance.

> **Point** The [Capture No.] setting item is only available when using [Multi-Capture] in the [Capture] tool. When Multi-Capture is used, the white balance settings are the same for all capture numbers.

(4) Reference Region

The reference region can be configured numerically. When you change the size of the reference region in the image display, the numerical values will be linked accordingly.

- **Width**: Sets the width of the reference region numerically.
- **Height**: Sets the height of the reference region numerically.
- **Center X/Y**: Sets the coordinates of the center of the reference region numerically.
- **Rotation Angle**: Sets the rotation angle of the reference region numerically.

(5) Average Within Region

The white balance within the reference region is displayed as the average value of R/G/B. You can adjust the screen brightness so that each average value is within the range of 100 to 200.

(6) Multiplier

You can set the adjustment scale (default: 1.000) for each average value in [Average Within Region]. The multipliers are adjusted so that the white color is within the reference region (in the same way as the RGB values).

(7) Recalculate/Clear

You can calculate/clear [Multiplier].

- **Recalculate**: When clicked, the reference region is calculated to be white (same RGB values) and reflected in [Multiplier].
- **Clear**: Click to initialize [Multiplier] to [1.000].

(8) OK/Cancel

- **OK**: Saves the settings and closes the dialog box.
- **Cancel**: Discards the settings and closes the dialog box.

Adjusting the White Balance

You can prepare a white object as a reference for white balance and adjust it according to the following procedure.

1 Select [Global Settings] - [Camera Settings] - [White Balance] from the menu bar.
The [White Balance] dialog box appears.

2 A white object is set up and captured as the reference for white balance.

A white object appears on the image display.

3 On the camera image, adjust [Reference Region] which will be the reference for adjusting the white balance.

The average value of each RGB component in [Reference Region] is displayed in [Average Within Region].

4 Adjust the screen brightness so that the RGB values in [Average Within Region] are each within the range of 100 to 200.

Because left-clicking updates the image continuously, the R, G, and B values will also change continuously.

5 Click [Recalculate].

The scale is calculated and reflected in [Multiplier].

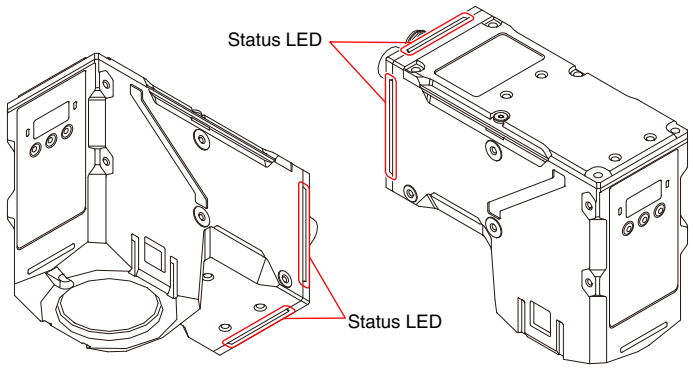
6 After completing the setting, click [OK].

The [White Balance] dialog box closes and the settings are saved.

Status LED

Functional Overview

You can set how the status LEDs on the VS camera are lit. You can check the status of the camera with the status LEDs as they can be configured separately for each inspection total status or event. Status LEDs can also be disabled in a batch.
The status LEDs are configured in the [Status LED] dialog box that appears when you select [Global Settings] - [Camera Settings] - [Status LED] from the menu bar.
→Setting the Status LED Lighting Method



Setting the Status LED Lighting Method

You can enable the status LEDs and set the lighting method for each event.

1 Select [Global Settings] - [Camera Settings] - [Status LED] from the menu bar.

The [Status LED] dialog box appears.

2 Enable [Enable Status LED].

3 Set the lighting method for each event.

> **Point** The lighting settings for [Error], [Startup in Progress], [Update in Progress], and [Device Detection] are fixed and cannot be changed.
> • Error: Blinking, Red
> • Startup in Progress: Blinking, Green
> • Update in Progress: Blinking, White
> • Device Detection: Blinking, Yellow

Light Emission

You can select the status LED lighting method.

- **Off**: Does not turn on the status LED when the corresponding event occurs.
- **On**: Lights the status LED in the color selected in [Select Color] when the corresponding event occurs.
- **Blinking**: Blinks the status LED in the color selected in [Select Color] when the corresponding event occurs.

> **Point** [Blinking] cannot be selected for [Total Status Pass] and [Total Status Fail].

Light Color

You can select the color of the LED when it lights/blinks. Select a color in the [Select Color] dialog box that appears when you click on a color.

Test Emission

Clicking lights or flickers the LED 10 seconds in accordance with the setting of [Light Emission] and [Light Color]. If you click again when the LED is lit or flickering, the LED is lit or flickers another 10 seconds from the time of clicking.

4 After completing the setting, click [OK].
The [Status LED] dialog box closes and the settings are saved.

Lens Drive Time Limit

Functional Overview

For VS zoom smart cameras (VS-S*CX/MX and VS-L*CX/MX), 1.5-second waiting time is placed after switching of ZoomTrax settings to secure 1.5-second interval between one motor driving and another to prevent the deterioration of the zoom lens. Removing this limit will eliminate the 1.5-second time lag when switching [ZoomTrax Settings].

> **Point** If [Lens Drive Time Limit] is removed, the camera may be damaged due to lens deterioration depending on how it is used.

Setting/Removing the Lens Drive Time Limit

1 Select [Global Settings] - [Camera Settings] - [Lens Drive Time Limit] from the menu bar.
The [Lens Drive Time Limit] dialog box appears.

2 Set [ON] or [OFF] under [Lens Drive Limit Cancellation].
- **ON**: Removes the lens drive time limit.
- **OFF** (default): Limits the lens drive time.

3 After completing the setting, click [OK].
The [Lens Drive Time Limit] dialog box closes and the settings are saved.

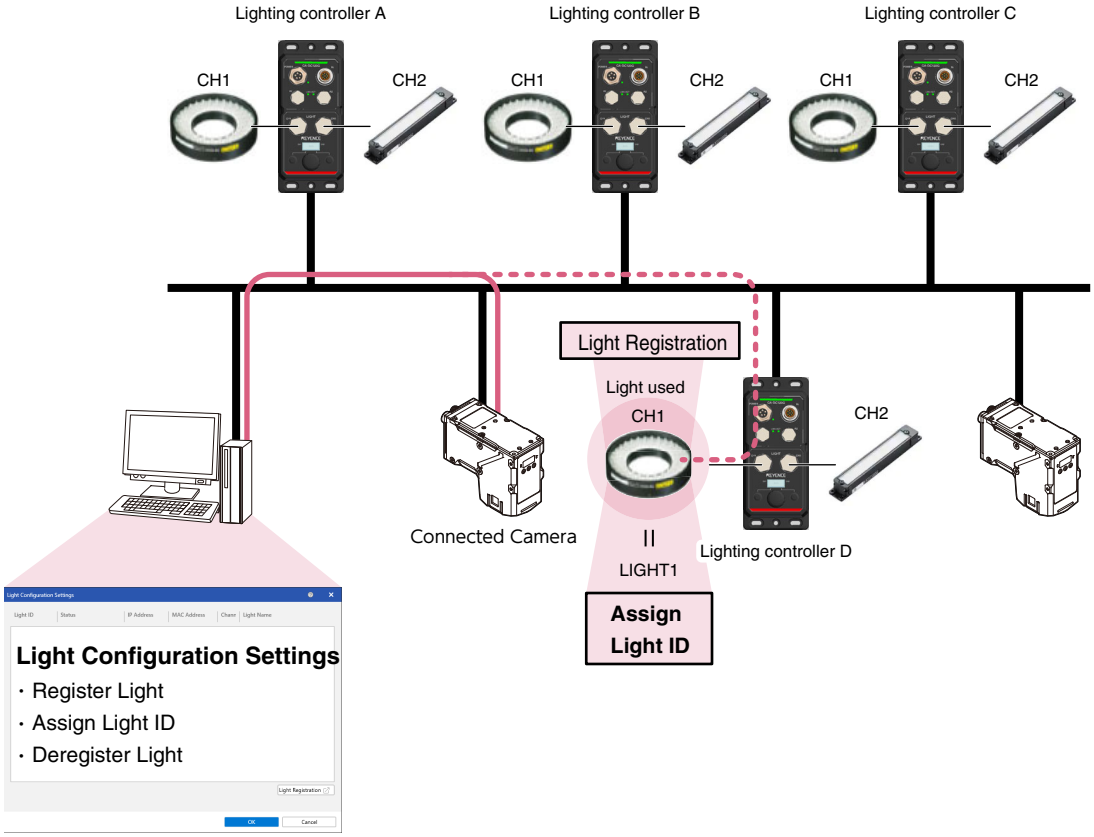
Light Configuration Settings

#D041

You can register/deregister the lights used in the inspection and change the light ID of the registered lights.

Functional Overview

The VS Series uses lights connected to an environmentally-resistant lighting controller or lights connected directly to the camera (High-luminance smart ring lights, Camera-connected light conversion unit + CA lights). Since environmentally-resistant lighting controllers are connected to the network, it is necessary to associate the camera with the lights that will be used, in order to specify which environmentally-resistant lighting controller they are connected to.



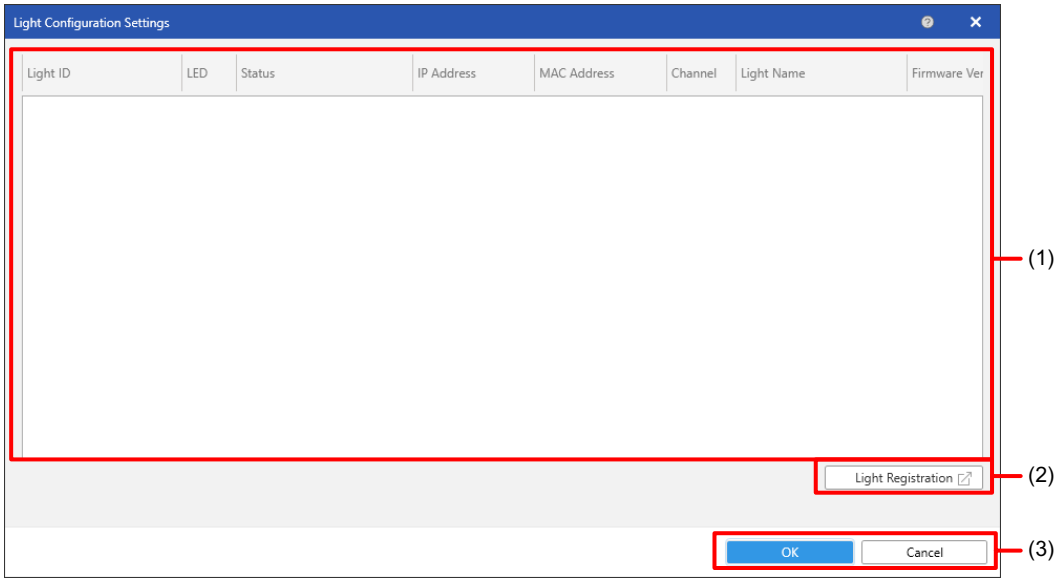
Reference Refer to "Light Settings" for information on settings such as volume limits and setting voltages for each registered light.

Point Camera-connected lights do not require a light registration. They can be used by enabling [Camera-Connected Light] in the [Capture] tool.

The light configuration settings allow you to register/deregister lights that are connected to the environmentally-resistant lighting controller for inspection, as well as change the light ID of the registered lights.
The light configuration settings are set in the [Light Configuration Settings] dialog box that appears when you select [Global Settings] - [Light Configuration Settings] from the menu bar.
→Layout of the Screen

Layout of the Screen

This section describes the layout of the [Light Configuration Settings] dialog box.



(1) List of Registered Lights

The list of the lights registered in [Light Registration] is displayed.

Point The lights are registered in [Light Registration] in units of environmentally-resistant lighting controllers. Since environmentally-resistant lighting controllers have two channels to which lights can be connected, two lights are listed for each controller.

Reference For items that can be sorted, click on the title to change the sort order.

Light ID

This shows the light ID assigned to the registered light. Click to change the light ID assigned to a light by selecting a different light ID from the drop-down list.

Point
- The initial value of the light ID is assigned the lowest available number when it was registered.
- If the deleted light is registered again, the light ID set previously will be assigned.

LED

Click to flicker the status LED of the environmentally-resistant lighting controller for 10 seconds.

If you click the again when the LED is flickering, the LED flickers another 10 seconds from the time of clicking.

Point The status LED cannot be lit when [Status] of the environmentally-resistant lighting controller is [Currently connected to another device].

Status

You can check the lighting usage and the status of the network settings of the environmentally-resistant lighting controller.

- **Currently connected to another device**: The light is being used by another device.

- **Device not found**: The environmentally-resistant lighting controller cannot be found on the network for the following reasons:
  - Network address mismatch. The lights are registered but the subnet mask of the environmentally-resistant lighting controller does not match the VS camera.
  - The environmentally-resistant lighting controller is not powered on.
  - The controller is powered on but not connected to the network. etc.

  To use the lights, you must modify the network settings of the environmentally-resistant lighting controller in the [Light Registration] dialog box.
  →Network Settings for Environmentally-resistant Lighting Controllers

IP Address

This shows the IP address of the environmentally-resistant lighting controller. The same IP address is displayed on channels 1 and 2 of a single environmentally-resistant lighting controller. For simulators "--------" is displayed.

MAC Address

This shows the MAC address of the environmentally-resistant lighting controller. The same MAC address is displayed on channels 1 and 2 of a single environmentally-resistant lighting controller. For simulators "--------" is displayed.

Channel

This shows the channel of the environmentally-resistant lighting controller to which the lights are connected.

Light Name

This shows the light name set for each environmentally-resistant lighting controller.

Firmware Version

The firmware version of the environmentally-resistant lighting controller is displayed. For simulators "-.-.----" is displayed.

(2) Light Registration

Light Registration

Clicking this button opens the [Light Registration] dialog box. The [Light Registration] dialog box allows you to register/deregister the lights to be used in the inspection in units of environmentally-resistant lighting controllers.
→Light Registration

(3) OK/Cancel

- **OK**: Saves the settings and closes the dialog box.
- **Cancel**: Discards the settings and closes the dialog box.

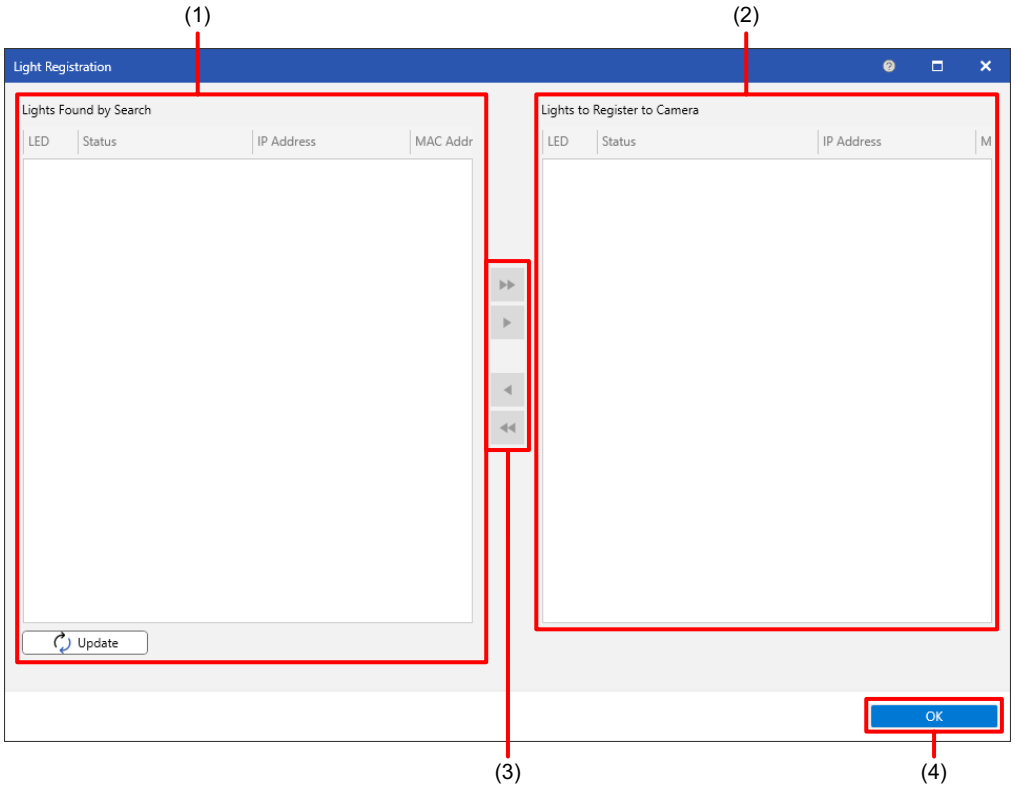
Light Registration

You can register the lights to be used for the inspection in units of environmentally-resistant lighting controllers.

Point The environmentally-resistant lighting controller has two channels to which the lightings are connected. The lights connected to each channel are distinguished by [Light ID], which is assigned in the [Light Configuration Settings] dialog box.

Layout of the Screen

This section describes the layout of the [Light Registration] dialog box.



(1) Lights Found by Search

This shows the list of environmentally-resistant lighting controllers detected on the network. Update Click to re-search the environmentally-resistant lighting controllers on the network and update the list.

Reference
- You can sort the list in ascending/descending order by clicking each list item.
- Right-click on a list row to display Context Menu.

LED

Click to flicker the status LED of the environmentally-resistant lighting controller for 10 seconds.

If you click the again when the LED is flickering, the LED flickers another 10 seconds from the time of clicking.

Point The status LED cannot be lit when [Status] of the environmentally-resistant lighting controller is [Currently connected to another device].

Status

You can check the usage and status of the network settings of the environmentally-resistant lighting controller.

- **Currently connected to another device**: The environmentally-resistant lighting controller is being used by another device.
- **IP address needs setting**: Network address mismatch. The subnet mask of the environmentally-resistant lighting controller does not match the VS camera.
- **IP address is redundant**: The IP address of the environmentally-resistant lighting controller is duplicated in the network.

To register an environmentally-resistant lighting controller whose status is [IP address needs setting] or [IP address is redundant], you must modify the network settings of the environmentally-resistant lighting controller by clicking under [IP Address].
→Network Settings for Environmentally-resistant Lighting Controllers

Reference If another device is connected and the network addresses do not match, [IP address needs setting] is preferentially displayed.

IP Address

This shows the IP address of the environmentally-resistant lighting controller. When you select a list row, will be displayed next to the IP address (or in case of network address mismatch or duplicate IP address, regardless of the list row selection state). Click the icon to configure the network settings for the environmentally-resistant lighting controller.
→Network Settings for Environmentally-resistant Lighting Controllers

Point
- If [Status] is "Currently connected to another device", will not be displayed.
- The network settings of the environmentally-resistant lighting controller are stored on the environmentally-resistant lighting controller itself. Therefore, if you change the network settings, you will be unable to cancel the changed network settings even if you close the [Light Configuration Settings] dialog box with [Cancel].

MAC Address

This shows the MAC address of the environmentally-resistant lighting controller.

Firmware Version

The firmware version of the environmentally-resistant lighting controller is displayed. For simulators "-.-.----" is displayed.

(2) Lights to Register to Camera

This shows the list of environmentally-resistant lighting controllers to be registered with the camera.

Reference
- You can sort the list in ascending/descending order by clicking each list item.
- Right-click on a list row to display Context Menu.

LED

Clicking the will cause the status LED on the Ambient Lighting Controller to blink for 10 seconds. Clicking while it is blinking will cause it to continue blinking for an additional 10 seconds from the time of clicking.

Point The lights cannot be turned on when [Status] of the environmentally-resistant lighting controller is [Device not found] or [Currently connected to another device].

Status

You can check the connection status of the registered environmentally-resistant lighting controllers.

- **Currently connected to another device**: The environmentally-resistant lighting controller is being used by another device.
- **Device not found**: The registered environmentally-resistant lighting controller can not be detected on the network or can no longer connect due to communication failure.
- **IP address needs setting**: Network address mismatch. The subnet mask of the environmentally-resistant lighting controller does not match the VS camera.
- **IP address is redundant**: The IP addresses of the environmentally-resistant lighting controllers are duplicated in the [Lights Found by Search] list, the [Lights to Register to Camera] list, or across the lists.

Point

- If [Status] is "Device not found", you will not be able to connect to the relevant environmentally-resistant lighting controller even if you register it. You will be able to connect after the problem is resolved.
- If [Status] is "Device not found", will appear next to the status. Clicking on it will display the [Light Selection] dialog box, which lists the environmentally-resistant lighting controllers that can be registered. You can switch the environmentally-resistant lighting controller to register by selecting an environmentally-resistant lighting controller that can be registered.

IP Address

This shows the IP address of the environmentally-resistant lighting controller.

MAC Address

This shows the MAC address of the environmentally-resistant lighting controller.

Light Name

This shows the light name set for each environmentally-resistant lighting controller. Click to edit the light name (max. 15 characters). The following characters cannot be used in the light name. Also, in the case of simulators, the light name cannot be changed.

- Forbidden characters: \ / : * ? ” < > |

Firmware Version

The firmware version of the environmentally-resistant lighting controller is displayed. For simulators "-.-.----” is displayed.

(3) Register/Deregister

You can register the environmentally-resistant lighting controllers detected on the network as those to be used by the device. You can also deregister environmentally-resistant lighting controllers that are no longer needed.

- [▸▸] (Register all): Click to move the number of environmentally-resistant lighting controllers shown in [Lights Found by Search] that can be registered in order from the top of the list to [Lights to Register to Camera].
- [▸] (Register): Click to move the environmentally-resistant lighting controller currently selected under [Lights Found by Search] to [Lights to Register to Camera].
- [◂] (Deregister): Click to move the environmentally-resistant lighting controller currently selected under [Lights to Register to Camera] to [Lights Found by Search].
- [◂◂] (Deregister all): Click to move all environmentally-resistant lighting controllers registered in [Lights to Register to Camera] to [Lights Found by Search].

Point

- Up to 10 lights connected to the environmentally-resistant lighting controller can be registered per camera. However, note that only up to five environmentally-resistant lighting controllers can be registered to a single camera. Even if the number of registered lights is less than 10, no more lights can be registered when the number of registered environmentally-resistant lighting controllers reaches 5.
- [Light ID] (LIGHTn, where n=01 to 10) is automatically assigned in order from the lowest available number at the time of registration. [Light ID] can be viewed and changed in the [Light Configuration Settings] dialog box.
- A single camera can use up to 10 lights connected to the environmentally-resistant lighting controller, plus one camera-connected light.
- A single environmentally-resistant lighting controller cannot be used simultaneously with different cameras on different channels.

Reference You can select multiple lightings in the list by holding down the [Shift] key or [Ctrl] key while selecting.
Multiple selected lights can be registered/deregistered at once.

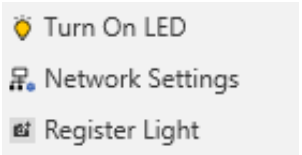
(4) OK

The environmentally-resistant lighting controller is registered to the VS camera and the [Light Registration] dialog box is closed.

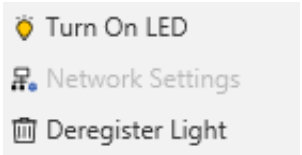
Context Menu

Right-clicking on a list row displays a context menu. This section describes the function and operation of each context menu.

[Lights Found by Search]



[Lights to Register to Camera]



Turn On LED

Click to turn on the status LED of the environmentally-resistant lighting controller currently selected for 10 seconds, and then turned off.

Reference You can select multiple rows in the list by holding down the [Shift] key or Ctrl] key while selecting.
Multiple LEDs can be lit at once by selecting multiple list rows.

Network Settings

Click to configure the network settings for the environmentally-resistant lighting controller that is selected in [Lights Found by Search].
→Network Settings for Environmentally-resistant Lighting Controllers

Register Light

Point [Register Light] is the context menu for [Lights Found by Search].

You can move the environmentally-resistant lighting controller currently selected under [Lights Found by Search] to [Lights to Register to Camera].

Reference Multiple lights in the list can be selected by holding down the [Shift] key or [Ctrl] key while selecting.
Multiple selected environmentally-resistant lighting controller can be registered for lighting at the same time.

Deregister Light

Point [Deregister Light] is the context menu for [Lights to Register to Camera].

You can move the environmentally-resistant lighting controller currently selected under [Lights to Register to Camera] to [Lights Found by Search].

Reference Multiple lights in the list can be selected by holding down the [Shift] key or [Ctrl] key while selecting.
Multiple selected environmentally-resistant lighting controller can be deregistered for lighting at the same time.

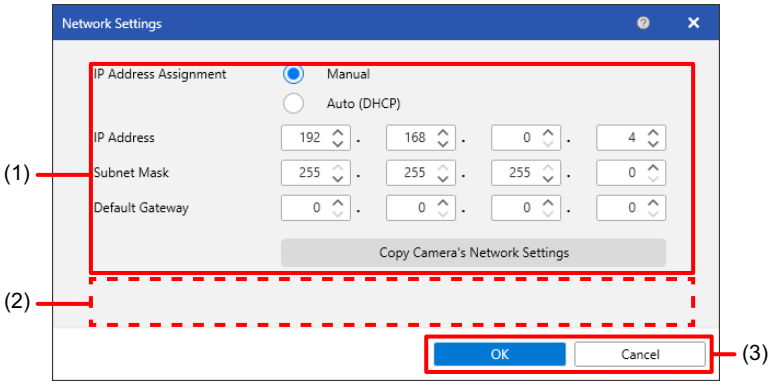
Network Settings for Environmentally-resistant Lighting Controllers

When you select a list row under [Lights Found by Search] (or in case of network address mismatch or duplicate IP address) will appear next to the IP address. Clicking the icon will display the [Network Settings] dialog box, allowing you to configure the network settings for the environmentally-resistant lighting controller.

Reference You can also display the [Network Settings] dialog box by selecting a list row in [Lights Found by Search] and right-clicking and selecting [Network Settings] from the context menu that appears.

Layout of the Screen

This section describes the layout of the [Network Settings] dialog box.



(1) Network Settings

You can set the network settings for the environmentally-resistant lighting controller.

IP Address Assignment

You can select the method for configuring the network information (IP address/ subnet mask/ default gateway) for the environmentally-resistant lighting controller.

- **Manual** (default): Select to set the network information manually.
- **Auto (DHCP)**: Select to automatically obtain network information from a DHCP server.

IP Address

You can enter the IP address of the environmentally-resistant lighting controller when [IP Address Assignment] is set to [Manual] (default: 192.168.0.20).

Subnet Mask

You can enter the subnet mask of the default gateway for the environmentally-resistant lighting controller when [IP Address Assignment] is set to [Manual] (default: 255.255.255.0).

Default Gateway

You can enter the IP address of the default gateway for the environmentally-resistant lighting controller when [IP Address Assignment] is set to [Manual] (default: 0.0.0.0).

Copy Camera's Network Settings

Click to set the network information configured on the camera to [IP Address], [Subnet Mask], and [Default Gateway]. You can modify the values accordingly.

Reference [IP Address] is set to the upper three octets of the IP address set for the camera, with "000" in the last one octet. Change to the IP address assigned to the environmentally-resistant lighting controller being configured.

(2) Error Message

An error messages is displayed when there is an error in the network settings.

(3) OK/Cancel

- **OK**: Saves the set network information on the environmentally-resistant lighting controller and closes the [Network Settings] dialog box.

Point The network settings of the environmentally-resistant lighting controller overwrite settings of the environmentally-resistant lighting controller itself. If you confirm the network setting changes by clicking [OK], clicking [Cancel] in the [Light Configuration Settings] dialog box will not cancel the setting changes.

- **Cancel**: Discards the settings and closes the [Network Settings] dialog box.

Light Settings

#D042

You can change the settings related to turning on/off the lights used in inspections on a per-light basis.

- Camera-Connected Light Settings
- Lighting Controller Settings

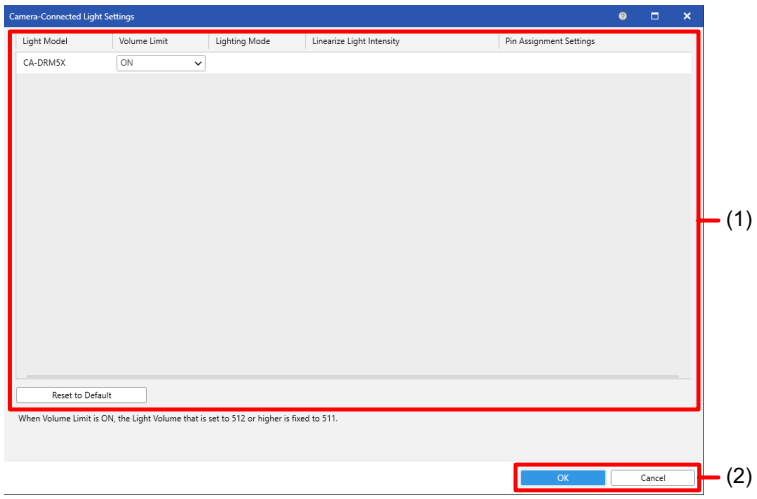
Camera-Connected Light Settings

Functional Overview

You can change the lighting settings for the lights connected directly to the VS camera.
The camera-connected light settings are configured in the [Camera-Connected Light Settings] dialog box that appears when you select [Global Settings] - [Light Settings] - [Camera-Connected Light Settings] from the menu bar.
→Layout of the Screen

Layout of the Screen

This section describes the layout of the [Camera-Connected Light Settings] dialog box.



(1) Directly Connected Light List

This shows the lights connected directly to the VS camera.

Light Model

This shows the model of the directly connected lights.

Volume Limit

You can select whether to limit the lighting output.

- **ON** (default): Limits the light output. Select to limit lighting output to prevent degradation due to overheating.

Point When [ON] is selected, the light intensity is fixed at 511, even if [Light Volume] is set to 512 or higher in the [Light] tab of the [Capture] tool.

- **OFF**: Does not limit the light output.

Lighting Mode

You can select the lighting mode for lights connected via the camera-connected light conversion unit (CG-LC10, CG-LC20).

- **Pulse Width Modulation** (default): Controls and illuminates the light using PWM.
- **DC**: Illuminates and controls the light using DC. If you have selected [DC], execute [Linearize Light Intensity].

Linearize Light Intensity

You can perform light intensity linearization or initialization for lights connected via the camera-connected light conversion unit (CG-LC10, CG-LC20).

- **Execute**: Click to linearize the light intensity.
- **Initialize**: Initializes the adjustment data for light intensity linearization to the factory default state.

Reference
- Light intensity linearization is a process of automatically adjusting the data inside the lights to the characteristics of their light emission part, such that the volume and lighting brightness change linearly.
- To readjust linearization, pressing the [Execute] button of Linearize Light Intensity again will suffice. Therefore, there is no need to execute [Initialize] typically.

Pin Assignment Settings

Configure the settings for pin assignment for the light connected via the camera-connected light conversion unit (CG-LC20).

- **Settings**: Click to display the [Pin Assignment Settings] dialog box. Connection settings for PIN1-5 can be selected from four different patterns.

Reset to Default

Click to reset [Volume Limit], [Lighting Mode], and [Pin Assignment Settings] to their default values for each light. The items to be initialized vary depending on the light model.

(2) OK/Cancel

- **OK**: Saves the settings and closes the dialog box.
- **Cancel**: Discards the settings and closes the dialog box.

Lighting Controller Settings

Functional Overview

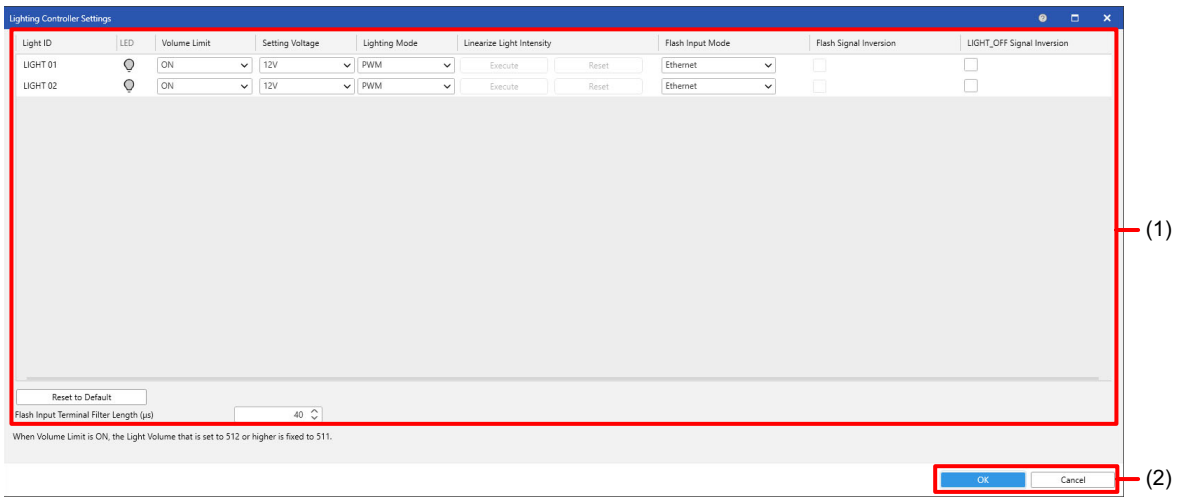
You can change the lighting settings for the lights connected to the VS camera via the environmentally-resistant lighting controller.

Lighting controller settings are configured in the [Lighting Controller Settings] dialog box that appears when you select [Global Settings] - [Light Settings] - [Lighting Controller Settings] from the menu bar.
→Layout of the Screen

Point The settings related to the lights connected via the environmentally-resistant lighting controller can also be configured using the operation buttons on the environmentally-resistant lighting controller. To configure it using the operation buttons of the environmentally-resistant lighting controller, you need to set [Light Settings Source] of the lights to be used to [Lighting Controller] in the [Capture] tool - [Light] tab - [Light Settings].

Layout of the Screen

This section describes the layout of the [Lighting Controller Settings] dialog box.



(1) List of Registered Lights

This shows the lights registered as the lighting to be used.

Light ID

This shows the light ID assigned to the registered light.

Volume Limit

You can select whether to limit the lighting output.

- **ON** (default): Limits the light output. Select to limit lighting output to prevent degradation due to overheating.

  Point When [ON] is selected, the light intensity is fixed at 511, even if [Light Volume] is set to 512 or higher in the [Light] tab of the [Capture] tool.

- **OFF**: Does not limit the light output.

Setting Voltage

You can select the voltage to be supplied to the lighting emission unit.

- **12V** (default)
- **24V**

CAUTION	Make sure to configure the setting voltage for the light emission unit correctly. Connecting a 12 V DC illumination unit to an output terminal at 24 V DC may cause fire, electric shock, or damage to the device.

Lighting Mode

You can select the lighting mode.

- **PWM** (default): Controls and illuminates the light using the PWM method.
- **DC**: Illuminates and controls the light using the DC method. If you have selected [DC], execute [Linearize Light Intensity].

Point

For the light connected via the camera-connected light conversion unit (CG-LC20), [Lighting Mode] will not be displayed.

Linearize Light Intensity

Linearize the light intensity or initialize the adjustment data for light intensity linearization

- **Execute**: Click to linearize the light intensity.
- **Reset**: Initializes the adjustment data for light intensity linearization to the factory default state.

Reference

- Light intensity linearization is a process of automatically adjusting the data inside the lights to the characteristics of their light emission part, such that the volume and lighting brightness change linearly.
- To readjust linearization, pressing the [Execute] button of Linearize Light Intensity again will suffice. Therefore, there is no need to execute [Reset] typically.

Flash Input Mode

You can select the Flash signal input method.

- **Ethernet**: Turns on the flash by Flash input via Ethernet from the camera. Flash input from the terminal is not accepted.
- **Terminal**: Turns on the flash by the Flash input from the terminal. Flash input from the camera via Ethernet is not accepted.

Flash Signal Inversion

You can select whether the Flash signal is output with or without inversion.

- **Disabled** (default): Outputs the Flash signal without inversion.
- **Enabled**: Outputs the Flash signal with inversion.

LIGHT_OFF Signal Inversion

You can select whether the LIGHT_OFF signal is output with or without inversion.

- **Disabled** (default): Outputs the LIGHT_OFF signal without inversion.
- **Enabled**: Outputs the LIGHT_OFF signal with inversion.

Reset to Default

Click to reset the following settings to their default values for each light.

- Volume Limit
- Setting Voltage
- Lighting Mode
- Flash Input Mode

- Filter Length
- Flash Signal Inversion
- LIGHT_OFF Signal Inversion

Flash Input Terminal Filter Length (µs)

You can set the input terminal filter length (µs) (1 to 150, default: 40).

(2) OK/Cancel

- **OK**: Saves the settings and closes the dialog box.
- **Cancel**: Discards the settings and closes the dialog box.

Memory Allocation

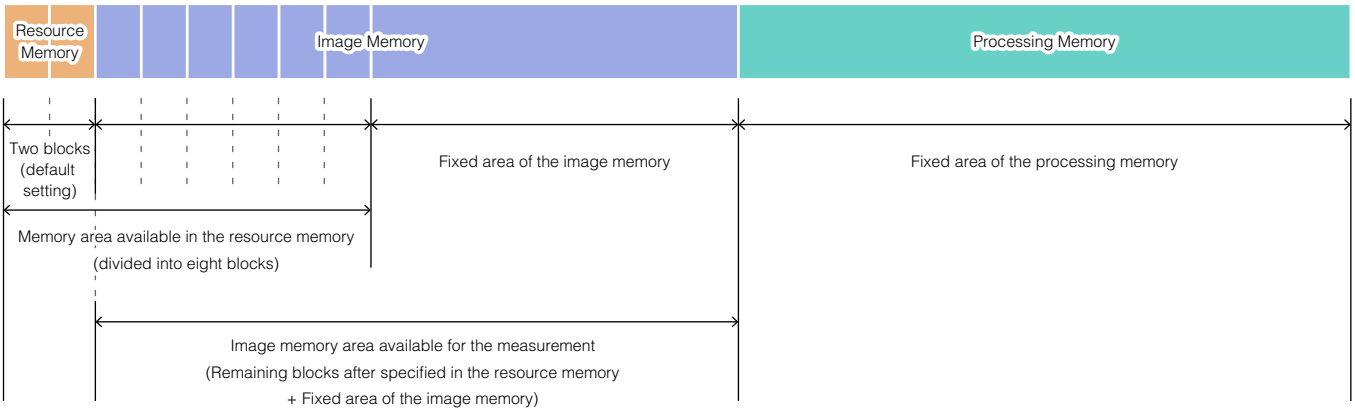
#D043

You can assign the memory built into the camera used for measurement to image memory/ resource memory/processing memory according to the settings and the number of pixels of the camera.

Functional Overview

Program settings consume image memory, resource memory, and processing memory when they perform measurements. The memory allocation is configured arbitrarily according to the program setting to be executed, because the amount of memory required varies depending on the settings and number of pixels of the camera.

Entire memory area of the VS camera



Point The processing memory is fixed. You can set the amount of resource memory and image memory to assign.

Memory assignment is configured in the [Memory Allocation] dialog box that appears when you select [Global Settings] - [Memory Allocation] from the menu bar.
→Changing the Memory Allocation for Each Use

Changing the Memory Allocation for Each Use

You can allocate resource memory and then assign each memory area to be used for the measurement.

1 Select [Global Settings] - [Memory Allocation] from the menu bar.
The [Memory Allocation] dialog box appears.

2 Allocate the memory area to be used as resource memory.

Resource Memory Allocation

The memory area available for the VS camera's resource memory is divided into eight parts. Allocate resource memory to be used in the program setting in blocks.

The selected allocated amount will be reflected in [Memory Usage].

3 Under [Memory Usage], check the memory usage and allocated amount.

4 After completing the setting, click [OK].
The [Memory Allocation] dialog closes and the setting is reflected.

Startup Mode Setting

#D044

You can select the Setup Mode or Run Mode, in which the device operates when turned on.

Functional overview

The device has two operating modes: [Setup Mode] and [Run Mode]. By switching the operation modes, the processes of configuring settings in [Setup Mode] and checking results in [Run Mode] can be repeatedly adjusted to ensure stable operation.
Startup mode is a function that sets the operation mode the device will start up in when it is powered on.
The startup mode is configured in the [Startup Mode Setting] dialog box that appears when you select [Global Settings] - [Startup Mode Setting] from the menu bar.
→Setting the startup mode

Setting the startup mode

Set the operation mode when the device is turned on according to the form of operation.

1 Select [Global Settings] - [Startup Mode Setting] from the menu bar.
The [Startup Mode Setting] dialog box appears.

2 Select the startup mode in [Startup Mode Setting].
- **Setup Mode** (default)
- **Run Mode**

3 After completing the setting, click [OK].
The [Startup Mode Setting] dialog box closes and the settings are saved.

Point The setting for [Startup Mode Setting] will take effect from the next startup.

Date and Time Settings

#D045

You can set the date and time manually on the device or the time synchronization using PTP/SNTP.

Functional Overview

If a device is kept running for a long period of time, there will be an error in the device time. To ensure that the date and time settings do not deviate from those of each device comprising the system, either manually check the date and time periodically or automatically update the time on the devices periodically using the time synchronization function.
Date and time settings are configured in the [Date and Time Settings] dialog box that appears when you select [Global Settings] - [Date and Time Settings] from the menu bar.
→Setting the Date and Time

Reference This device also supports reading and writing of date and time settings using a command.
- 119 : TR : Read Date & Time
- 118 : TW : Write Date & Time

Date and time settings can be changed using a command from the PLC, etc.

Point
- The date and time settings cannot be changed during the trial period for AI activation.
- After the AI activation trial period has expired, the date cannot be changed to a date earlier than the trial period expiration date.
- The restrictions do not apply to the lifetime AI activation.
- If the RTC (real time clock) battery runs out, the date and time will be set to 0:00:00 of January 1, 2010.

Setting the Date and Time

Follow the steps below to set the device date and time.
- Setting the Date and Time Manually
- Setting the Date and Time with Time Synchronization

Setting the Date and Time Manually

1 Select [Global Settings] - [Date and Time Settings] from the menu bar.
The [Date and Time Settings] dialog box will appear.

2 Set the date and time.

Date

You can set the date by entering the date (MM/DD/YYYY) or by clicking on and clicking on the date in the calendar that appears.

Time

You can select and enter the hour, minutes, and seconds, or set using the spin button.

3 After completing the setting, click [OK].

The [Date and Time Settings] dialog box closes and the settings are saved.

Setting the Date and Time with Time Synchronization

1 Select [Global Settings] - [Date and Time Settings] from the menu bar.

The [Date and Time Settings] dialog box will appear.

2 Click [Use Time Synchronization] to enable it.

3 Under [Protocol Selection], select the protocol to be used for time synchronization.

- **PTP**
- **SNTP**

Point When [PTP] is selected, time synchronization is complete when [Synchronized] is displayed in [Synchronization Status]. Click [OK] to close the dialog box. Once time synchronization is performed using [PTP], no periodic updates will be performed thereafter.

4 If [SNTP] is selected, set the target specification method, IP address/host name, time zone, and update cycle.

Target Specification Method

Set the method for specifying the target SNTP server to connect to (default: IP Address).

- **IP Address**
- **Host Name**

SNTP Server IP Address

If [IP Address] is selected for [Target Specification Method], set the IP address of the SNTP server (default: blank).

Point Click [Check Connection (Ping)] to issue a Ping command to check the connection with the SNTP server.

SNTP Server Host Name

If [Host Name] is selected for [Target Specification Method], set the host name of the SNTP server (default: blank).

Point The only characters that can be used in a host name are alphanumeric characters, hyphens (-), and periods (.). Up to 63 characters can be entered.

Time Zone

You can select the time zone to be set from the drop-down menu.

Point If [OPC UA Server] is enabled, it is necessary to reboot the device in order to apply the specified time zone to the OPC UA server.

Update Cycle (min)

You can set the cycle for retrieving the time from the SNTP server (1 to 9999, default: 1).

5 After completing the setting, click [OK].

The [Date and Time Settings] dialog box closes and the settings are saved.

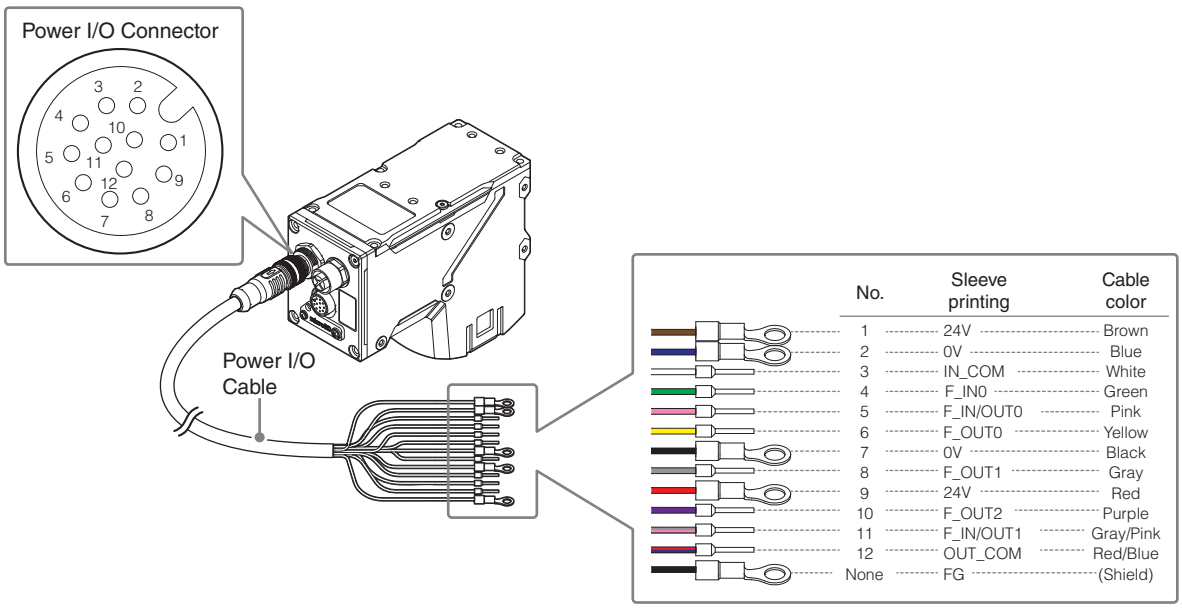
Terminal I/O Settings

#D046

You can assign a function to each terminal of the VS camera.

Functional Overview

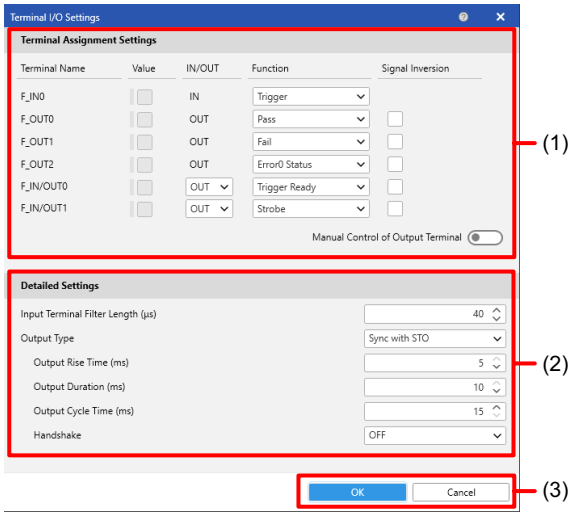
You can change the settings for controlling the input and output of data through the VS camera's power I/O connector terminals.



Terminal I/O settings are configured in the [Terminal I/O Settings] dialog box that appears when you select [Global Settings] - [Terminal I/O Settings] from the menu bar.
→Layout of the Screen

Layout of the Screen

This section describes the layout of the [Terminal I/O Settings] dialog box.



(1) Terminal Assignment Settings

Terminal Name

This shows the terminal names of the power I/O connector.
→Checking the terminal assignment of the VS camera

Value

This displays the terminal status with indicators and checkboxes.

: OFF

: ON

Point

- The indicators and checkboxes will be hidden because the status cannot be monitored for terminals whose [Function] is assigned to [Flash*].
- If [Manual Control of Output Terminal] is enabled, you can select the checkbox to force the output terminal to ON.

IN/OUT

Indicate whether each terminal is an input terminal (IN) or an output terminal (OUT). The F_IN/OUT0 and F_IN/OUT1 terminals can be changed by selecting IN or OUT from the drop-down menu.

Function

The shows the function assigned to the terminal. The function to be assigned can be selected and changed from the drop-down menu.
→Initial Assignment
→Assignable Functions

Signal Inversion

You can select whether to invert the signals of the output terminal.

Point

[Signal Inversion] is a setting item for the OUT terminals only.

Manual Control of Output Terminal

You can select whether or not the output terminals can be temporarily enabled for manual output.

- **Disabled** (default): Outputs the current status of the function assigned to each terminal.
- **Enabled**: Enable to set [Value] to ON or OFF. You can set the terminal ON/OFF in [Value] and output the ON terminal.

Point

Since this is a temporary setting, it will become disabled when the [Terminal I/O Settings] dialog box is closed.

(2) Detailed Settings

Input Terminal Filter Length (μs)

You can set the input terminal (F_IN0) filter length (μs) (1 to 150, default: 40).

Output Type

You can select the output type for outputting from the terminal.

- **Sync with STO** (default)
- **One Shot**

Output Rise Time (ms)

You can set the rise time of the terminal output when [Sync with STO] is selected for [Output Type].

Point	Values larger than [Output Cycle Time (ms)] - [Output Duration (ms)] cannot be set.

Output Duration (ms)

You can set the output time of the terminal when [Sync with STO] is selected for [Output Type].

Point	Values larger than [Output Cycle Time (ms)] - [Output Rise Time (ms)] cannot be set.

Output Cycle Time (ms)

You can set the output cycle of the terminal output when [Sync with STO] is selected for [Output Type].

Point	Values smaller than [Output Rise Time (ms)] + [Output Duration (ms)] cannot be set.

One Shot Time (ms)

You can set the one shot time of the terminal output when [One Shot] is selected for [Output Type].

Handshake

When [Sync with STO] is selected for [Output Type], you can set whether or not to perform handshake on the terminal to which Result Request is assigned.

(3) OK/Cancel

- **OK**: Reflects the edited setting, and closes the dialog.
- **Cancel**: Discards the settings and closes the dialog box.

Initial Assignment

The initial assignment of the power I/O connector for VS cameras is as follows.

Terminal	Function
F_IN0	Trigger
F_OUT0	Pass
F_OUT1	Fail
F_OUT2	Error0 Status
F_IN/OUT0	Trigger Ready
F_IN/OUT1	Strobe

Assignable Functions

The functions that can be assigned to the input and output terminals are as follows.

Functions Assignable to Input Terminals

Name	Function	Description
OFF	Not assigned	No assigned states
Trigger	Issue trigger	Issues a trigger and captures with the camera. Only F_IN0 can be assigned.
Trigger Disable	Disable Trigger Input	ON disables trigger acceptance.
Output Disable	Disable output	ON disables output. The output and archiving will stop, but the images/data that have already been archived will not be cleared. When the output is stopped, it will stop after the output of the image/data that has already been archived is completed.
Reset	Reset	Performs a reset. Refer to "103 : RS : Reset" for information on what will be reset.
Error0 Clear	Clear Error0	Clears the Error0 status.
Error1 Clear	Clear Error1	Clears the Error1 status.
Result Request	Terminal output control	Controls the handshake signal for the terminal output.
Go to Run	Switch to Run Mode	Switches to Run Mode.
Go to Setting	Switch to Setup Mode	Switches to Setup Mode.
Reset Output Data	Initialize output data	Initializes the output terminal and clears the output region of the industrial Ethernet to 0. Also clears the buffer for data output.
Image Capture Buffer Clear	Clear image buffer capacity	Clears the image buffer capacity.
Soft Event 0 to 31	Issue Soft Event 0 to 31	Issues the selected Soft Event.
Tool Buffer Clear	Clear tool buffer	Clears the buffers of various tools.

Functions Assignable to Output Terminals

Name	Function	Description
OFF	Not assigned	No assigned states
Flash 1	Strobe light 1	Terminal for external Flash output. It outputs according to the external FLASH setting in the program setting.
Flash 2	Strobe light 2	Terminal for external Flash output. It outputs according to the external FLASH setting in the program setting.
Flash 3	Strobe light 3	Terminal for external Flash output. It outputs according to the external FLASH setting in the program setting.
Flash 4	Strobe light 4	Terminal for external Flash output. It outputs according to the external FLASH setting in the program setting.

Name	Function	Description
Flash 5	Strobe light 5	Terminal for external Flash output. It outputs according to the external FLASH setting in the program setting.
Trigger Ready	Trigger input enabled	Trigger acceptable. • **OFF**: Trigger not acceptable • **ON**: Trigger acceptable
Error0 Status	Status of error 0	Occurrence state of Error 0 system error (assigned error cause). • **OFF**: No error • **ON**: Error
Error1 Status	Status of error 1	Occurrence state of Error 1 system error (assigned error cause). • **OFF**: No error • **ON**: Error
Run Status	Operation mode status	State of the current operation mode. • **OFF**: Setup Mode • **ON**: Run Mode
Pass	Total Status Pass	Total status = Pass. Updated with each tool execution. • **OFF**: Fail/Not judged yet • **ON**: Pass
Fail	Total Status Fail	Total status = Fail. Updated with each tool execution. • **OFF**: Pass/Not judged yet • **ON**: Fail
Strobe	Strobe for terminal output	Signal for synchronization of terminal outputs.
Camera Exposure Busy	Signal indicating camera exposure in progress	Exposure state of the camera. • **OFF**: Not exposing • **ON**: Exposing
Output Image Busy	Image output in progress	Indicates whether or not image output is in progress. Turns to High (1) during output. Whether output is in progress or not will be determined by the OR of each protocol.
Output Image Buffer Status	Image remaining in image buffer	Indicates whether any image remains in the image output buffer. Turns to High (1) when images remain in the buffer. Whether any image remains in the buffer will be determined by the OR of each protocol.
Output Data Busy	Data output in progress	Indicates whether or not data output is in progress. Turns to High (1) during output. Whether output is in progress or not will be determined by the OR of each protocol.
Output Data Buffer Status	Data remaining in data buffer	Indicates whether any data remains in the data output buffer. Turns to High (1) when data remains in the buffer. Whether any data remains in the buffer will be determined by the OR of each protocol.
Processing Status	Flow processing in progress	Indicates whether or not image processing is in progress. It is set to ON during image processing (mathematical operations or measurement). Image/data output is not included.

Name	Function	Description
Result Data A	For terminal output	Signal for data output to the terminal. It outputs the value set by the Data Output (Terminal) tool.
Result Data B		
Result Data C		
Result Data D		
Result Data E		

Network Settings

#D047

Configure the network settings of the VS camera. The settings to be configured are the same as those configured from the [Connect to Device] screen. For details, refer to "[Connect to Device] screen" - "Configuring Device's Network Settings".

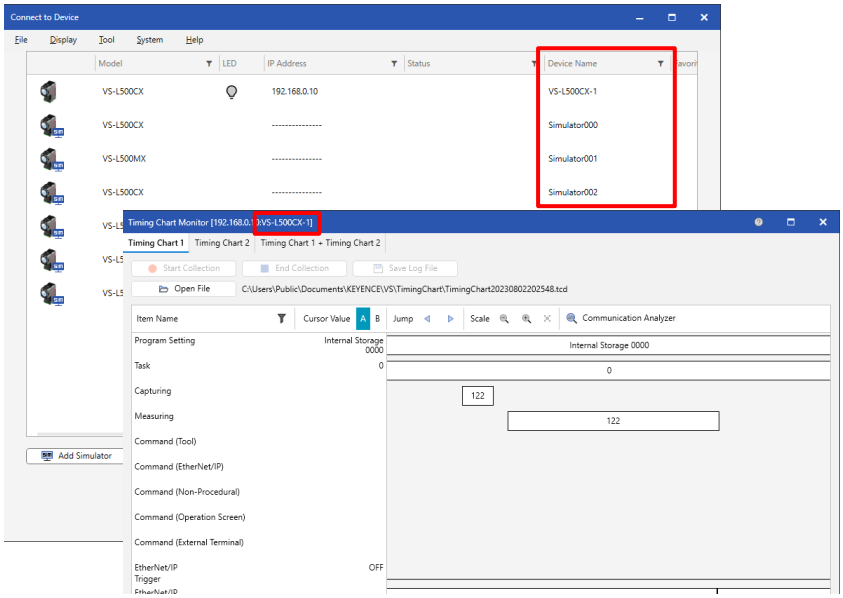
Device Name Setting

#D048

You can set the device name of the connected VS camera.

Functional Overview

You can set the device name to be displayed in the list of devices in the [Connect to Device] dialog box or in the title of the dialog box that is being set.
Device name is set in the [Device Name Setting] dialog box that appears when you select [Global Settings] - [Device Name Setting] from the menu bar.
→Setting the Device Name



Setting the Device Name

You can follow the steps below to set the device name.

1 Select [Global Settings] - [Device Name Setting] from the menu bar.
The [Device Name Setting] dialog box appears.

2 Enter the device name.

Device Name

You can enter the device name using single-byte alphanumeric symbols (maximum 15 characters).
Forbidden characters \ / : * ? " < > |

3 After completing the setting, click [OK].
The [Device Name Setting] dialog box closes and the settings are saved.

Industrial Ethernet Settings

#D049

You can configure the settings for data input/output with external devices using industrial Ethernet protocols (EtherNet/IP, PROFINET, PLC-Link).

Functional Overview

This unit supports the following industrial Ethernet protocols for data input/output with external devices.

- EtherNet/IP
- PROFINET
- PLC-Link

Point The "PLC-Link" tab may not be visible depending on the version of the Global Settings.

Industrial Ethernet settings are configured in the [Industrial Ethernet Settings] dialog box that appears when you select [Global Settings] - [Industrial Ethernet Settings] from the menu bar.
→Layout of the Screen (for EtherNet/IP and PROFINET)
→Layout of the Screen (for PLC-Link)

EtherNet/IP

This is an open industrial communication standard developed and maintained by the ODVA (Open DeviceNet Vendor Association, Inc.). This device is compliant with the conformance test Version.CT19.1. The following functions are possible using EtherNet/IP connection.

Cyclic Communication

Cyclic communication at RPI (Request Packet Interval) communication cycle intervals allows high-speed control at intervals of several ms to several tens of ms (implicit communication). It is easier to write PLC programs because you can control the VS camera by referencing and updating the variables and devices in the PLC without considering communication.

Message Communication

This can be used for communications that do not require punctuality as is needed with cyclic communications (Explicit message). There is no functional difference between the message communication function and cyclic communication function. As a result, it is not necessary to use it in most cases. However, it can be used for EtherNet/IP communications with PLC devices that do not support cyclic communication (SLC5/05 Series, etc.).
Refer to "Communicating with the another device via EtherNet/IP message communication" for input/output of data with external devices via message communication.

PROFINET

This is an open communication standard defined by PI (PROFIBUS & PROFINET International). This device is compliant with Conformance Class B. The following functions are possible by PROFINET connection.

Data I/O Communication (Cyclic Communication)

Communicating at specified update time intervals allows high-speed control performed every several to several tens of microseconds. It is easier to write PLC programs because you can control this unit by referencing and updating the variables and devices in the PLC without considering communication.

Record data communication (acyclic communication)

This method can be used for communication which does not require regularity like the cyclic communication. This communication uses dedicated commands to read/write data records (1024 bytes/record) and can access to the regions exceeding the maximum size allowed to the cyclic communication (1408 bytes).

PLC-Link

This function connects the PLC and the VS camera via Ethernet and can input/output directly to the DM (data memory) of the target PLC. The PLC-Link enables the following functions.

Data Output

Measurement data of the device can be output directly to the DM in the PLC.

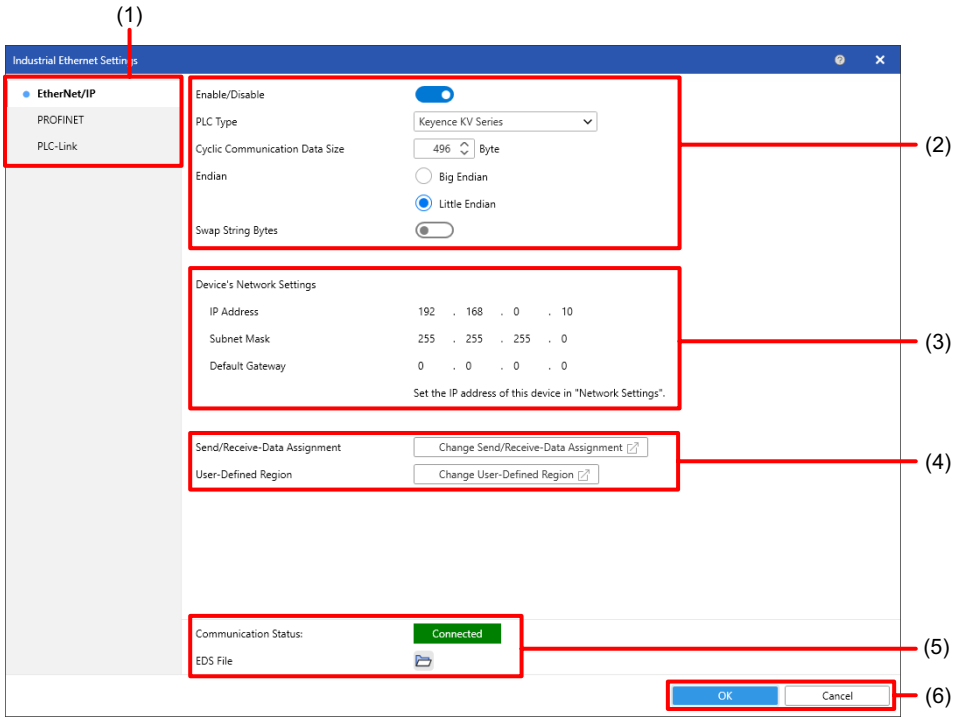
Controlling the Device

The device can be controlled by making it read the commands in the DM in the PLC.

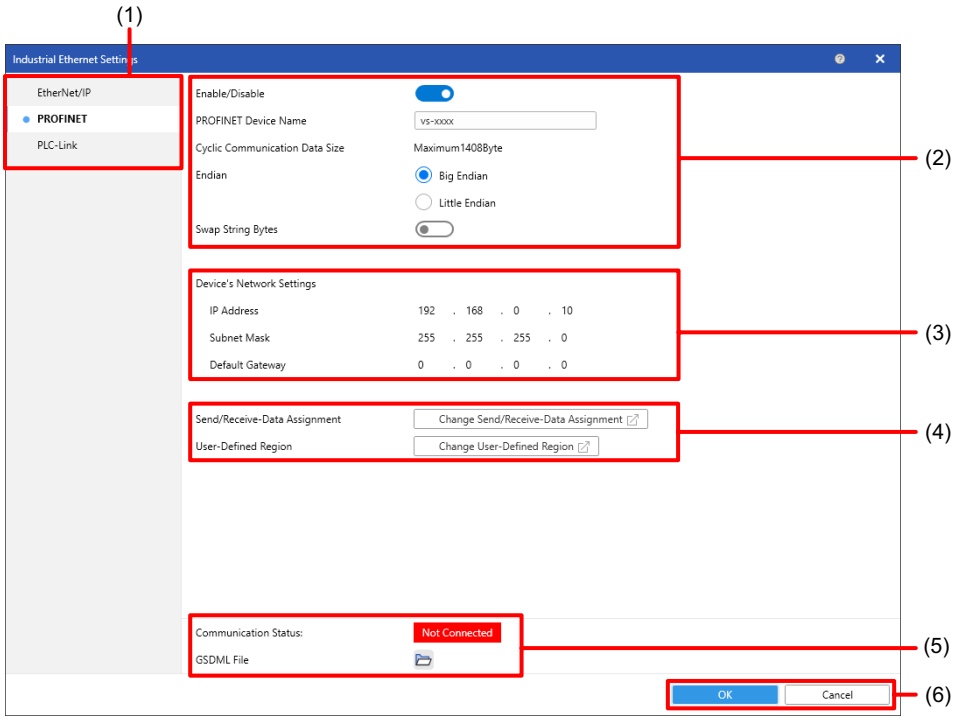
Layout of the Screen (for EtherNet/IP and PROFINET)

This section describes the layout of the [Industrial Ethernet Settings] dialog box.

When setting up EtherNet/IP



When setting up PROFINET



(1) Switching Protocols

You can click on the protocol name to switch to the protocol to change settings. The protocol that is currently enabled will have • in the protocol name.

(2) Communication Settings

You can configure the communication settings for the enabled protocol.

Enable/Disable

Enable this option when communication is to be performed using the currently displayed protocol. [Enable/Disable] is an exclusive setting. Multiple communication protocols cannot be enabled at the same time. Only one of the communication protocols can be enabled.
If any communication protocol is enabled at the timing when you try to enable another protocol, a confirmation message will appear asking whether to disable the currently enabled communication protocol. Click [OK] to disable the currently enabled communication protocol and switch to the new communication protocol.

Point

- When [EtherNet/IP] is enabled, settings such as the cyclic communication cycle (RPI) and data size, timeout period, and transmission trigger are performed on the PLC side. During implicit communication with the device, set the RPI value to 5 ms or more. When COS (Change Of State) is selected with a PLC where a sending trigger can be selected (Keyence KV-3000/5000/5500/7300/7500/8000/Nano, etc.), in the same way set a minimum sending interval (Inhibit Time) of 5 ms or more.
- When [PROFINET] is enabled, the update time, data size, and timeout time are set on the PLC. Be sure to set the update time of 4 ms or longer for the cyclic communication with the device.
- Even if you specify the communication cycle time (the update time of EtherNet/IP's RPI or the PROFINET cyclic communication) according to the above specified time, the processing may be delayed or the communication may be disconnected by temporary timeout due to the excessive load applied to the device temporarily or continuously when there are other communication functions being used in the device, such as measurement condition settings, dialog box operations, commands, FTP, or remote desktop. In such a case, you need to review the communication cycle and usage conditions. Be sure to test that there are no problems with operating performance prior to operation.
- In a network where many devices are connected, including destination EtherNet/IP or PROFINET devices, if a large load is constantly or temporarily applied to the network, then delays and packet losses may occur. Be sure to perform sufficient tests prior to operation.
- If [Enable/Disable] has been changed, it is necessary to reboot the device in order to apply the settings.

PLC Type (Only when [EtherNet/IP] is Enabled)

You can select the connection destination model.

- **Allen-Bradley ControlLogix**
- **Allen-Bradley SLC5/05**
- **Keyence KV Series**
- **OMRON SYSMAC**
- **Other**

→Model compliant with EtherNet/IP connection

Point

- Changing the PLC type will initialize some of the EtherNet/IP settings.
- If [PLC Type] has been changed, it is necessary to reboot the device in order to apply the settings.

PROFINET Device Name (Only when [PROFINET] is enabled)

You can specify the name for identifying this unit in the PROFINET network. Set the same name for this device as you entered when designating this device as the connection target on the PLC. If an inappropriate name is specified, PROFINET communication cannot be established because the PLC cannot detect the device.

Point If [PROFINET Device Name] has been changed, it is necessary to reboot the device in order to apply the settings.

Cyclic Communication Data Size

When [EtherNet/IP] is Enabled

You can specify the data size assigned to EtherNet/IP fixed-cycle communication in 4 byte units. Various data regions can be allocated from the start address of cyclic communication to the region of the size specified in this setting. The range that can be specified and the default settings will differ by the PLC type that has been selected.

– When [Allen-Bradley ControlLogix] is selected: 16 to 496 bytes (default: 496 bytes)
– When [Allen-Bradley SLC5/05] is selected: 16 to 248 bytes (default: 248 bytes)
– When [Keyence KV Series] is selected: 16 to 1436 bytes (default: 496 bytes)
– When [OMRON SYSMAC] is selected: 16 to 1436 bytes (default: 496 bytes)
– When [Other] is selected: 16 to 1436 bytes (default: 496 bytes)

Point
- The data size that will actually be sent and received follows the PLC-side connection settings. In order to send and receive the assigned data correctly, it is recommended that the cyclic communication data size of the device be set to the same value as the data size on the PLC side.
- The value set here is used as the data size to gain access to the input data (instance 100, attribute 3) and output data (instance 101, attribute 3) of the Assembly Object in the message communication.
- If [Cyclic Communication Data Size] has been changed, it is necessary to reboot the device in order to apply the settings.

When [PROFINET] is Enabled

The maximum cyclic communication data size available with the unit is displayed (1408 bytes).

Point The data size that will actually be sent and received follows the PLC-side connection settings.

Endian

Endian is a method of aligning multi-byte data in the PLC memory. Select the appropriate Endian for the PLC type.

- **Big Endian**: Aligns bytes in order from the most significant byte to the least significant byte.
- **Little Endian**: Aligns bytes in order from the least significant byte to the most significant byte.

Point The default value of [Endian] depends on the protocol used.
- Default setting when [EtherNet/IP] is enabled: Little Endian
- Default setting when [PROFINET] is enabled: Big Endian

Swap String Bytes

It configures whether to swap string bytes (default: OFF). When turned ON, two bytes of characters are swapped if the data type on the device is a string, making it easier to check on the PLC monitor.

(3) Device's Network Settings

The network settings of the device are displayed.

> **Point** You cannot configure the device's IP address in the [Industrial Ethernet Settings] dialog box. The network settings of this device are configured in [Connect to Device] Screen.

IP Address

Shows the device's IP address (default: 192.168.0.010).

Subnet Mask

Shows the device's subnet mask (default: 255.255.255.0).

Default Gateway

Shows the device's default gateway (default: 0.0.0.0).

(4) Memory Map Settings

For data received by and sent from this device, you can change the data assignment as well as set the addresses and sizes for sending and receiving command control and user-defined data.

Send/Receive-Data Assignment

Clicking on [Change Send/Receive-Data Assignment] opens the [Send/Receive-Data Assignment] dialog box. You can assign the receive/send functions to an assignable region in the system-defined region.
→Assigning Receive/Send Functions to Bit Region/Byte Region (for EtherNet/IP and PROFINET)

User-Defined Region

You can click [Change User-Defined Region] to display the [Change User-Defined Region] dialog box. Set the start address and size of the command control and data send/receive regions for the user-defined region of this device, which is used for receiving and sending via industrial Ethernet communication.
→Setting the Size of User-Defined Region (for EtherNet/IP and PROFINET)

(5) Communication Status / EDS File / GSDML File

This shows the communication status (Connected/Not Connected) with the destination PLC.

Clicking will display the [Open] dialog box, allowing you to open the folder containing the configuration information files (EDS file/GSDML file) defined by each communication standard.

(6) OK/Cancel

- **OK**: Saves the settings and closes the dialog box.

Point If you have changed the protocol enable/disable, the PLC type for EtherNet/IP, cyclic communication data size, or PROFINET device name, you will see a reboot confirmation message after clicking [OK]. A reboot is required for the settings to take effect.

- [Save and Reboot Now]: Save the global settings and the program setting and reboot the device. The main screen will appear when the reboot is complete.
- [Reboot Later]: Closes the message. Rebooting the system using [Reboot] in the [System] menu will apply the settings.

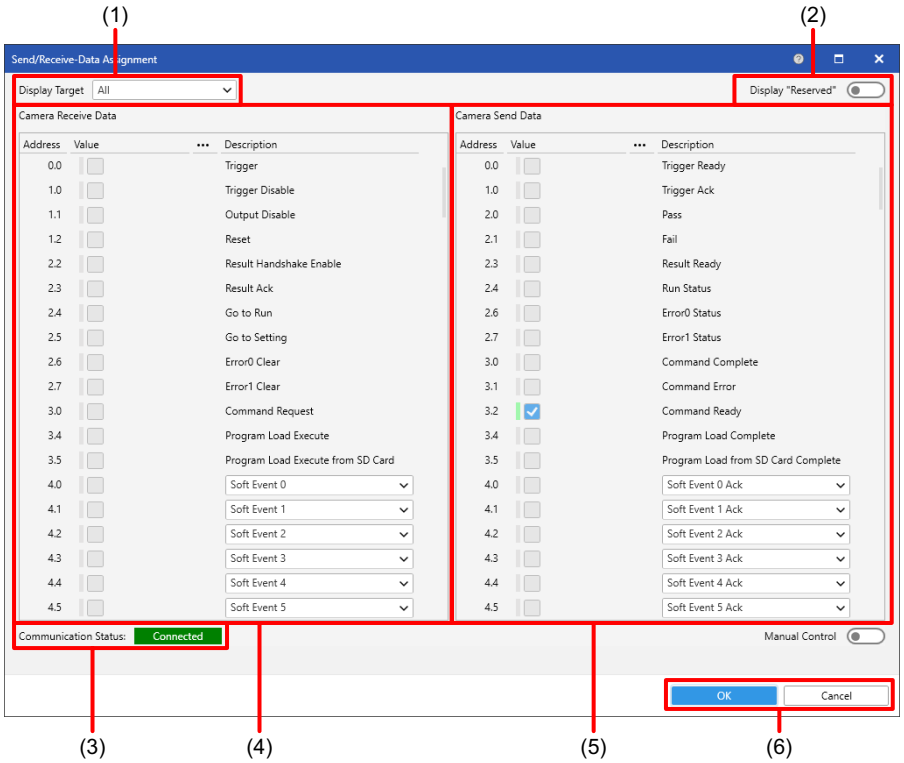
- **Cancel**: Discards the settings and closes the dialog box.

Assigning Receive/Send Functions to Bit Region/Byte Region (for EtherNet/IP and PROFINET)

The send/receive functions are assigned in the [Send/Receive-Data Assignment] dialog box that appears when you click [Change Send/Receive-Data Assignment] in the [Industrial Ethernet Settings] dialog box.

Layout of the Screen

This section describes the layout of the [Send/Receive-Data Assignment] dialog box.



(1) Display Target

You can select the type of data to be displayed in [Camera Receive Data] and [Camera Send Data].

- **All** (default): All data sent and received by industrial Ethernet communication are displayed in [Camera Receive Data] and [Camera Send Data].

- **Command Input and Output**: Only the input/output data used for command control will be displayed in [Camera Receive Data] and [Camera Send Data].
- **Data Input (Tool)**: Only the input data from the PLC is displayed in [Camera Receive Data].
- **Data Output (Tool)**: Only the output data to the PLC is displayed in [Camera Send Data].

(2) Display "Reserved"

When turned ON, the Reserved receive/send data are displayed in [Camera Receive Data] and [Camera Send Data] (default: OFF).

(3) Communication Status

This shows the communication status (Connected/Not Connected) with the destination PLC.

(4) Camera Receive Data

This shows the receive-data from the PLC. The list is ordered by bit region at the top and byte region at the bottom.

Reference The width of each column can be changed by dragging along its borders.

Address

This shows the address for each data according to the user-defined region settings.

Value

This shows the input status from the PLC with indicators and checkboxes.

: OFF

: ON

··· (Menu)

Clicking on ··· which appears when you hover the mouse cursor on a row of data in the byte region will display the [Display Mode] menu.
Clicking on the menu opens the [Display Mode] dialog box.

Display Mode

You can select a display mode for the receive-data and click [OK]. You can check the displayed contents in the selected display mode in [Preview].

- **Binary**: Displays the target data in the following format.
  Format: Add [2#] at the beginning. Data should be separated by underscore (_) every 4 bits.
  Example: 2#0000_0000_0000_0000_0000_0000_0000_0001
- **Decimal (Signed)**: Displays data as signed decimal integers.
  Format: #10 is not added at the beginning. A minus (-) sign is added for negative values.
  Example: -2147483648
- **Decimal (Unsigned)**: Displays data as unsigned decimal integers.
  Format: #10 is not added at the beginning.
  Example: 4294967295
- **Hexadecimal**: Displays data as hexadecimal integers.
  Format: Add #16 at the beginning. Data should be separated by an underscore (_) every 2 bytes.
  Example: 16#FFFF_FFFF

– **Floating-point Number**: Displays data in floating-point numbers.
  Format: A minus (-) sign is added for negative values. If the number of digits is large, it will be displayed as an exponent.
  Example: -1.665335E- 16
– **ASCII**: Converts and displays byte data into ASCII codes one byte at a time.
  Format: Convert each byte to ASCII code and enclose it in single quotation marks ('). If it cannot be converted into characters, it will be displayed as '$'+ASCII code.
  Example: 'ABCD', '$00$00XY'.
– **String**: Displays data as a string.
  Example: ABCD

Description

The receive-data assigned to each address is displayed. For data to which functions can be assigned (changed), the details will be displayed in a drop-down menu.
→Assignable Functions (for EtherNet/IP and PROFINET)

Point

- Functions that are fixed-assigned as default settings cannot be changed. [Data Input (Industrial Ethernet)] Functions assigned by the tool should be changed using the [Data Input (Industrial Ethernet)] tool.
- A function that has been fixed-assigned as the default setting or a function that has already been assigned cannot be assigned to another data in duplicate.
  →Functions Fixed-assigned to Bit Region (for EtherNet/IP and PROFINET)

(5) Camera Send Data

This shows the send-data to the PLC. The list is ordered by bit region at the top and byte region at the bottom.

Reference The width of each column can be changed by dragging along its borders.

Address

This shows the address for each data according to the user-defined region settings.

Value

This shows the send status to the PLC with indicators and checkboxes.
: OFF
: ON

··· (Menu)

Clicking on ··· which appears when you hover the mouse cursor on a row of data in the byte region will display the [Display Mode] menu.
Clicking on the menu opens the [Display Mode] dialog box.

Display Mode

You can select a display mode for the sent data and click [OK]. You can check the displayed contents in the selected display mode in [Preview].
– **Binary**: Displays the target data in the following format.
  Format: Add [2#] at the beginning. Data should be separated by underscore (_) every 4 bits.
  Example: 2#0000_0000_0000_0000_0000_0000_0000_0001

- **Decimal (Signed)**: Displays data as signed decimal integers.
  Format: #10 is not added at the beginning. A minus (-) sign is added for negative values.
  Example: -2147483648
- **Decimal (Unsigned)**: Displays data as unsigned decimal integers.
  Format: #10 is not added at the beginning.
  Example: 4294967295
- **Hexadecimal**: Displays data as hexadecimal integers.
  Format: Add #16 at the beginning. Data should be separated by an underscore (_) every 2 bytes.
  Example: 16#FFFF_FFFF
- **Floating-point Number**: Displays data in floating-point numbers.
  Format: A minus (-) sign is added for negative values. If the number of digits is large, it will be displayed as an exponent.
  Example: -1.665335E- 16
- **ASCII**: Converts and displays data into ASCII codes one byte at a time.
  Format: Convert each byte to ASCII code and enclose it in single quotation marks ('). If it cannot be converted into characters, it will be displayed as '$'+ASCII code.
  Example: 'ABCD', '$00$00XY'.
- **String**: Displays data as a string.
  Example: ABCD

Description

This shows the send-data assigned to each address. If the data is assignable (changeable), the details will be displayed in a drop-down menu.
→Assignable Functions (for EtherNet/IP and PROFINET)

Manual Control

You can select whether or not the output send-data can be temporarily enabled for manual output.

- **Disabled**: No forced output.
- **Enabled**: [Value] of the bit region can be set to ON or OFF if enabled. Also, you can set a value for [Value] of the byte region according to [Display Mode]. It outputs data in the bit region and byte region where [Value] is ON.

Point Since this is a temporary setting, it will become disabled when the [Send/Receive-Data Assignment] dialog box is closed.

(6) OK/Cancel

- **OK**: Saves the settings and closes the dialog box.
- **Cancel**: Discards the settings and closes the dialog box.

Functions Fixed-assigned to Bit Region (for EtherNet/IP and PROFINET)

Camera Receive Data

Address (byte/bit)	Name	Function	Description
0.0	Trigger	Issue trigger	ON issues a trigger and performs a camera capture. Confirm that Trigger Ack has been turned ON and turn Trigger OFF.
1.0	Trigger Disable	Disable trigger input	ON disables trigger acceptance.
1.1	Output Disable	Disable output	ON disables output. The output and archiving will stop, but the images/data that have already been archived will not be cleared. When the output is stopped, it will stop after the output of the image/ data that has already been archived is completed.
1.2	Reset	Reset	ON performs a reset.
2.2	Result Handshake Enable	Enable data output handshake	ON enables handshake for the data output.
2.3	Result Ack	Data read complete	ON indicates that the PLC has finished reading the output data.
2.4	Go to Run	Switch to Run Mode	ON switches to Run Mode.
2.5	Go to Setting	Switch to Setup Mode	ON switches to Setup Mode.
2.6	Error0 Clear	Clear Error0	ON clears the Error0 state.
2.7	Error1 Clear	Clear Error1	ON clears the Error1 state.
3.0	Command Request	Execute command	ON executes the command specified by a Command Number with Command Parameter as an argument.
3.4	Program Load Execute	Switch program settings (Internal storage)	ON switches to the program setting of the number specified in [Program Number], which is stored in the internal storage.
3.5	Program Load Execute from SD Card	Switch program settings (SD card)	ON switches to the program setting of the number specified in [Program Number], which is stored on the SD card.

Camera Send Data

Address (byte/bit)	Name	Function	Description
0.0	Trigger Ready	Trigger input enabled	Trigger acceptance state. • **OFF**: Trigger not acceptable • **ON**: Trigger acceptable
1.0	Trigger Ack	Trigger acceptance complete	Indicates whether Trigger from Fieldbus has been accepted. Turns ON when Trigger is accepted. When Trigger is turned OFF, Trigger Ack will also be turned OFF.

Address (byte/bit)	Name	Function	Description
2.0	Pass	Total Status Pass	Total status = Pass judgment. Updated with each tool execution. • **OFF**: Fail/Not judged yet • **ON**: Pass
2.1	Fail	Total Status Fail	Total status = Fail judgment. Updated with each tool execution. • **OFF**: Pass/Not judged yet • **ON**: Fail
2.3	Result Ready	Data send complete	Flag indicating completion of storing result data to Fieldbus. • **OFF**: Data storage incomplete • **ON**: Data storage complete
2.4	Run Status	Operation mode status	State of the current operation mode. • **OFF**: Setup Mode • **ON**: Run Mode
2.6	Error0 Status	Status of Error0	Occurrence state of the Error0 system error (assigned error cause). • **OFF**: No error • **ON**: Error
2.7	Error1 Status	Status of Error1	Occurrence state of the Error1 system error (assigned error cause). • **OFF**: No error • **ON**: Error
3.0	Command Complete	Command execution completion	Execution state of the command from Command Request via Fieldbus. • **OFF**: Executing • **ON**: Execution completed
3.1	Command Error	A command error	Command error state from Command Request via Fieldbus. • **OFF**: Error • **ON**: No error
3.2	Command Ready	Command input enabled	Indicates whether commands are acceptable. • **OFF**: Commands not acceptable • **ON**: Commands acceptable
3.4	Program Load Complete	Switching of program settings complete (Internal storage)	Flag indicating completion of switching of program settings from Program Load Execute. • **OFF**: Switching in progress • **ON**: Switching complete
3.5	Program Load Complete from SD Card	Switching of program settings complete (SD card)	Flag indicating completion of switching of program settings from "Program Load Execute Complete from SD Card". • **OFF**: Switching in progress • **ON**: Switching complete

Assignable Functions (for EtherNet/IP and PROFINET)

The functions that can be assigned as receive-data and send-data are as follows.

Assignable Region (Address)

- **Bit Region**: 4.0 to 7.7 (Receive-data, Send-data)
- **Byte Region**: 12 to 24 (Send-data only)

Camera Receive Data (Bit Region)

Name	Function	Description
Assignable	Not set	No assigned function
Image Capture Buffer Clear	Clear image capture buffer	Clears the image capture buffer (default: Not assigned).
Reset Output Data	Initialize output data	Initializes the output terminal and clears the output region of the industrial Ethernet to 0. Also clears the buffers of data output (default: Not assigned).
Soft Event 0	Issue Soft Event 0	Issues Soft Event 0 (default: Assigned to address 4.0).
Soft Event 1	Issue Soft Event 1	Issues Soft Event 1 (default: Assigned to address 4.1).
Soft Event 2	Issue Soft Event 2	Issues Soft Event 2 (default: Assigned to address 4.2).
Soft Event 3	Issue Soft Event 3	Issues Soft Event 3 (default: Assigned to address 4.3).
Soft Event 4	Issue Soft Event 4	Issues Soft Event 4 (default: Assigned to address 4.4).
Soft Event 5	Issue Soft Event 5	Issues Soft Event 5 (default: Assigned to address 4.5).
Soft Event 6	Issue Soft Event 6	Issues Soft Event 6 (default: Assigned to address 4.6).
Soft Event 7	Issue Soft Event 7	Issues Soft Event 7 (default: Assigned to address 4.7).
Soft Event 8 to 31	Issue Soft Event 8 to 31	Issues Soft Event 8 to 31 (default: Not assigned).
Tool Buffer Clear	Clear tool buffer	Clears the buffers of various tools (default: Not assigned).

Camera Send Data (Bit Region)

Name	Function	Description
Assignable	Not set	No assigned function
Camera Exposure Busy	Signal indicating camera exposure in progress.	Indicates whether exposure is in progress. • **OFF**: Not exposing • **ON**: Exposing
Output Data Buffer Status	Data remaining in data buffer	Indicates whether data remains in the data output buffer. • **OFF**: Not remaining • **ON**: Remaining
Output Data Busy	Data output in progress	Indicates whether data output is in progress. • **OFF**: Not outputting • **ON**: Output in progress
Output Image Buffer Status	Image remaining in image buffer	Indicates whether images remain in the image output buffer. • **OFF**: Not remaining • **ON**: Remaining
Output Image Busy	Image output in progress	Indicates whether image output is in progress. • **OFF**: Not outputting • **ON**: Output in progress
Processing Status	Flow processing in progress.	Indicates whether or not image processing is in progress. Turns ON during image processing (mathematical operations or measurement). This does not include image/data output in progress.

Name	Function	Description
Soft Event 0 Ack	Soft Event 0 acceptance complete	Indicates whether Soft Event 0 from Fieldbus has been accepted (default: Assigned to address 4.0). Turns ON when Soft Event 0 is accepted.
Soft Event 1 Ack	Soft Event 1 acceptance complete	Indicates whether Soft Event 1 from Fieldbus has been accepted (default: Assigned to address 4.1). Turns ON when Soft Event 1 is accepted.
Soft Event 2 Ack	Soft Event 2 acceptance complete	Indicates whether Soft Event 2 from Fieldbus has been accepted (default: Assigned to address 4.2). Turns ON when Soft Event 2 is accepted.
Soft Event 3 Ack	Soft Event 3 acceptance complete	Indicates whether Soft Event 3 from Fieldbus has been accepted (default: Assigned to address 4.3). Turns ON when Soft Event 3 is accepted.
Soft Event 4 Ack	Soft Event 4 acceptance complete	Indicates whether Soft Event 4 from Fieldbus has been accepted (default: Assigned to address 4.4). Turns ON when Soft Event 4 is accepted.
Soft Event 5 Ack	Soft Event 5 acceptance complete	Indicates whether Soft Event 5 from Fieldbus has been accepted (default: Assigned to address 4.5). Turns ON when Soft Event 5 is accepted.
Soft Event 6 Ack	Soft Event 6 acceptance complete	Indicates whether Soft Event 6 from Fieldbus has been accepted (default: Assigned to address 4.6). Turns ON when Soft Event 6 is accepted.
Soft Event 7 Ack	Soft Event 7 acceptance complete	Indicates whether Soft Event 7 from Fieldbus has been accepted (default: Assigned to address 4.7). Turns ON when Soft Event 7 is accepted.
Soft Event 8 to 31 Ack	Soft Event acceptance complete	Indicates whether Soft Event 8 to 31 from Fieldbus has been accepted (default: No Assignment). Turns ON when Soft Event 8 to 31 is accepted.

Camera Send Data (Byte region)

Name	Function	Description
Assignable	Not set	No assigned function
Error0 Code	Cause of Error0	Number of the last system error that occurred with Error0 (default: assigned to address 12 to 15).
Error1 Code	Cause of Error1	Number of the last system error that occurred with Error1 (default: assigned to address 16 to 19).
Program Number	Program No.	Program No. being measured (default: assigned to addresses 20 to 23). If the number cannot be determined, 65535 will be returned.
Program Storage	Program setting storage	ID of the program setting storage media during measurement. 1: Internal storage 2: SD card If the storage location of the program setting is not known, it will be assumed to be 1 (Internal storage).
Total Count	Measurement count	Main task execution count (default: assigned to addresses 24 to 27).

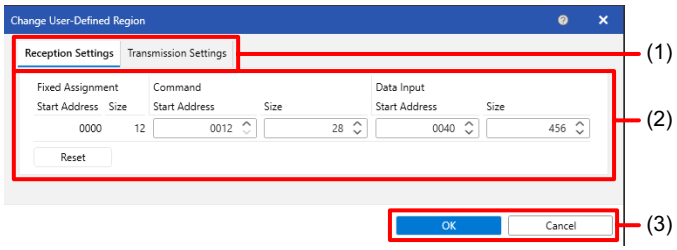
Setting the Size of User-Defined Region (for EtherNet/IP and PROFINET)

You can set the size of the user-defined region in the [Change User-Defined Region] dialog box that appears when you click [Change User-Defined Region] in the [Industrial Ethernet Settings] dialog box.

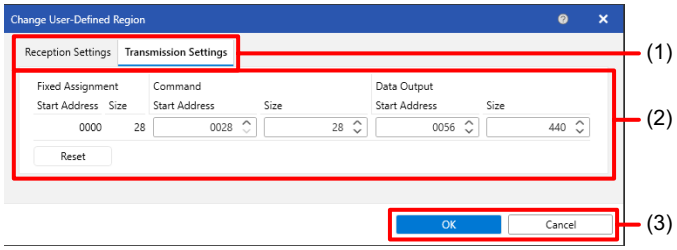
Layout of the Screen

This section describes the layout of the [Change User-Defined Region] dialog box.

Reception Settings



Transmission Settings



(1) Switching Setting Targets

Click the [Reception Settings] or [Transmission Settings] tab to switch the target for which you wish to set a user-defined region.

(2) User-Defined Region Settings

You can set the start address and size of the command region, data input region, and data output region, respectively, to set the user-defined region.

Point

The maximum size of each region is subject to the upper limit of each protocol.

- EtherNet/IP: Cyclic communication data size set in the [Industrial Ethernet Settings] dialog box
- PROFINET: 1408 bytes (during cyclic communication; For record data communication, data input region = 2060 bytes and data output region = 4124 bytes)

Fixed Assignment

This shows the start address and size of the fixed-assigned region. These values cannot be modified.

Command

You can set the start address and size of the region where the command No. and the command will be input.

- **Start Address**: Set the start address of the command region.
  - Reception Settings: 12 to the upper limit for each protocol (default: 12)
  - Transmission Settings: 28 to the upper limit for each protocol (default: 28)
- **Size**: Sets the size of the command region (0 to the upper limit for each protocol - start address, default: 28).

Data Input

You can set the start address and size of the region that will store the data to be used for data input.

- **Start Address**: Sets the start address of the data input region (12 to the upper limit for each protocol, default: 40).
- **Size**: Set the size of the data input region (0 to the upper limit for each protocol - start address).
  - Default Ethernet/IP: The value obtained by subtracting [Start Address] from [Cyclic Communication Data Size] in the Industrial Ethernet Protocol Settings.
  - Default PROFINET/EtherCAT: The value obtained by subtracting the start address (40) from the reception side maximum value (2060) for the camera reception side (2020). The value obtained by subtracting the start address (56) from the transmission side maximum value (4124) for the camera transmission side (4068).

Point

- The start address and size can only be set in bytes that are multiples of 4.
- ! is displayed when the addresses of the command input region and the data input region are overlapped. If you wish to finalize the settings as they are, be careful not to overlap addresses.

Data Output

You can set the start address and size of the region that will store the data to be used for data output.

- **Start Address**: Sets the start address of the data output region (56 to the upper limit for each protocol, default: 56).
- **Size**: Set the size of the data output region (0 to the upper limit for each protocol - start address).
  - Default Ethernet/IP: The value obtained by subtracting [Start Address] from [Cyclic Communication Data Size] in the Industrial Ethernet Protocol Settings.
  - Default PROFINET/EtherCAT: The value obtained by subtracting the start address (40) from the reception side maximum value (2060) for the camera reception side (2020). The value obtained by subtracting the start address (56) from the transmission side maximum value (4124) for the camera transmission side (4068).

Point

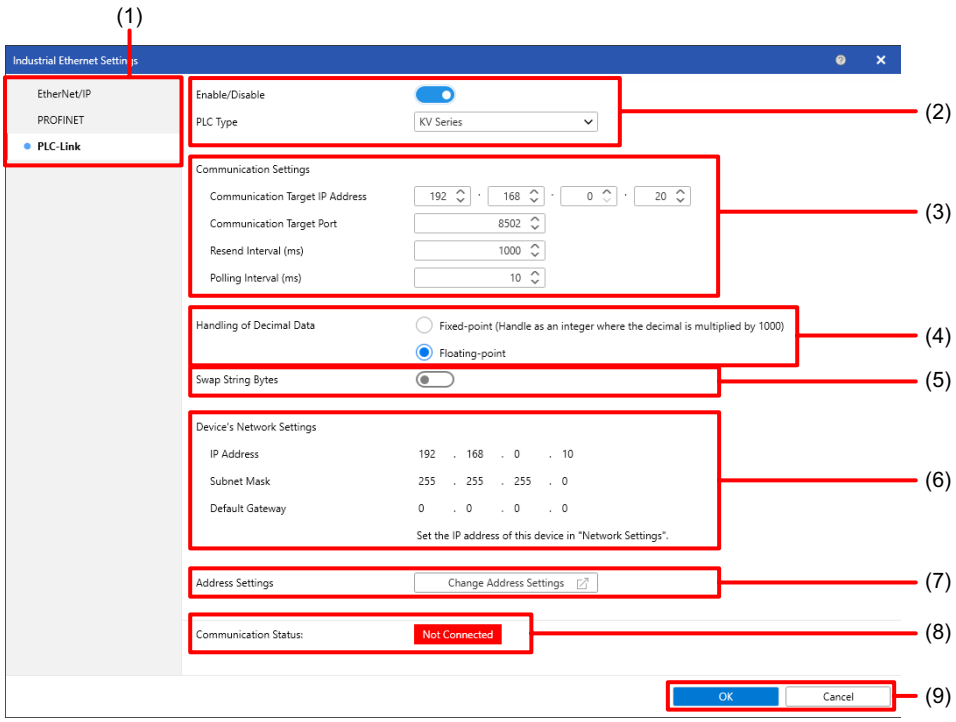
- The start address and size can only be set in bytes that are multiples of 4.
- ! is displayed when the addresses of the command output region and the data output region are overlapped. If you wish to finalize the settings as they are, be careful not to overlap addresses.
- If the data output size is not sufficient, reduce the command region size to the least amount required, and change the start position of the data output assignment.

(3) OK/Cancel

- **OK**: Saves the settings and closes the dialog box.
- **Cancel**: Discards the settings and closes the dialog box.

Layout of the Screen (for PLC-Link)

This section describes the layout of the [Industrial Ethernet Settings] - [PLC-Link] screen.



(1) Switching Protocols

You can click on the protocol name to switch to the protocol to change settings. The protocol that is currently enabled will have ● in the protocol name.

(2) Enable/Disable / PLC Type

You can enable/disable PLC-Link and configure a PLC type.

Enable/Disable

Enable this option when communication is to be performed using the currently displayed protocol. [Enable/Disable] is an exclusive setting. Multiple communication protocols cannot be enabled at the same time. Only one of the communication protocols can be enabled. If any communication protocol is enabled at the timing when you try to enable another protocol, a confirmation message will appear asking whether to disable the currently enabled communication protocol. Click [OK] to disable the currently enabled communication protocol and switch to the new communication protocol.

Point If [Enable/Disable] has been changed, it is necessary to reboot the device in order to apply the settings.

PLC Type

You can select the connection destination model.

- **KV Series** (default)
- **MELSEC Q/L/iQ-R/iQ-F Series**

→Model compliant with PLC-Link connection

Point
- Changing the PLC type will initialize some of the PLC-Link settings.
- If [PLC Type] has been changed, it is necessary to reboot the device in order to apply the settings.

(3) Communication Settings

You can configure the communication settings for the enabled protocol.

Communication Target IP Address

Set the IP address of the communication target (default: 192.168.0.20).

Communication Target Port

Set the port number of the communication target (defaults: 8502 (KV series), 5000 (MELSEC series)).

Resend Interval (ms)

Set the resend interval (default: 1000).

Polling Interval (ms)

Set the polling interval (default: 10).

(4) Handling of Decimal Data

Specify the method for expressing decimal points for output data and commands that handle decimals.

- **Fixed-point (Handle as an integer where the decimal is multiplied by 1000)**: Multiplies the data by 1000 and treats it as 32-bit signed integer data.
- **Floating-point** (default): Treats the data as single-precision floating point data (32-bit).

(5) Swap String Bytes

It configures whether to swap string bytes (default: OFF). When turned ON, two bytes of characters are swapped if the data type on the device is a string, making it easier to check on the PLC monitor.

(6) Device's Network Settings

The network settings of the device are displayed.

Point
You cannot configure the device's IP address in the [Industrial Ethernet Settings] dialog box. The network settings of this device are configured in [Connect to Device] Screen.

IP Address

Shows the device's IP address (default: 192.168.0.10).

Subnet Mask

Shows the device's subnet mask (default: 255.255.255.0).

Default Gateway

Shows the device's default gateway (default: 0.0.0.0).

(7) Address Settings

Click [Change Address Settings] to display the [Change Address Settings] dialog box. Set the command control and data output.
→Changing the Address Settings (for PLC-Link)

(8) Communication Status

This shows the communication status (Connected/Not Connected) with the destination PLC.

(9) OK/Cancel

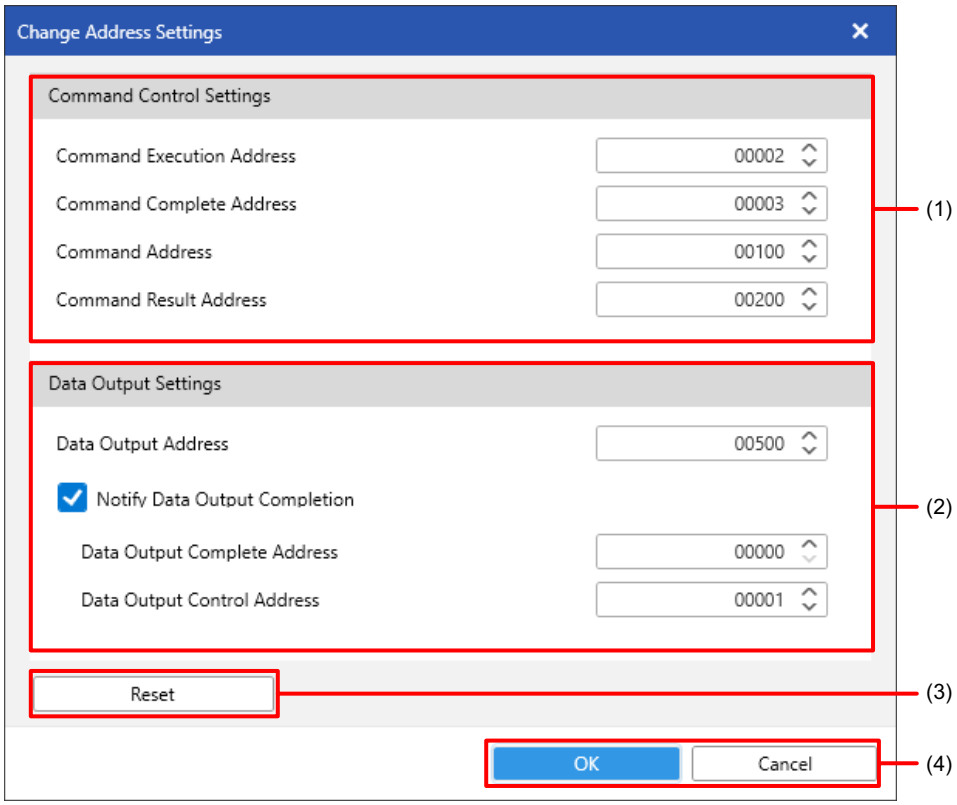
- **OK**: Saves the edited setting, and closes the dialog.
- **Cancel**: Cancels the edited setting, and closes the dialog.

Changing the Address Settings (for PLC-Link)

You can change the address settings for PLC-Link.

Layout of the Screen

This section describes the layout of the [Change Address Settings] dialog box.



(1) Command Control Settings

You can set the address for controlling the VS Camera via PLC-Link.
→Controlling the VS Camera via PLC-Link (Command Control)

- **Command Execution Address**: Set the address that the PLC uses to request command execution (default: 2).
- **Command Complete Address**: Set the address that the device uses to notify the completion of command execution (default: 3).
- **Command Address**: Set the starting address of the data memory that stores the command No. and command parameters (default: 100).

Reference The data memory used for the command address is for two words. For example, if the command address is set to 100, the following will apply.
  - 100: Command No.
  - 102: Command parameter 1
  - 104: Command parameter 2

- **Command Result Address**: Set the starting address of the data memory that stores the result of command execution (default: 200).

Reference The data memory used for the command result address is for two words. For example, if the command result address is set to 200, the following will apply.
- 200: Command result
- 202: Command data 1
- 204: Command data 2

(2) Data Output Settings

You can set the address for outputting data via PLC-Link.
→Outputting Measurement Data via PLC-Link (Data Output)

- **Data Output Address**: Set the starting address of the data memory that stores the output data (default: 500).
  - **Notify Data Output Completion**: When turned ON, 1 is written to the DM (data memory) of the data output complete address when data output is completed (default: ON).

    Reference When [Notify Data Output Completion] is turned OFF, even if data output is completed, no data is written to the data output complete address, thus reducing processing time.

- **Data Output Complete Address**: Set the address used to notify the PLC of the completion of writing output data (default: 0).
- **Data Output Control Address**: Set the address that the PLC uses to notify the device whether or not the measurement results can be written (default: 1).

(3) Reset

You can initialize the settings in the [Change Address Settings] dialog box.

(4) OK/Cancel

- **OK**: Saves the edited setting, and closes the dialog.
- **Cancel**: Cancels the edited setting, and closes the dialog.

Non-Procedural Communication Settings

#D050

You can configure the settings for inputting/outputting data with external devices using non-procedural communication.

Functional Overview

You can output measured values and judgment results as well as control this device, using Ethernet non-procedural communication from this device.
The non-procedural communication settings are set in the [Non-Procedural Communication Settings] dialog box that appears when you select [Global Settings] - [Non-Procedural Communication Settings] from the menu bar.
→Setting the Ports and Delimiters for Non-Procedural Communication

Point

- Consult your controller or network administrator when connecting to an existing LAN. If any incorrect settings are made, not only this device but also other devices on the network may not work properly.
- The device may truncate parts of the output data, depending on the network conditions. (The device does not resend data with packet loss.)
- Some delays may occur with data transmission between the network and the device, depending on the network conditions. If a response is required, such as a trigger input, communicating via the power I/O interface is recommended.
- The connection may fail if there is a firewall on the network path. In this case, you need to disable the firewall or take other measures. For details, consult your network administrator or the manufacturer of the PC.
- Use equipments that are intended for use in a factory environment (such as hubs and LAN cables) for the network. Using commercial equipments designed for office applications may cause unstable operations.

Setting the Ports and Delimiters for Non-Procedural Communication

Set the ports and delimiters to be used for non-procedural communication according to the following procedure.

1 Select [Global Settings] - [Non-Procedural Communication Settings] from the menu bar.
The [Non-Procedural Communication Settings] dialog box appears.

2 Configure the port settings.

Data Output/Command

You can set the port number used for data output and command control (1 to 65535, except 3956, 8502, and the Listen Port number of the FTP server on the device which are reserved; default: 8500).

Data Input

You can set the port number used for data input (1 to 65535, except 3956, 8502, and the Listen Port number of the FTP server on the device which are reserved; default: 8501).

Point

- The same port number cannot be used for the data output/command port and the data input port.
- A reboot is required for the settings to take effect.

3 Configure the delimiter settings.

Start Delimiter

You can output the specified delimiter at the head of the output data.

- **STX**: STX (=0x02) is output as the start delimiter.
- **ENQ**: ENQ (=0x05) is output as the start delimiter.
- **ASCII Code**: The desired ASCII code value is output as the start delimiter.
- **None** (default): The start delimiter is not output.

End Delimiter

You can output the specified delimiter at the end of the output data.

- **CR** (default): CR (=0x0D) is output as the end delimiter.
- **CR+LF**: CR (=0x0D) + LF (=0x0A) is output as the end delimiter.
- **LF**: LF (=0x0A) is output as the end delimiter.
- **ETX**: ETX (=0x03) is output as the end delimiter.
- **ASCII Code**: The desired ASCII code value is output as the end delimiter.

4 After completing the setting, click [OK].

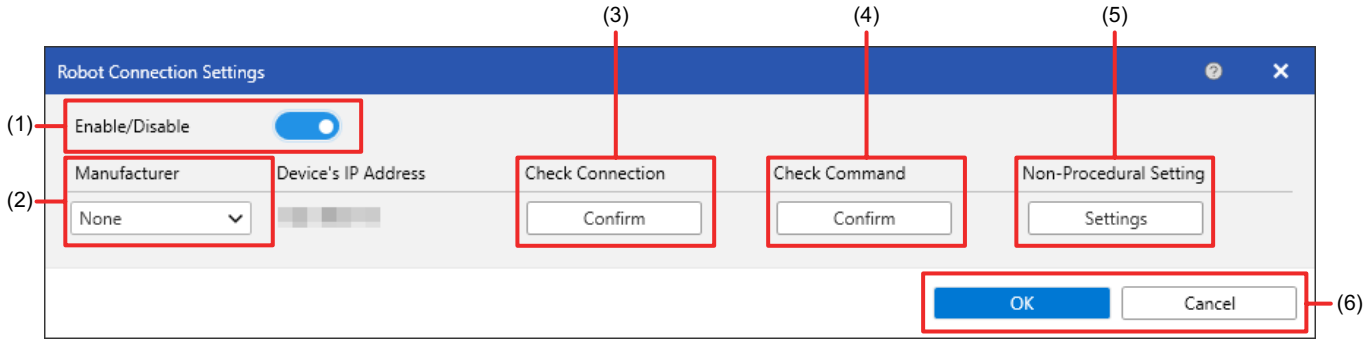
The [Non-Procedural Communication Settings] dialog box closes and the settings are reflected.

Robot Connection Settings

#D051

Configure the settings related to the connection with the robot when using the vision-guided robotics function. Also, it is possible to check the connection with the specified robot.

Screen Details



(1) Enable/Disable

Enable this option only when connecting with a robot. This option can be enabled and used simultaneously with other communications. Enable this option to configure the items in the dialog.

Reference For more details related to the connection with the robot, refer to "VS Series Robot Connection Manual".

(2) Manufacturer

Select the manufacturer of the robot to connect with (default: not specified).

Reference The output data format will be optimized according to the manufacturer selected here.

(3) Check Connection

Click the [Confirm] button to display the [Check Connection] dialog.
→Check Connection (Robot)

(4) Check Command

Click the [Confirm] button to display the [Check Command] dialog.
→Check Command

(5) Non-Procedural Setting

Click the [Settings] button to display the [Non-Procedural Communication Settings] dialog.
→Non-Procedural Communication Settings

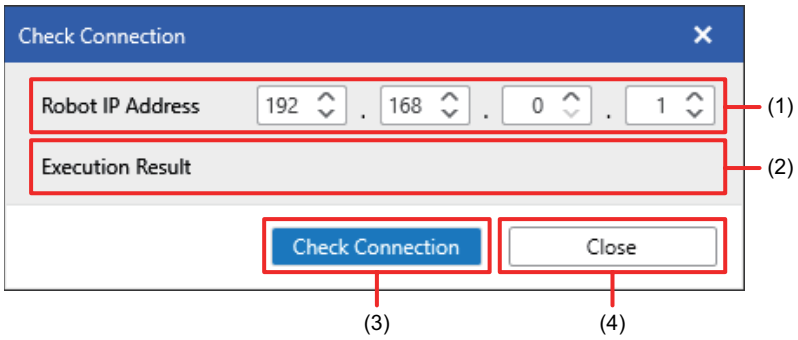
(6) OK/Cancel

- **OK**: Saves the edited settings, and closes the dialog.
- **Cancel**: Discards the edited settings, and closes the dialog.

Check Connection (Robot)

Specify the IP address of the robot to connect with and check the connection.

Screen Details



(1) Robot IP Address

Specify the IP address of the robot.

(2) Execution Result

The result of the connection check with the robot appears.

- **Done**: Successfully connected with the robot.
- **Failed**: Failed to connect with the robot.

(3) Check Connection

The connection check with the robot is executed and [Execution Result] is updated.

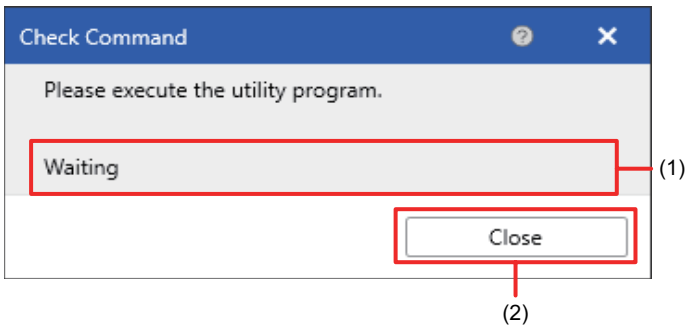
(4) Close

Closes the [Check Connection] dialog.

Check Command

Check whether commands from the robot can be received successfully.

Screen Details



(1) Execution Result

Displays the result of command reception.

- **Waiting**: Waiting for commands to be sent from the robot.
- **The command was received normally.**: Successfully received a command.
- **The received command is invalid.**: Failed to receive a command.

(2) Close

Closes the [Check Command] dialog box.

Target FTP Settings

#D052

You can configure the settings related to the FTP server for outputting data and images from the [Data Output (FTP/Storage)] tool and [Image Output (FTP/Storage)] tool.

Functional Overview

You can set the network settings for the FTP server to which the [Data Output (FTP/Storage)] and [Image Output (FTP/Storage)] tools will output data/images, and how to connect to the FTP server. Since SFTP is also supported, data can be safely output to an FTP server using SSH (SFTP: SSH File Transfer Protocol).
VS cameras can have settings for two FTP servers (FTP1/FTP2). Data output can be customized for different purposes, such as FTP1 for data output and FTP2 for image output.
FTP settings are configured in the [Target FTP Settings] dialog box that appears when you select [Global Settings] - [Target FTP Settings] from the menu bar.
→Configuring Destination FTP Server and Connection Settings

Point

- Also refer to the descriptions of the [Data Output (FTP/Storage)] and [Image Output (FTP/Storage)] tools for the data/images to be output.
- It is not possible to guarantee that all results and image data will be output without omission. Temporary or chronic high load or some other failure of the network or output destination device may cause the output speed to drop or errors to occur.
- The connection may fail if there is a firewall on the FTP server or on the network path to the FTP server. In this case, you need to disable the firewall or take other measures. For details, consult your network administrator or the manufacturer of the PC.
- If the configured FTP server cannot be connected to, the text of the FTP server displayed in the [Destination] field of the [Data Output (FTP/Storage)] tool and [Image Output (FTP/Storage)] will turn red.

Configuring Destination FTP Server and Connection Settings

Follow the steps below to configure the network settings of the destination FTP server and the connection method from this device.

1 Select [Global Settings] - [Target FTP Settings] from the menu bar.
The [Target FTP Settings] dialog box will appear.

2 Select the [FTP1] or [FTP2] tab to switch to the target FTP settings you wish to configure.

3 Configure the settings of the destination FTP server network.

Target Specification Method

Set the method for specifying the destination FTP server to connect to (default: IP Address).

FTP Server IP Address

If [IP Address] is selected for [Target Specification Method], set the IP address of the destination FTP server (default: blank).

FTP Server Host Name

If [Host Name] is selected for [Target Specification Method], you can set the host name of the target FTP server (default value: blank).

Point

- For the data output to the FTP server, the FTP command [APPE] is used. If your FTP server does not support the [APPE] command, data cannot be output.
- An error will occur if the FTP server IP address and the device's IP address are the same.
- The only characters that can be used in a host name are alphanumeric characters, hyphens (-), and periods (.). Up to 63 characters can be entered.

FTP Server Port No.

You can set the port number of the FTP server used for control (default: 21, or 22 if SFTP is used).

SFTP

Enable this when SFTP (SSH File Transfer Protocol) is to be used (default: Disabled).

Device's IP Address

This shows the device's IP address.

User Name

You can enter the user name to be used to log in to the destination FTP server.

Password

You can enter the password for logging in to the destination FTP server.

Connection Check

Click to perform the following checks on the configured network settings.

- Server IP Address Verification (connection check using ping)
- FTP Connection Verification (connection check and login verification at TCP level)
- File Transfer Test (check the write permission, etc.)

Point

For simulators, clicking [Connection Check] while Passive Mode is disabled may result in connection failures during the file transfer test due to the firewall on your PC.

Reference

- The test file will be written to the FTP output base path, and the file name will be "CheckFtpWrite.txt".
- Only single-byte alphanumeric characters and symbols can be used for the user name and password. There is no limit on the number of characters.

4 Configure the FTP output base path as required.

Specify FTP Output Base Path

Enabling this option will allow you to specify the base path for the FTP output. Separate FTP output base paths can be set for [FTP1] and [FTP2].

FTP Output Base Path

If [Specify FTP Output Base Path] is enabled, enter the base path of the output destination.

Create Subfolder with Device's Identification Information

When enabled, a subfolder is created with the identification information selected in [Identification Information] to store the data/images.

Identification Information

If [Create Subfolder with Device's Identification Information] is enabled, select the identification information to be used as the name of the subfolder.

- **MAC Address**
- **IP Address**
- **Device Name**
- **PROFINET Device Name**

FTP Output Base Path

The base path of the output destination is previewed according to the settings in [FTP Output Base Path Settings].

5 If necessary, configure the connection method to the FTP server.

Timeout (sec)

You can enter the response timeout period (sec) from the FTP server during data/image output (5 to 600 sec, default: 5 sec).

Connection Retry Count

You can enter the number of attempts to log in when connection to the FTP server fails (0 to 20 times, default: 3 times).

Passive Mode

When enabled, a connection to the FTP server will be established in passive mode (default: Enabled).

Point Passive mode is disabled if [SFTP] is enabled.

6 After completing the setting, click [OK].

The [Target FTP Settings] dialog box closes and the settings are reflected.

HTTP Settings

#D067

You can configure the settings for communication between the VS camera's web server and the client.

Functional Overview

Configure the settings for communication for sending and receiving HTML between the VS camera's web server and the client. By configuring the HTTP settings, the WebUI HTML created in [Custom Screen] can be sent and received between the VS camera and the client.
Also, if HTTPS is used as the communication method, certificates can be generated and imported.

Configuring the Settings for Communication Method and Certificates

Follow the steps below to configure the settings for the HTTP communication method and certificate generation/import.

1 Select [Global Settings] - [HTTP Settings] from the menu bar.
The [HTTP Settings] dialog box will appear.

2 Select the communication method from [Mode] (default: HTTP).

3 If [HTTPS] is selected in [Mode], configure the certificate settings.

Use Certificate Generated by the Device

Click [Manage Certificate] - [Certificate Generation] and configure the following items in the displayed dialog box.

- Server Name (1 to 36 characters)
- Organization Name (0 to 36 characters)
- Organizational Unit (0 to 36 characters)
- Region Name (City) (0 to 36 characters)
- State or Province (0 to 36 characters)
- Country Name (0 to 2 characters)
- Validity Period (Years) (1 to 100)
- Encryption Key Length (2048 bits/3072 bits/4096 bits)

Point For simulators, the certificate settings cannot be configured.

Use External Certificate

Click [Manage Certificate] - [Import] to enter the following items in the displayed dialog box.

- Certificate File (server certificate) (maximum 200 bytes)
- Private Key File (maximum 200 bytes)
- Passphrase (up to 80 characters)

Download Certificate

Click [Download] or the URL to download the certificate via a web browser.

Point

- Install the certificate using the import wizard on your PC. Manually place the certificate store in the "Trusted Root Certification Authorities".
- If no certificate exists, the [Download] button will be disabled.
- If a certificate contains an EKU (Extended Key Usage options) code and the code does not include “serverAuth”, it will be considered an invalid file and cannot be imported.
- When using the Custom Screen Viewer, after installing the certificate on your PC, close the main screen and Custom Screen Viewer once to reflect the certificate changes.

4 After completing the setting, click [OK].

Point

- Clicking the [OK] button after completing the settings will display a message prompting for a reboot. Click the [OK] button to reboot the device.
- If the device's IP address is changed after the certificate is issued, it will no longer match the IP address in the certificate and the certificate will no longer be usable.

Setting the Frequency of Screen Updates

Use the following procedure to set the frequency of screen updates when displayed on a web browser.

1 Select [Global Settings] - [HTTP Settings] from the menu bar.
The [HTTP Settings] dialog box appears.

2 Select the frequency of screen updates from [HTTP Detailed Settings] - [Screen Update Mode] (default: High Speed).
Select [Custom] to specify the screen update interval in [Update Interval (ms)] (25 to 1000, default: 25).

Point

If the screen update of this device is employed in conjunction with other communications such as commands or output processing while [Screen Update Mode] is set to [High Speed], delays may occur in other communications. In this case, set [Screen Update Mode] to [Custom] and reduce the frequency of screen updates to improve the situation. Be sure to verify if the performance is acceptable before operation.

Device's FTP Server Settings

#D053

You can configure the settings to use this device as an FTP server.

Functional Overview

The device can function as an FTP server for enabling direct access to the SD card in the device from an external FTP client to perform sending, receiving, and deleting of files and creating and deleting of folders.
The FTP server settings for this device are configured in the [Device's FTP Server Settings] dialog box, which is accessed by selecting [Global Settings] - [Device's FTP Server Settings] from the menu bar.
→Configure FTP Server Settings

Point

- To access the device's FTP server from an FTP client, use the user account and password set in [Account Settings].
- The following functional restrictions apply depending on the permission level of the user logged in as an FTP client.
  - –Edit, Full Control: No restrictions on file access.
  - –View Only: Only file retrieval is permitted. You cannot manipulate files and folders on the FTP server or transfer files to the FTP server.
- Up to two users can access the FTP server at the same time.
- This device can be configured as an FTP server for up to five servers.
- When accessing the device's FTP server from an FTP client, the default folder will be “/EM/” (internal storage). To access the microSD, enter “/SD/”.
- If a file or folder name is not comprised of only single-byte alphanumeric characters, accessing it may fail.
- [Device's FTP Server Settings] can be used simultaneously with [Target FTP Settings] (FTP client function).
- This function does not affect measurements.

Configure FTP Server Settings

You can configure the settings to use this device as an FTP server by following the procedure below.

1 Select [Global Settings] - [Device's FTP Server Settings] from the menu bar.
The [Device's FTP Server Settings] dialog box will appear.

2 Configure the FTP server functions.

Allow Anonymous User

You can enable this option to permit access from anonymous users (default: Disabled).

Point

Anonymous users will not be able to manipulate files and folders on the FTP server or transfer files to the FTP server. Only file retrieval is permitted.

Device's IP Address

This shows the device’s IP address (FTP server's IP address).

Listen Port

You can enter the port number opened for FTP clients (default: 21).

Point If [Listen Port] has been changed, it is necessary to reboot the device in order to apply the settings.

3 After completing the setting, click [OK].

The [Device's FTP Server Settings] dialog box will close.

Point If you have changed [Listen Port], a reboot confirmation message will appear after you click [OK]. A reboot is required for the settings to take effect.

- [Save and Reboot Now]: Save the global settings and the program setting and reboot the device. The main screen will appear when the reboot is complete.
- [Reboot Later]: Closes the message. Rebooting the device using [Reboot] in the [System] menu will apply the settings.

OPC UA Settings

#D072

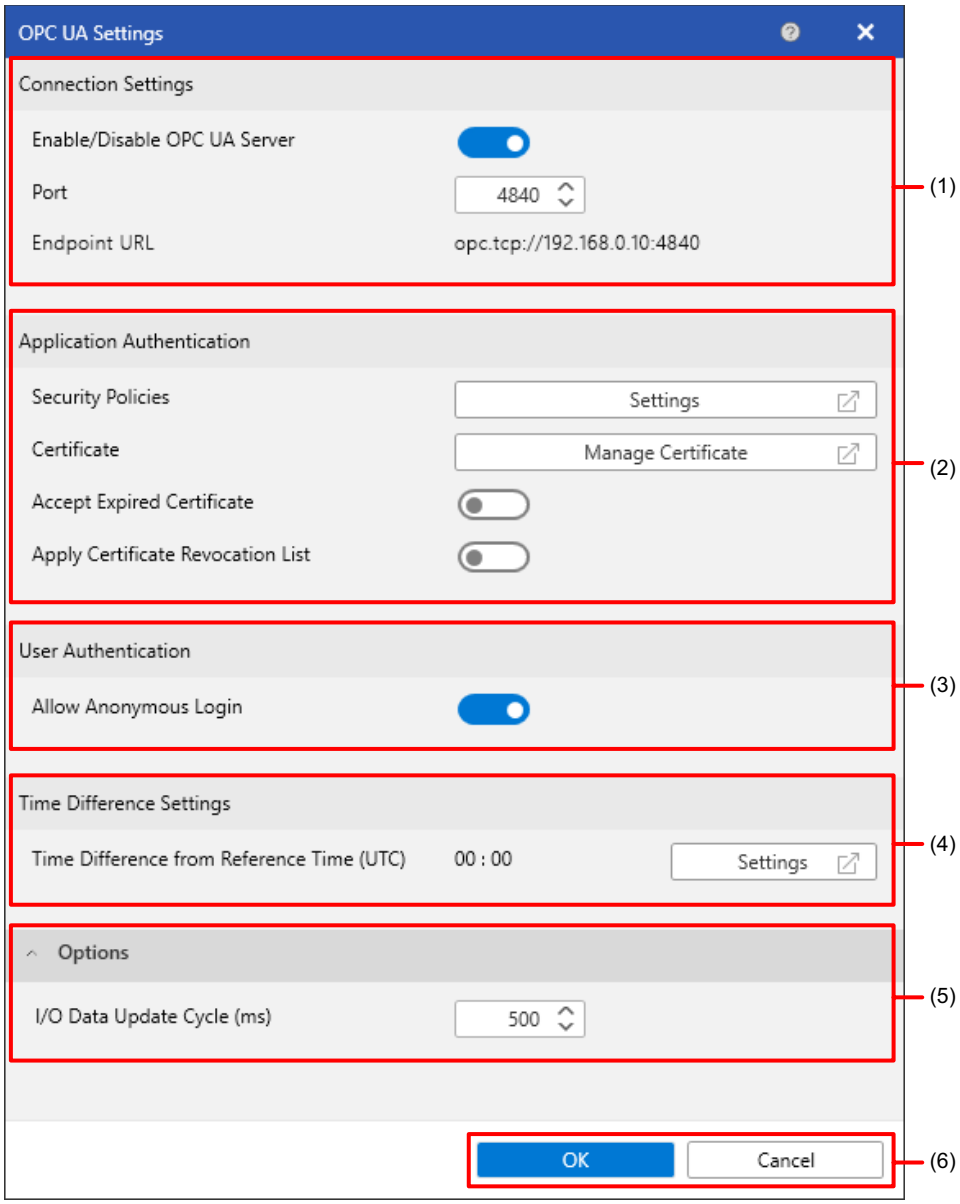
You can configure the settings for the OPC UA server function.

Functional Overview

Enable the OPC UA server function of the VS camera and configure security settings for connections from OPC UA clients. Also, set the time difference from the reference time (UTC) if necessary.

Layout of the Screen

This section describes the details of the [OPC UA Settings] dialog box.



(1) Connection Settings

Enable/Disable OPC UA Server

Turn this ON to enable the OPC UA server function (default: OFF). When turned ON, the items in the [OPC UA Settings] dialog box can be set.

Point

- When the following conditions are met, the OPC UA server function is started. If even one of the following conditions is not met, the OPC UA server function will be stopped.
  - –[Enable/Disable OPC UA Server] is ON
  - –The program setting with the OPC UA server enabled has been transferred to the VS camera.
- Turning [Enable/Disable OPC UA Server] OFF will initialize the OPC UA settings.

Port

Set the port number to be used for OPC UA communication (1 to 65535, default: 4840).

Point

Port numbers used for other settings, such as non-procedural communication and the FTP server, cannot be used.

Endpoint URL

Displays the URL (opc.tcp://[IP address]:[port number]) to specify when the OPC UA client connects to the OPC UA server.

Reference For simulators, the endpoint URL will not be displayed.

(2) Application Authentication

Security Policies

Click [Settings] to display the [Security Policy Settings] dialog box, which allows you to select the security policy to be used by means of the checkboxes.

Reference For details, such as the default value of the security policy, see "Security Policies".

Certificate

Click [Manage Certificate] to display the [Manage Certificate] dialog box, which allows you to manage various certificates.

Point

The certificate field will be displayed in red when connecting to a device under all of the following conditions. If you are concerned about security, perform certificate registration.

- Certificate is not registered.
- [None] for security policies is set to ON.
- [Anonymous Login] for user authentication is set to ON.

Reference For details on the role of various certificates, see "Application Authentication".

- **[Server] tab**: Displays the installed server certificates.
  - **[Certificate Generation]**: Click this to display the [Certificate Generation] dialog box. Enter each item and click [OK] to generate a server certificate.
  - **[Import]**: Select a server certificate file/private key file (*.der) to import into the VS camera. You also can set a passphrase for the private key.

Reference Identity is mutually verified between the server and client that have exchanged certificates. The sender side signs with the private key, and the receiver side verifies the sender with the public key in the certificate. If the private key is deleted due to the replacement of the VS camera or other reasons, the server certificate must be regenerated and re-registered on the client side.

  - **[Export]**: Select the save destination to export the server certificate file (default file name: vs_opcua_server.der).
- **[Client] tab**: Displays the client certificates.
  - **[Trusted] tab**: Displays the list of trusted client certificates. Click [Add] to register a client certificate file (*.der) to the trusted certificate list.
  - **[Untrusted] tab**: Displays the list of untrusted client certificates. Select a certificate and click [Trust] to add it to the trusted certificate list.
- **[CA (Certificate Authority)] tab**: Displays the CA certificates and the certificate revocation list issued by the Certificate Authority (CA).
  - **[Trusted] tab**: Displays the registered CA certificates. Certificates can be added or deleted.
  - **[Revoked] tab**: A certificate revocation list can be added or deleted. The certificate revocation list is a list of CA-signed client certificates that have been revoked due to certificate compromise, company name change, or other reasons.

Accept Expired Certificate

Set whether to allow connection requests from authenticated clients even after the client certificate has expired (default: OFF).

Apply Certificate Revocation List

Set whether to reject a connection if the client certificate of the client that has requested the connection is included in the certificate revocation list (default: OFF).

(3) User Authentication

Allow Anonymous Login

Set whether to allow anonymous login during user authentication (default: ON).

Point If anonymous login is not allowed, register the user to be used for user authentication in "Account Settings" of the Global Settings.

(4) Time Difference Settings

Time Difference from Reference Time (UTC)

Since the OPC UA send data must be linked to the reference time (UTC), configure the settings to convert the local time set in "Date and Time Settings" to UTC time. Click [Settings] to display the [Settings] dialog box, which allows you to set the difference between the time set in [Date and Time Settings] and the reference time (UTC).

Reference If the time synchronization in [Date and Time Settings] is enabled, the time difference cannot be set in the [OPC UA Settings] dialog box.

(5) Options

I/O Data Update Cycle (ms)

Set the update cycle for sending input/output data information to the server (20 to 1000, default: 500).

Point Shortening the update cycle may cause delays in screen updates and command processing.

(6) OK/Cancel

- **OK**: Saves the edited setting, and closes the dialog box.
- **Cancel**: Cancels the edited setting, and closes the dialog box.

Point To apply the changed settings, the VS camera must be rebooted.

DNS Server Settings

#D073

You can configure the IP address of the preferred/alternate DNS server and check the connection.

Functional Overview

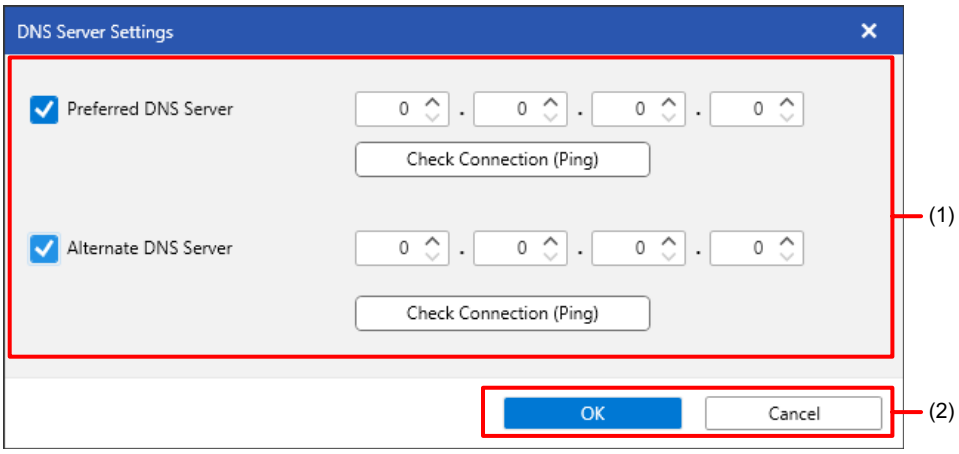
By configuring the DNS server settings, host names (example: ftp.keyence.co.jp) can be used instead of IP addresses when connecting from a client to an FTP server or SNTP server. DNS server settings can be configured in the [DNS Server Settings] dialog which is displayed by selecting the menu bar - [Global Settings] - [DNS Server Settings].

Point

- To connect to an FTP server by host name, set the target specification method of [Target FTP Settings] to [Host Name].
- To connect to an SNTP server by host name, set the target specification method of [Date and Time Settings] to [Host Name].
- During the time immediately after the DNS server is started, the host name to IP address conversion (name resolution) is not performed.

Layout of the Screen

This section describes the details of the [DNS Server Settings] dialog box.



(1) Preferred DNS Server/Alternate DNS Server

Checkbox

Select the check box of the DNS server to be used (default: OFF). IP address input and [Check Connection (Ping)] for the checked DNS server will be enabled.

Point

- Only when the Preferred DNS Server is turned ON, the checkbox for Alternate DNS Server will be enabled. When the Preferred DNS Server is turned OFF, the Alternate DNS Server will also be turned OFF.
- The DNS server settings will be reset after rebooting the device if both the Preferred DNS Server and the Alternate DNS Server are turned OFF and Host Name is not in use.

IP Address

Enter the IP address of the DNS server (0 to 255, default: 0).

Check Connection (Ping)

Click this to issue a Ping command to the entered IP address and check the connection.

(2) OK/Cancel

- **OK**: Saves the edited setting, and closes the dialog box.
- **Cancel**: Cancels the edited setting, and closes the dialog box.

System Error Settings

#D054

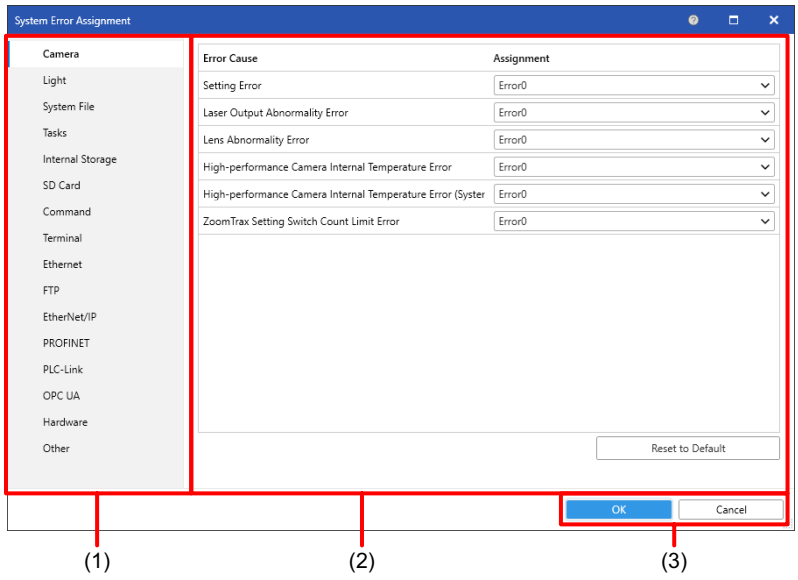
You can assign Error0 or Error1 to each system error cause.

Functional Overview

When a system error occurs, VS Creator will display an error message and error code. By assigning Error0 or Error1 to system errors, you can output the occurrence status of system errors to external devices according to Terminal I/O Settings and Industrial Ethernet Settings. Error0 or Error1 can be set for each system error cause.
System error settings are configured in the [System Error Assignment] dialog box that appears when you select [Global Settings] - [System Error Settings] from the menu bar.
→Layout of the Screen

Layout of the Screen

This section describes the layout of the [System Error Assignment] dialog box.



(1) Switching Error Categories

This shows the list of system error categories. Click to switch to the system error to configure the assignment settings.

(2) Assignment Settings

The assignment settings for the selected error category are listed for each error cause. Under [Assignment], select the system error assignment destination (Error0/Error1/No Assignment) for each error cause.
When an assigned system error occurs, the error status will be turned ON.

- **Error0**: [Error0 Status] is turned ON (1).
- **Error1**: [Error1 Status] is turned ON (1).

- **No Assignment**: Does nothing.

Click [Reset to Default] to reset the system error assignment status to the default.
→Initial Value of Assignment States

(3) OK/Cancel

- **OK**: Saves the settings and closes the dialog box.
- **Cancel**: Discards the settings and closes the dialog box.

Initial Value of Assignment States

Category	System Error Cause name	Initial Assignment value
Camera	Setting Error	Error0
	Laser Output Abnormality Error	Error0
	Lens Abnormality Error	Error0
	High-performance Camera Internal Temperature Error	Error0
	High-performance Camera Internal Temperature Error (System Stop)	Error0
	ZoomTrax Setting Switch Count Limit Error	Error0
Light	Light Setting Error	Error0
	Light Connection Error	Error0
	Light Head Initialization Error	Error0
	Light Head High Temperature Error	Error0
	Light Head High Temperature Error (System Stop)	Error0
	Light Head Power Supply Error	Error0
	Camera-Connected Light Conversion Unit High Temperature Error	Error0
	Camera-Connected Light Conversion Unit (For External Light) High Temperature Error	Error0
	Lighting Controller Internal Temperature Error	Error0
	Lighting Controller Internal Temperature Error (System Stop)	Error0
System File	Program Setting File Detection Error	Error0
	Program Setting Memory Overflow Error	Error0
	Program Setting File Version Error	Error0
	Program Setting File Damage Error	Error0
	Global Settings File Detection Error	Error0[*1]
	Global Settings File Version Error	Error0[*1]
	Global Settings File Damage Error	Error0[*1]
	Startup Program Setting File Detection Error	Error0
	Startup Program Setting File Damage Error	Error0
	HTTPS Server Certificate Detection Error	Error1
	Vision Dashboard Mathematical Operation Internal Memory Error	Error0

Category	System Error Cause name	Initial Assignment value
Tasks	Tool Overall Error	No Assignment
	Event Buffer Full Error	Error1
Internal Storage	Access Error	Error0
	Insufficient Space Error	Error0
SD Card	Connection Error	Error0
	Access Error	Error0
	Format Error	Error0
	Read-Only Error	Error0
	Output Buffer Full Error	No Assignment
	Insufficient Space Error	Error0
	Improper Removal Error	Error1
Command	External Command Error	No Assignment
	Internal Command Error	No Assignment
Terminal	Output Buffer Full Error	No Assignment
Ethernet	Connection Error	Error0
	Communication Error	Error0
	Timeout Error	Error0
	Output Buffer Full Error	No Assignment
FTP	FTP Server Connection Error	Error0
	FTP Server Login Error	Error0
	FTP Output Timeout Error	Error0
	FTP File Output Error	Error0
	Output Buffer Full Error	No Assignment
EtherNet/IP	Communication Error	No Assignment
	Output Buffer Full Error	No Assignment
PROFINET	Communication Error	No Assignment
	Output Buffer Full Error	No Assignment
PLC-Link	Link Establishment Error	No Assignment
	Output Buffer Full Error	No Assignment
	IP Address Redundancy Error	Error0
OPC UA	OPC UA Connection Error	Error1
Hardware	Internal Battery Depletion Error	Error0
Other	Time Synchronization Failure	Error0
	DNS Server Connection Error	Error0
	DNS Server Host Name Resolution Error (FTP)	Error0
	DNS Server Host Name Resolution Error (SNTP)	Error0

*1: Not changeable

Account Settings

#D055

You can manage the users and permission groups that use this device.

Functional Overview

You can register users to limit access to the device. Setting a password for each user and limiting the functions and interfaces that can be accessed will allow flexible user management, such as having system administrators, field administrators and actual operators, according to the operational needs.
Account settings are set in the [Account Settings] dialog box that appears when you select [Global Settings] - [Account Settings] from the menu bar.
→Layout of the Screen

User

Users are managed with a user name and password. The user permissions adhere to the assigned permission group.

Permission Group

A group of permissions assigned to the users. You can select the permission level to be applied and restrict the allowed operations as needed.

Permission Level

A level of permissions granted to a permission group.

- **Full Control**: All functions are available for use
- **Edit**: Some of the operations on the Vision Dashboard (operation on a constant cell (number/string/theoretical value/error value) or a cell configured with a data input rule), reproduction of history, and simulation execution are possible
- **View Only**: Only viewing is permitted

Point

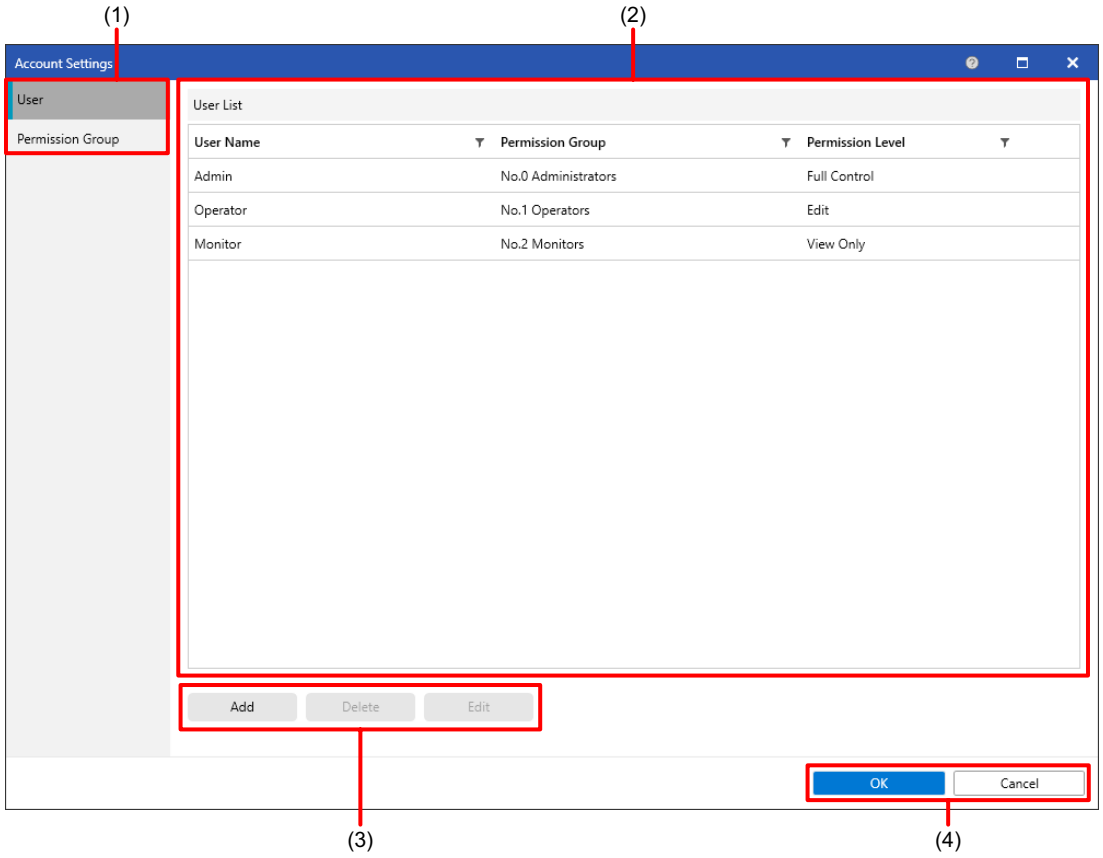
The available functions prioritize settings in [Settings Protection] over the user permissions. Even users with the [Full Control] permission level cannot use the functions protected by [Settings Protection].

Layout of the Screen

This section describes the layout of the [Account Settings] dialog box.
The [Account Settings] dialog box consists of two tabs.

- [User] Tab: You can add/edit/delete users.
- [Permission Group] Tab: You can add/edit/delete permission groups.

[User] Tab



(1) Settings Target Tab

You can click on the tabs to switch the setting target.

(2) User List

This shows the list of currently registered users. Three users, [Admin], [Operator], and [Monitor] are pre-registered.

Reference You can switch the list sort order (ascending/descending) by clicking the title row of [User List].

User Name

This shows the user name of currently registered users. Click ▼ to show a text box which allows you to filter the user list by user name of the entered string.

Permission Group

This shows the permission group assigned to registered users. Click ▼ to show a text box which allows you to filter the user list by user permission(s) of the entered string.

Permission Level

This shows the permission level granted for a permission group. Click ▼ to show the permission level checkbox, which allows you to filter the user list by the enabled permission level.

(3) Add/Delete/Edit

You can add new users and edit/delete users currently selected in the user list.

Add

Clicking this button opens the [Edit User] dialog box.
→Adding/Editing Users

Point The maximum number of users that can be registered is 1000.

Delete

Click to delete the currently selected user in the user list.

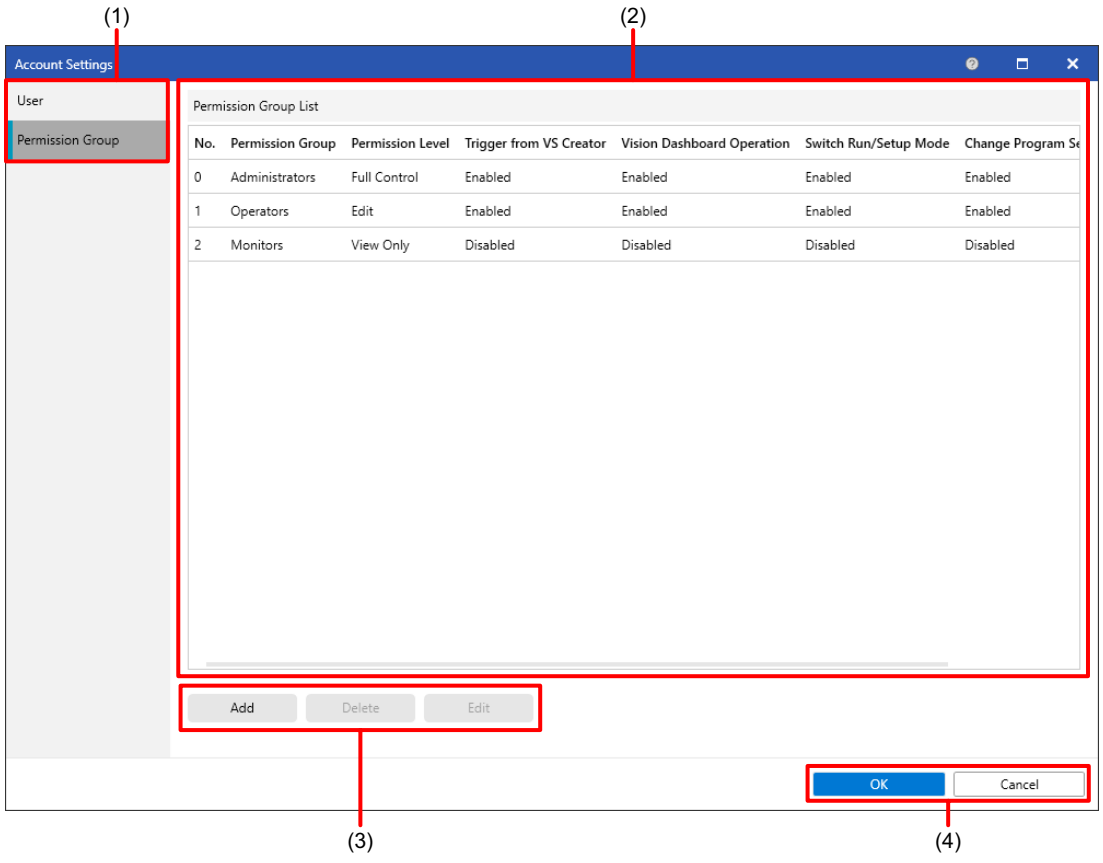
Edit

Click to display the [Edit User] dialog box for the user currently selected in the user list.
→Adding/Editing Users

(4) OK/Cancel

- **OK**: Saves the settings and closes the dialog box.
- **Cancel**: Discards the settings and closes the dialog box.

[Permission Group] Tab



(1) Settings Target Tab

You can click on the tabs to switch the setting target.

(2) Permission Group List

This shows the list of currently registered permission groups. There are three pre-registered permission groups: [Administrators], [Operators], and [Monitors].

No.

This shows the permission group No.

Permission Group

This shows the name of the registered permission group.

Permission Level

This shows the permission level granted for a permission group.

Trigger from VS Creator, Vision Dashboard Operation, Switch Run/Setup Mode, Change Program Setting, Save Settings, "Get Editing Rights" Display

These show the setting status of each operation in the permission group.

- **Enabled**: The target operation is allowed.
- **Disabled**: The target operation is forbidden.

(3) Add/Delete/Edit

You can add a new permission group or edit/delete the permission group currently selected in the permission group list in [Permission Group List].

Add

Clicking this button opens the [Edit Permission Group] dialog box.
→Adding/Editing Permission Groups

Point Up to seven permission groups can be registered.

Delete

Click to delete the permission group currently selected in the permission group list.

Edit

Click to display the [Edit Permission Group] dialog box for the permission group currently selected in the permission group list.
→Adding/Editing Permission Groups

(4) OK/Cancel

- **OK**: Saves the settings and closes the dialog box.
- **Cancel**: Discards the settings and closes the dialog box.

Adding/Editing Users

You can add and edit users from the [Edit User] dialog box.

1 Set the user information.

User Name

You can enter the user name. User names can contain only alphanumeric characters, underscores (_), and hyphens (-). The maximum number of characters is 32.

Password

- If no password has been set: Set the login password for the user you wish to add in the [Set Password] dialog box that appears when you click [Set Password]. Enter the password in [Password] and [Confirm Password], and then click [OK].
- If a password has already been set: Click on [Set Password] and change the password in the [Change Password] dialog box that appears. Enter [Old Password], [New Password] and [Confirm New Password], and then click [OK].

The password can contain only half-width alphanumeric characters and symbols (allowed symbols: !#$%&'()+-_./*@[]<>=^",:;\`|{}~?). The maximum number of characters is 32.

Point Setting a password is not mandatory. Users can be registered without a password.

Permission Group

You can select the permission group to assign to the added user. You can select from permission groups registered in [Permission Group List].

Point The [Admin] permission group that is registered by default cannot be changed.

2 After completing the setting, click [OK].

The [Edit User] dialog box will close.

Adding/Editing Permission Groups

Add and edit permission groups from the [Edit Permission Group] dialog box.

1 Set the permission group.

Permission Group No.

This shows the permission group No. of the permission group to be set.
When adding a permission group, the youngest unregistered permission group No. will be assigned.

Permission Group Name

You can enter the permission group name. Permission group names can contain only alphanumeric characters, underscores (_), and hyphens (-). The maximum number of characters is 32.

Permission Level

You can select the level of permission to be granted to the permission group.

- **Full Control**: All functions are available for use
- **Edit**: Some of the operations on the Vision Dashboard (operation on a constant cell (number/string/theoretical value/error value) or a cell configured with a data input rule), reproduction of history, and simulation execution are possible
- **View Only**: Only viewing is permitted

Point The available functions prioritize settings in [Settings Protection] over the user permissions. Even users with the [Full Control] permission level cannot use the functions protected by [Settings Protection].

Options

You can set the operations allowed to users in the permission group. Enable to allow the relevant operation.

- **Allow Trigger Operation from VS Creator**
- **Allow Vision Dashboard Operation**
- **Allow Switching Between Run Mode/Setup Mode**
- **Allow Changing of Program Setting**
- **Allow Saving of Settings**
- **Display "Get Editing Rights"**

Point The configurable options vary depending on the permission group.
- Full Control: You can select whether to enable only [Allow Trigger Operation from VS Creator]. Other options are fixed at enabled (operation allowed).
- Edit: All options can be enabled (allowed) or not.
- View Only: All options are fixed to disabled (operation not allowed).

2 After completing the setting, click [OK].

The [Edit Permission Group] dialog box will close.

System

With [System] on the menu bar, you can make operations and settings related to the system such as switching between Setup and Run Modes, switching accounts, and switching languages.

Function overview

#D056

You can make operations and settings related to the system such as switching between Setup and Run Modes, switching accounts, and switching languages. Selecting [System] from the menu bar displays a submenu. For details of each menu item, see the linked content.

Menu item		Operational permissions based on account permission levels		
		Full control	Edit	View only
Change Mode	Setup Mode	✓	✓*1	–
	Run Mode	✓	✓*1	–
Change Account		✓	✓	✓
Reboot		✓	–	–
Update Firmware		✓	–	–
System Information		✓	✓	✓
Device Temperature List		✓	✓	✓
Language		✓	–	–
Startup Screen Settings		✓	✓	✓

*1:Operation is permitted depending on the configuration.

Change Mode

Switches between the Setup Mode and Run Mode. For details, see "Change Mode".

Change Account

You can switch to the account that you configured by [Global Settings] - [Account Settings]. For details, see Change Account.

Reboot

Reboots the device. For details, see "Reboot".

Update Firmware

The firmware of the device can be updated. For details, see "Update Firmware".

System Information

Displays the product model, firmware version, MAC/IP addresses, memory usage, etc. in the [System Information] dialog. For details, see "System Information".

Device Temperature List

The temperature of the connected device is displayed. For details, see "Device Temperature List".

Language

Select the language to be displayed on the [Connect to Device] screen and the main screen from the following languages. For details, see "Language".

English/Spanish/Brazilian Portuguese/German/French/Italian/Czech/Hungarian/Polish/Japanese/Simplified Chinese/Traditional Chinese/Korean/Thai/Vietnamese/Indonesian

Point

- The change of the language is reflected when the main screen is displayed next time.
- The language setting of the main screen and that of the [Connect to Device] screen are the same. The change of the language is reflected to the [Connect to Device] screen after closing the [Connect to Device] screen and restarting the VS Creator.

Startup Screen Settings

Set the screen to be displayed when starting the VS Creator. For details, see "Startup Screen Settings".

Change Mode

#D057

The VS camera has two modes of operation: Setup Mode and Run Mode. Switch between Setup Mode and Run Mode by selecting [System] - [Change Mode] from the menu bar. For details, see "Procedure".

Function overview

This section explains the Setup Mode and Run Mode and the system operation in the case when multiple clients are connected to a VS camera.

Setup Mode

Setup Mode is the operation mode for editing the program setting. Available functions provided in the main screen can be used. You can review archives based on measurement results and make simulations using images that you have prepared.

Point

- In Setup Mode, the counting of the number of times of measurement, the accumulation of archives and statistical data, and output processing are not made.
- Some functions cannot be used in Setup Mode for simulators.

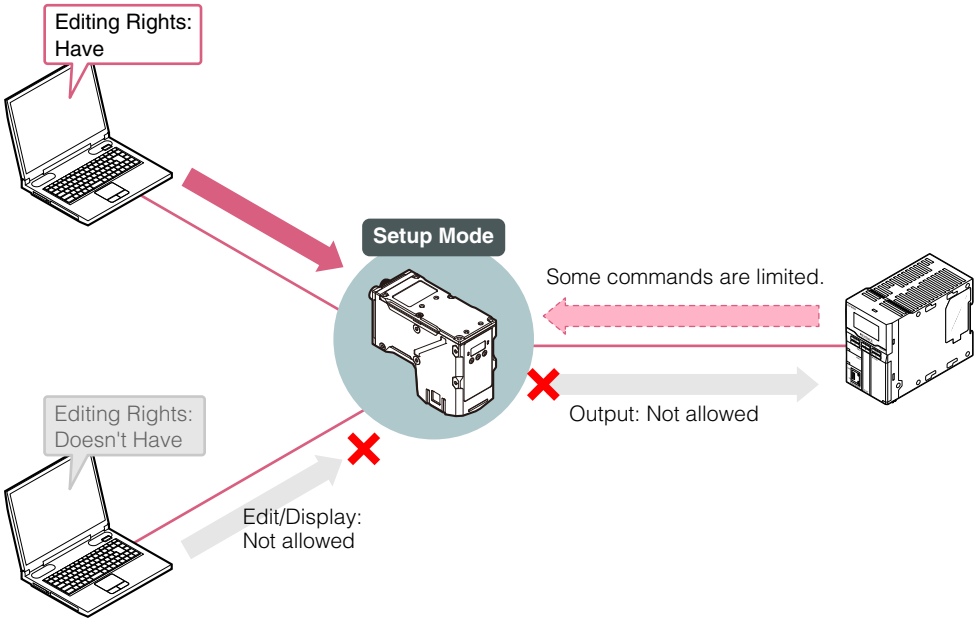
When you switch from Setup Mode to Run Mode, a message is displayed that asks if you will save the setting.

Run Mode

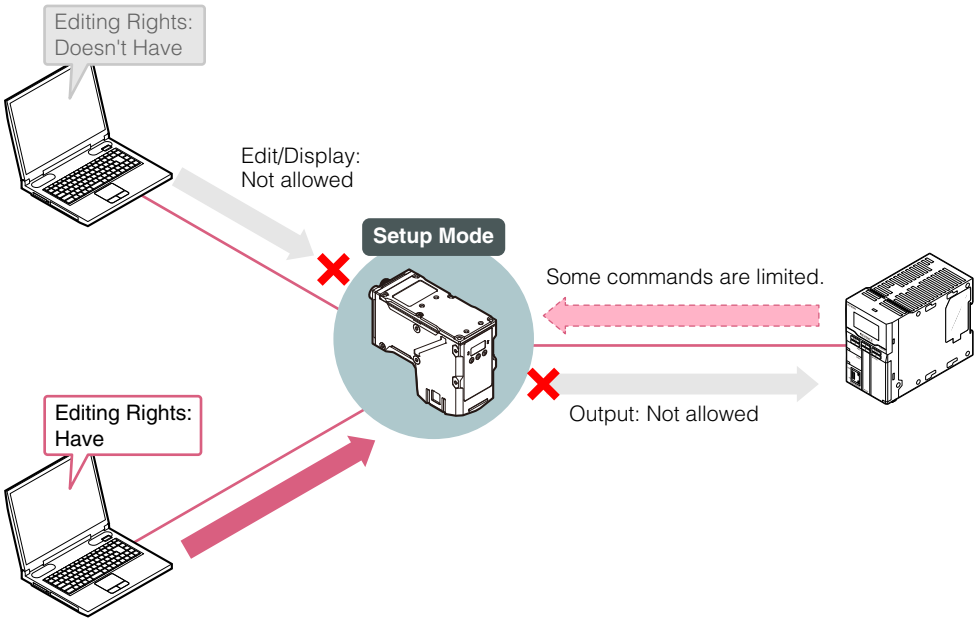
Run Mode is the operation mode for performing the measurement of the program setting. In Run Mode, available functions are limited compared to Setup Mode. For example, addition/edition of tools is not possible.

Editing Rights

When multiple clients are connected to a VS camera, the client that has made the VS camera transition to Setup Mode holds the editing rights.
On other connected clients, a message is displayed indicating that the VS camera is being edited. For other clients to edit the setting, the client that has acquired the editing rights must finish edition and have the VS camera transition to Run Mode.



Even if the VS camera is in Setup Mode, the user of a different client can obtain the editing rights by clicking the [Get Editing Rights] button included in the message displayed on the client. However, the different client cannot get the editing rights if the client that currently holds the editing rights has an editing dialog open.



		Edit	Display
When no client has the editing rights		Partially restricted (equivalent to Run Mode)	Images and results are updated when measurement finishes.
When a client has the editing rights	Client that has editing rights	All editing operations are allowed.	Images and results are updated when measurement finishes.
	Client that does not have editing rights	Editing is prohibited. However, the client can get the editing rights.	Not updated.

Point

When the client that has the editing rights is disconnected, the VS camera stays in Setup Mode with all clients not having editing rights. In order to switch the VS camera to Run Mode, obtain the editing rights from a different client and have the VS camera transition to Run Mode, or make the VS camera transition to Run Mode by external operation.

Procedure

Selecting [System] - [Change Mode] from the menu bar displays a submenu (Setup Mode / Run Mode). A check mark is displayed beside the current mode. Selecting the unmarked mode switches modes.

Point If you switch from Setup Mode to Run Mode without saving the edited content, a message is displayed that asks if you will save the setting.

Reference You can also change the mode by [Mode] on the toolbar.

Change Account

#D058

You can switch users while operating the VS Creator.
Selecting [System] - [Change Account] from the menu bar displays the [Login] dialog. Fill out [User Name] and [Password], and click [OK]. Then, users are switched.

Point

- The user name and the password to be entered must be registered beforehand at [Global Settings] - [Account Settings] selected from the menu bar.
- The settings of the main screen stay unchanged after users are switched.

Reboot

#D059

Selecting [System] - [Reboot] from the menu bar displays a confirmation message. Clicking the [Save and Reboot] button reboots the device.

Point

- You cannot select [Reboot] on the simulator.
- If you select [Reboot] in the Admin account, the device reboots even if there are other connected clients.
- If the program setting has been changed, a confirmation message will be displayed before rebooting, allowing you to choose whether to save the changes. If changes are saved and a backup is also saved on the PC, select the [Save a Backup on the PC] check box and click [Yes].

The main screen closes when reboot begins. After the reboot, select a VS camera on the [Connect to Device] screen to connect to it, and open the main screen again.

Point

If the device is rebooted by a different client, the main screen is closed and the [Connect to Device] screen is displayed.

Update Firmware

#D060

The firmware of the device can be updated from the main screen.
On the menu bar, selecting [System] - [Update Firmware] displays the [Firmware Update] dialog box. For details, see "Updating Firmware".

Point

- [Update Firmware] cannot be selected on a simulator.
- Update cannot be executed when multiple main screens are displayed.

System Information

#D061

Selecting [System] - [System Information] from the menu bar displays the [System Information] dialog. You can find the following information:

- **Product Model (Firmware Version)**: Shows the product model and the firmware version of the device.
- **Copyright**: Shows the copyright of the product.
- **Serial No.**: Shows the serial number of the device.
- **MAC Address**: Shows the MAC address of the device.
- **IP Address**: Shows the IP address configured for the device.
- **Device Name**: Shows the device name configured for the device.
- **Hardware Version**: Shows the hardware version of the device.
- **Program Setting Version / Global Settings Version**: Shows the setting file versions and operation-supported versions of the program setting and the global setting that the device has loaded.
- **Resource Memory Usage**: Shows the usage of the resource memory.
- **Image Memory Usage**: Shows the usage of the image memory.
- **Processing Memory Usage**: Shows the usage of the processing memory.
- **Free Space**: Shows the amount of space remaining in the internal storage and the microSD card.

Device Temperature List

#D062

On the menu bar, selecting [System] - [Device Temperature List] displays the [Device Temperature List] dialog box. The following information is available for the connected VS camera and lighting controller.

- **MAC Address**: Displays the MAC address and name of the connected devices.
- **Temperature**: Displays the temperature of the devices (measurement error of +5°C). The temperature displayed is the internal temperature of the device, so it may be higher than the surface temperature of the device.

Language

#D063

On the menu bar, selecting [System] - [Language] displays a list of languages in a sub-menu.
English/Spanish/Brazilian Portuguese/German/French/Italian/Czech/Hungarian/Polish/
Japanese/Simplified Chinese/Traditional Chinese/Korean/Thai/Vietnamese/Indonesian

A check mark is displayed beside the language currently used in the [Connect to Device] screen and the main screen. If you select a different language, the language is used at the next startup.

Reference

- The change of the language is reflected when the main screen is displayed next time.
- The language setting of the main screen and that of the [Connect to Device] screen are the same. To reflect the change of language made from the system menu of the main screen also to the [Connect to Device] screen, you need to close the [Connect to Device] screen and restart the VS Creator.

Custom Screen Viewer Settings

#D069

Set the display configuration of the custom screen viewer.

Display Configuration Settings

Set the display configuration of the browser display. For details, see "Display Configuration Settings".

Startup Screen Settings

#D068

Set the screen to be displayed when starting the VS Creator.

Startup Screen

Select the screen to be displayed when starting the VS Creator from the drop-down menu.

- **"Connect to Device" Screen** (default): Displays the [Connect to Device] screen.
- **Main Screen**: Connects to the VS camera set in [Target IP Address] and displays the main screen directly without going via the [Connect to Device] screen.
- **Custom Screen Viewer**: Displays the custom screen viewer without going via the [Connect to Device] screen.

Target IP Address

This option appears if you selected [Main Screen] on [Startup Screen]. Directly enter the IP address of the VS camera to connect to at startup.

Reference [Startup Screen Settings] is a setting item common among the [Connect to Device] screen and the main screen.

Layout

The layout of views in the main screen can be changed freely. This section explains the "Layout" functions such as the layout customization of views and the restoration to a particular layout.

Overview of Functions

#D064

You can change the positions and sizes of the views that compose the main screen for your convenience. A view can be fixed (docked), made independent (floating), and also temporarily hidden. Also, you can configure an initial layout to be used when the main screen is started and call a customized layout and switch to it anytime.

View status

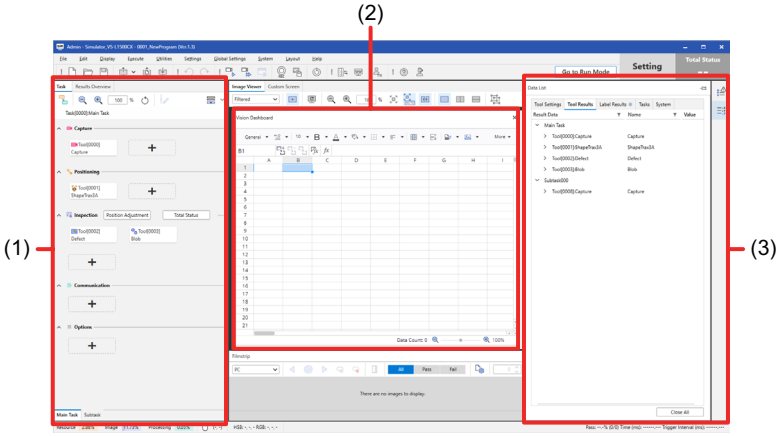
You can show or hide any view in the main screen at any time. (See "[Display] Menu")

Example of initial view display in Layout 1

View	Default Display
Task	Displayed
Results Overview	Displayed
Image Viewer	Displayed
Vision Dashboard	Displayed
Custom_Screen	Displayed
Filmstrip	Displayed
Properties	Displayed
Tool Results	Displayed
Data List	Auto-hide
Error Check	Auto-hide

A view can be in any of four states and can transition from one state to another.

- Docked: The view is fixed at a certain position of the main screen (1). When there are multiple views at the same position, tabs of their names are displayed and the view of the selected tab comes in front.
- Floating: The view is independent from the main screen and can be moved freely (2). The size of the view can be changed. Clicking ✕ at the upper-right corner of the view hides the view. To display the view again, use the [Display] menu to select and put a check mark on the view that you want to display.
- Hidden: The view is not displayed in the main screen.
- Auto-hide: The view is automatically hidden and normally reduced to an icon on the Sidebar (3). The view is displayed when you click the icon, and is reduced to the icon again when you click somewhere else.



You can switch a view between different states using the menu that appears at the right-click of the view name.

- Floating: The view transitions from the Docked state to the Floating state.
- Auto-hide: The view transitions from the Auto-hide state to the Docked state.
- Close: The view transitions to the Hidden state. The view is also hidden when you click ✕.

Reference When you click 📌 at the upper-right corner of a view, the icon is changed to 📌 and the view enters the Auto-hide state. For more details, see “Main Screen” - "Sidebar".

About layout

A layout is the position and configuration information of the views that appear when the main screen is started. When you close the main screen or switch layouts, the layout information at that time is saved as the latest condition. That latest condition of layout is reproduced when you start the main screen next time or when you make layout restoration.

Layout operations

You can make the following layout operations:

- Switching between different layouts to suit the usage scene (See "Layout List")
- Creating a new layout with any name (See "Create New" and "Duplicate")
- Deleting a layout (See "Delete")
- Fixing the position, size, and display condition of each view (See "Lock")
- Configuring the default layout for each mode (See "Layout Setting by Mode")

[Layout] menu

#D065

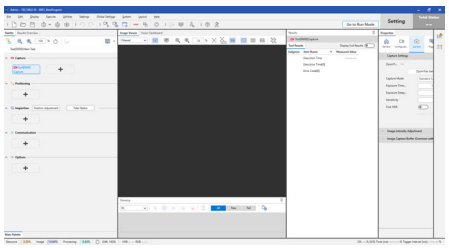
Selecting [Layout] from the menu bar displays a submenu. For details of each menu item, see the referenced content.

Menu items		Operational permissions based on account permission levels		
		Full control	Edit	View only
Layout List	Layout_1	✓	✓	–
	Layout_2	✓	✓	–
	Layout_3	✓	✓	–
	(Added layouts)	✓	✓	–
Create New		✓	–	–
Duplicate		✓	–	–
Rename		✓	–	–
Delete		✓	–	–
Lock		✓	–	–
Layout Setting by Mode		✓	–	–

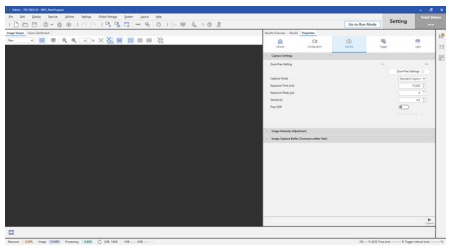
Layout List

You can switch between different layouts to suit Setup Mode, Run Mode, or the usage scene. Selecting [Layout] - [Layout List] from the menu bar displays a submenu that lists available layouts.
There are three layouts (Layout_1, Layout_2, and Layout_3) when you installed the VS Creator. The default layout setting is Layout_1 in both Setup Mode and Run Mode. You can configure a layout for each mode by [Layout Setting by Mode].

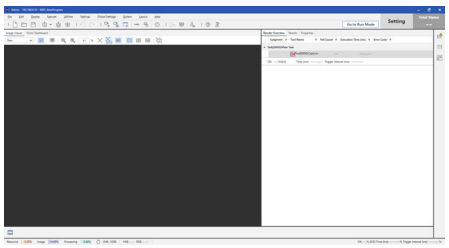
Layout_1



Layout_2



Layout_3



Reference For the Display Expansion Unit, Layout_2 is set for Setup Mode and Layout_3 is set for Run Mode as the default setting.

When you add a layout, its name is added to the layout list (maximum of 10 layouts). Selecting a layout from the submenu applies that layout to the main screen. You can check which layout the currently displayed layout is by viewing the submenu and finding the layout name that has a check mark next to it.

Create New

Create a new layout. You can switch the screen to the created layout from [Layout List].

Point A maximum of 10 layouts can be created.

1 Select [Layout] - [Create New] from the menu bar.
The [Create New] dialog appears.

2 Enter a name for the layout in [Layout Name].

3 From the [Layout Template Selection] drop-down menu, select a layout template.

4 Click the [OK] button.
The new layout is saved and its name is added to the submenu.

Reference The main screen switches to the new layout.

Duplicate

Copy the layout information of the views currently displayed in the main screen to create a new layout. You can switch the screen to the created layout from [Layout List].

Point A maximum of 10 layouts can be created.

1 Select [Layout] - [Duplicate] from the menu bar.
The [Duplicate] dialog appears.

2 Enter a name for the layout in [Layout Name].

3 Click the [OK] button.
The new layout is saved and its name is added to the submenu.

Reference The main screen switches to the copied layout.

Rename

Change the name of the selected layout.

1 Select [Layout] - [Rename] from the menu bar.
The [Rename] dialog appears.

2 From the [Target] drop-down menu, select the target layout.

3 Enter the new name in [Layout Name].

4 Click the [OK] button.
The name of the layout is changed.

Delete

Selecting [Layout] - [Delete] from the menu bar displays the [Delete] dialog. In the dialog, the names of created layouts are listed. Select the check boxes of layouts and click the [Delete] button, then the selected layouts are deleted.

Point The currently used layout displays “(Selected)” and cannot be deleted.

Lock

You can put the following restrictions on operations on views by selecting [Layout] - [Lock] from the menu bar.

- Prohibiting the change of position of views that are in the [Docked] state
- Prohibiting views in the [Hidden] state from being displayed
- Prohibiting displayed views from being hidden and hidden views from being displayed

When a layout is locked, a check mark is put on the left of this menu item.

Point The following operations are possible for a layout even if it is locked.
- Changing the size of a view
- Changing the position of a view in the [Floating] state

Selecting [Lock] again releases locking, and the check mark disappears.

Layout Setting by Mode

You can set different layouts to be used at the start of the main screen for Setup Mode and Run Mode. In the default setting, the layout at the top of [Layout List] is set for both modes.

1 Select [Layout] - [Layout Setting by Mode] from the menu bar.
The [Layout Setting by Mode] dialog appears.

2 Turn the [Layout Setting by Mode] switch to ON (default: OFF).

3 From the [Setup Mode] and [Run Mode] drop-down menus, select the layout to be displayed at the start of the main screen.

Reference
- If you have added a layout, its name is displayed in the drop-down menu.
- If you delete the layout that you have selected in the above steps, the layout at the top of [Layout List] is used instead.

4 Click the [OK] button.

Chapter 5 Measurement

With the VS Creator, you use the [Task] view of the main screen to add tools to a task and make program settings.
Tools are configured with settings necessary for processing, so that users without special knowledge of programming languages can easily and quickly make complex image processing with the GUI, in which dragging and dropping are the main operations.
There are the following categories of VS Creator tools.

List of tool categories

Category	Overview
Capture	Tools of this category are related to image capturing of measurement target objects. In addition to ordinary capturing, functions of this category include capturing images using special lights, calibrating images to correct distortion, and scaling images to correct their sizes.
Inspection	Tools of this category perform different inspections based on images output by capture tools and other tools. Tools of this category include those that measure areas and intensities, detect positions of registered patterns, measure positions and widths of edges, detect defects and blobs, recognize characters, and read 1D/2D codes.
AI Inspection	Tools of this category do not need detailed condition settings but train the AI with captured images to detect defective objects and categorize objects into classes. Tools of this category include those that detect defective points in current images based on training results and those that categorize current images into classes based on training results.
Measurements & Dimensions	Tools of this category analyze measurement results of inspection tools to measure positions, tilt angles, and distances as well as to detect straight lines, circles, and points. Tools of this category include those that measure the distance between points detected by inspection tools, determine the angle and intersection coordinate of two detected straight lines, and determine a straight line or a circle from edge information.
Region	Tools of this category create inspection regions that are referable from other tools. Tools of this category include the Shared Region tool, which specifies region shapes such as rectangle and circle, and Image Region tools, which create an inspection region by extracting the white or black area from a binarized image of a region of the specified shape.
Image Conversion	Tools of this category generate images referable by other tools. Tools of this category include those that generate preprocessed images, images of difference between model images and input images, and images corrected by position shift amount information.
Vision-Guided Robotics	Tools of this category are used in vision-guided robotics such as picking or placing an object. Tools of this category include those that configure robot calibration and those that calculate the robot coordinates of object positions.
Communication	Tools of this category perform input/output of data between the VS series and external devices. Tools of this category include those that configure data to be input from external devices configured in Global Settings (configured by different industrial protocols (EtherNet/IP, PROFINET, PLC-Link) individually) and those that configure data and images to be output to external devices.
Display	The tool of this category is the [Graphics Display] tool, which configures graphic components that are displayed in the camera image. Graphic components include shapes such as points and straight lines, as well as numbers and text strings.
Data Analysis	Tools of this category save the processing result of any tool added to the task as statistical data.
Control	Tools of this category execute commands. Various commands are available including those that switch between different program settings and model images and those that issue events.

Capture

Capture tools capture images of objects to be measured and provide input images appropriate for the processing of measurement tools. In this device, the following capture tools are provided.

List of capture tools

Capture Tool	Function overview
Capture	The [Capture] tool captures images of measurement target objects by the connected camera. Various images can be captured by switching between different capture modes.
Standard Lighting Mode	Outputs captured images as output images.
LumiTrax Mode	Generates shape/topography (bumps and dips) images and texture (pattern) images by analyzing images captured with lighting from different directions.
MultiSpectrum Mode	Captures images with lighting of up to eight different colors to obtain more detailed color information than ordinary color cameras to enable the detection of subtle color differences and the accurate specification of color ranges.
Flickerless Mode	Turns on and off the light repeatedly in a frequency that human eyes cannot perceive and automatically changes and synchronizes the camera exposure to match this frequency. This makes it possible to capture significantly brighter images compared to those captured with continuous lighting.
Calibration	Corrects *lens distortion* caused by lens properties and *perspective distortion* caused by camera installation conditions.
Scaling	Converts values measured in images captured by a camera to actual dimensions or values in any specified tool.

Overview of [Capture] Tool

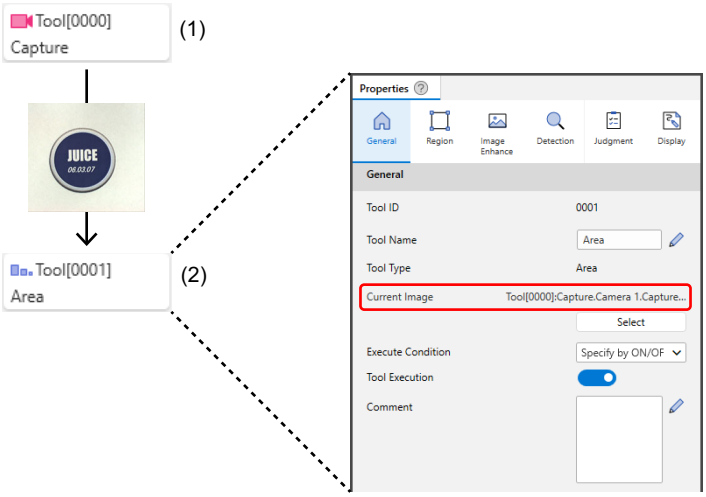
#E001

The [Capture] tool captures images of measurement target objects by the connected camera. This section explains the flow of image capturing and the overview of the tool functions.

Image Capture Flow

Upon an external or internal trigger, the [Capture] tool captures an image of the measurement target objects by the connected camera and lights, and outputs the captured image. Captured images are used as input images of measurement tools.

- When the [Capture] tool is executed, the tool makes the preparation of image capturing with the configured camera.
- You can choose to capture images upon a trigger or without waiting for a trigger.
- Using special lights, you can capture various types of images by changing the Capture Mode.
- By using the Image Capture Buffer, the camera can capture images without waiting for the completion of task processing and the image data can be accumulated in the buffer.
- If Multi-Capture is enabled, capturing is made multiple times and the captured images can be processed as one measurement.



(1) Capturing is performed upon a trigger input.

(2) The image is processed by the tool that has the output image of the [Capture] tool selected as its input image.

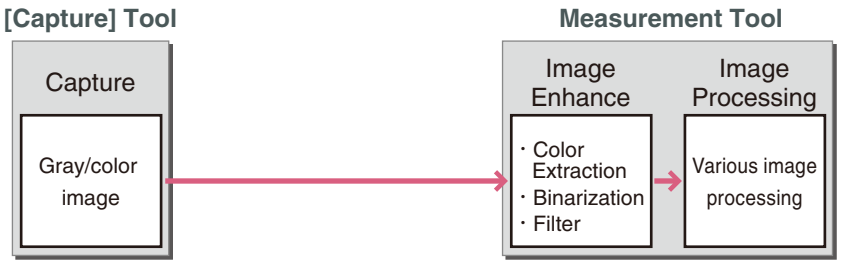
Capture Mode

In addition to image capturing in Standard Lighting Mode, the VS Creator also supports special capturing in LumiTrax Mode, MultiSpectrum Mode, and Flickerless Mode using special lights.

Standard Lighting Mode

Outputs captured images as output images.

Processing flow



LumiTrax Mode

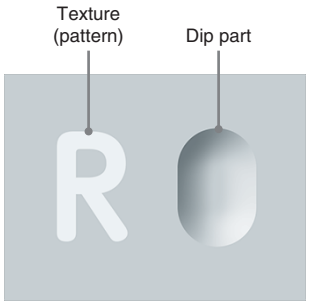
Images captured by lighting the target object from different directions are analyzed, and shape/topography (bumps and dips) images and texture (pattern) images can be generated. You can perform measurement that is focused on the object shape or the surface pattern (texture) by eliminating the variation of the object and the influence of the surrounding environment which prevent stable inspections.

Point The LumiTrax Mode can be used when one of the following lights is connected.
- High-intensity smart ring light CA-DE*X
- MultiSpectrum light CA-DRM*X
- LumiTrax 400 mm large-size light CA-DQW40X

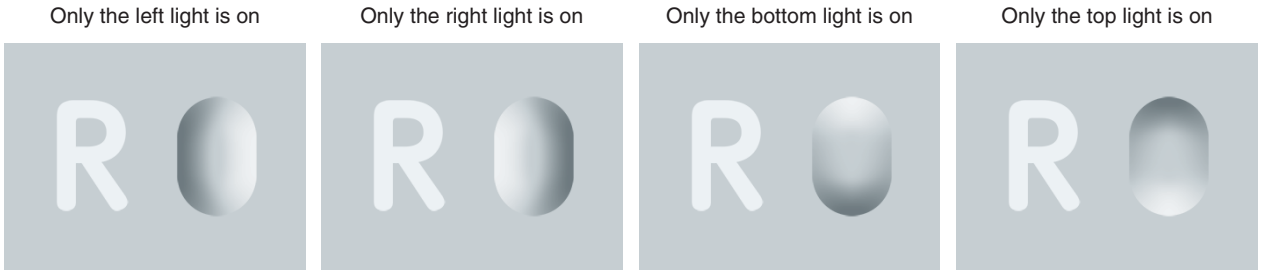
Images that Can be Generated with LumiTrax Mode

With LumiTrax processing, you can generate images of the following types for use for the measurement.

- **Normal image**: Images that are captured with all lights turned on.

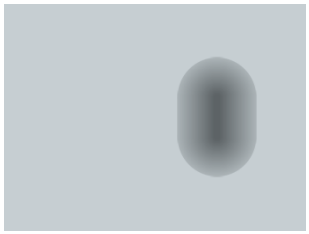


- **Partial lighting image**: Images that are captured with lights partially turned on.



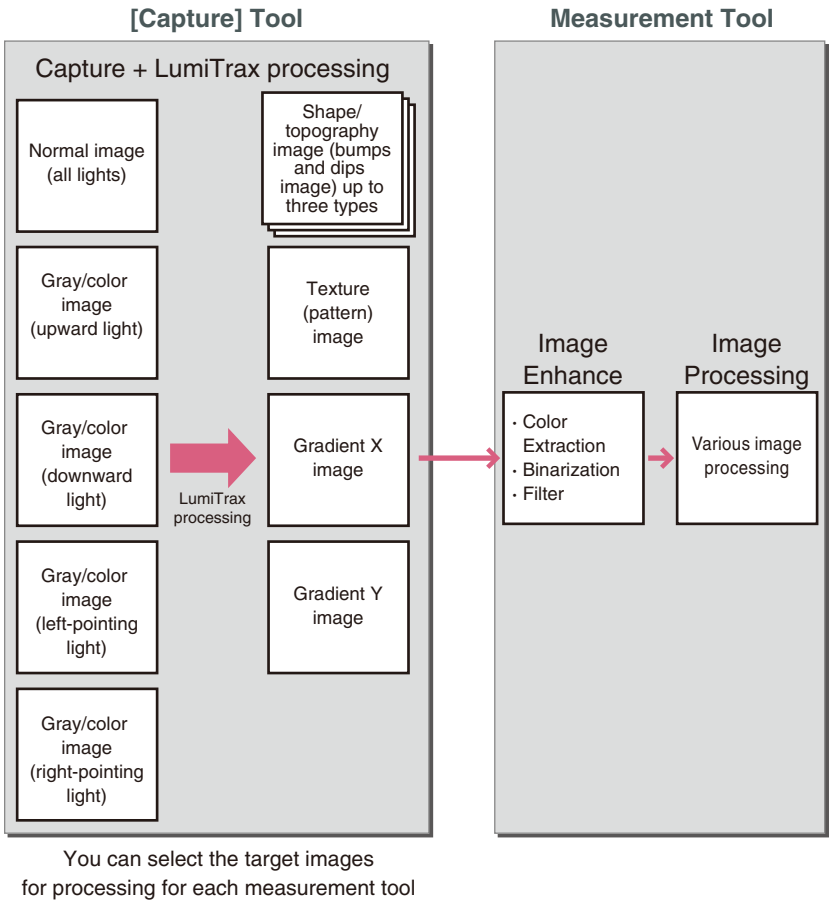
- **Texture pattern image**: Images that show the patterns and colors on the object surface. It is used for detections of printing defects and stains and for recognition of printed characters. It is suitable for inspections where the effects of halation should be suppressed.

- **Shape/topography images (Shape / Topography Image 1 to 3)**: Images that show the surface deformations on the object. It is used for detections of cuts and damages and for recognition of raised or incised characters. It is suitable for inspections where the influence of object surface patterns and colors should be suppressed. When there are several features with different sizes, it is possible to generate three types of shape/topography images (shape/topography image 1 to 3) by using different setting values and use the images for measurement, which is very convenient.



- **Gradient X image**: Images that show the inclination in the X direction of each pixel. With respect to the image, the more the object is tilted to the left, the brighter the image becomes. Conversely, the more the object is tilted to the right, the darker the image becomes.
- **Gradient Y image**: Images that show the inclination in the Y direction of each pixel. With respect to the image, the more the object is tilted upward, the brighter the image becomes. Conversely, the more the object is tilted downward, the darker the image becomes.

Processing flow



MultiSpectrum Mode

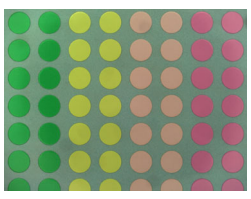
By capturing images with up to eight colors of light and obtaining more detailed color information than a regular color camera, slight differences in color can be detected and the color range can be accurately specified. As a function to select and exclude multiple colors can also be used, stable color extraction is also possible.

Point The MultiSpectrum Mode can be used when a MultiSpectrum light CA-DRM*X is connected.

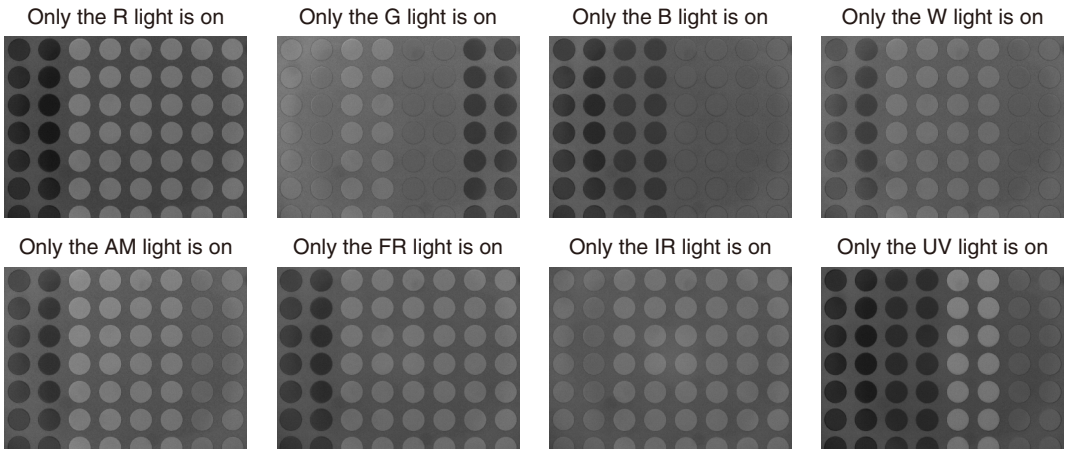
Images that can be generated in MultiSpectrum Mode

The following types of images can be generated in MultiSpectrum Mode. All lighting color images can be used in measurements. The MultiSpectrum Color Image is for displaying on the screen and output for adjustment and checking purposes.

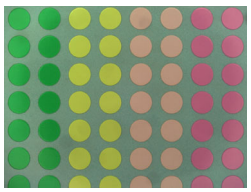
Actual image of an object



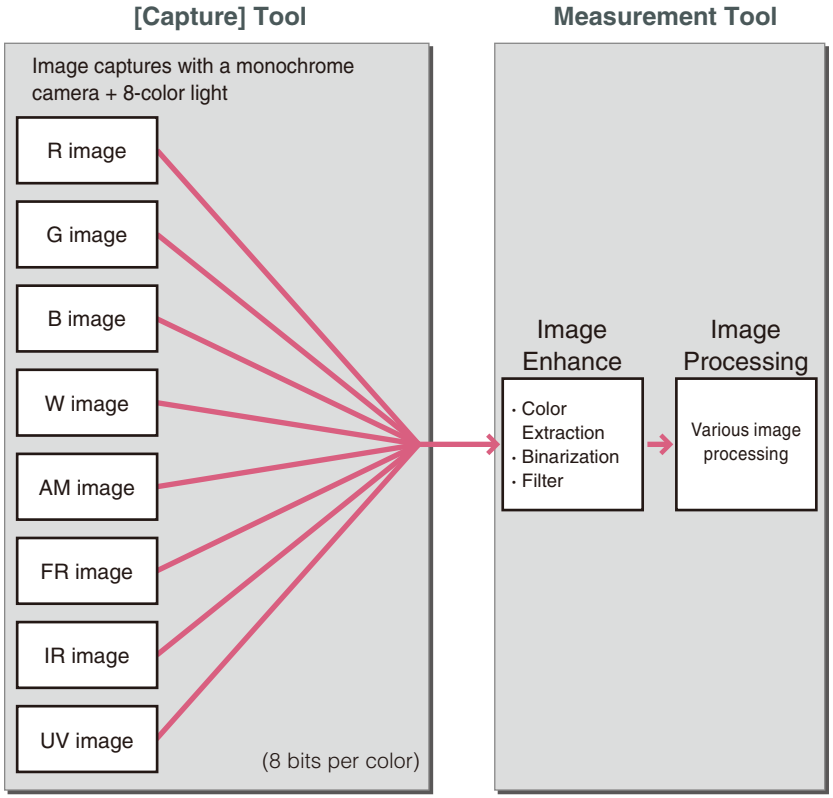
- **Each lighting color image**: These images were obtained by lighting each light color individually.



- **MultiSpectrum color image**: This image is the composite color image created from all lighting color images.



Processing flow

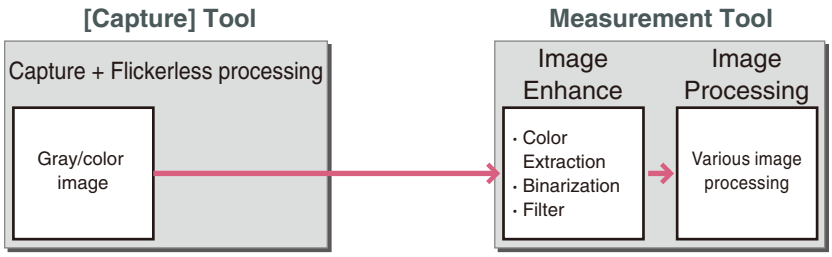


Flickerless Mode

This mode captures very bright images of objects at rest on inspection equipment such as a semi-automatic device, without dazzling the operator.

Point The Flickerless Mode can be used when a high-intensity smart ring light CA-DE*X is connected.

Processing flow

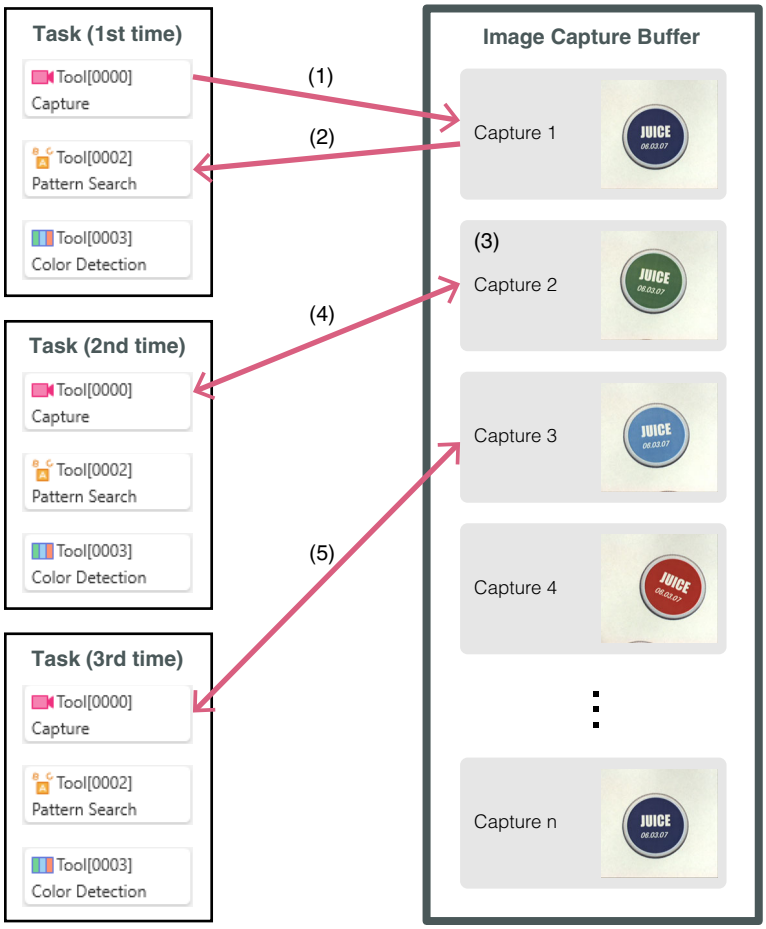


Point

- In Flickerless Mode, multiple images are captured and synthesized into one image. Therefore, this mode cannot be used to capture objects that are moving.
- The Flickerless Mode cannot be used with VS cameras with 15 megapixels or more (VS-L1500CX/MX (when 15M is selected for pixels), VS-S1500CX/MX (when 15M is selected for pixels),VS-C1500CX/MX and VS-C2500CX/MX). Even VS cameras with more than 15 megapixels can be used if the pixel count is set to 5M or less.

Image Capture Buffer

With the Image Capture Buffer, images are captured without waiting for the completion of the task processing. This advance capturing makes it possible to minimize the time in which an object stops in front of the camera even in the case of inspections where the processing of the measurement tool takes time.



(1) If the buffer does not contain a captured image, the Image Capture Buffer function enters the wait-trigger-input state and the first capturing is made by the camera upon a trigger input.

(2) The first image processing of the task is performed with the first captured image.

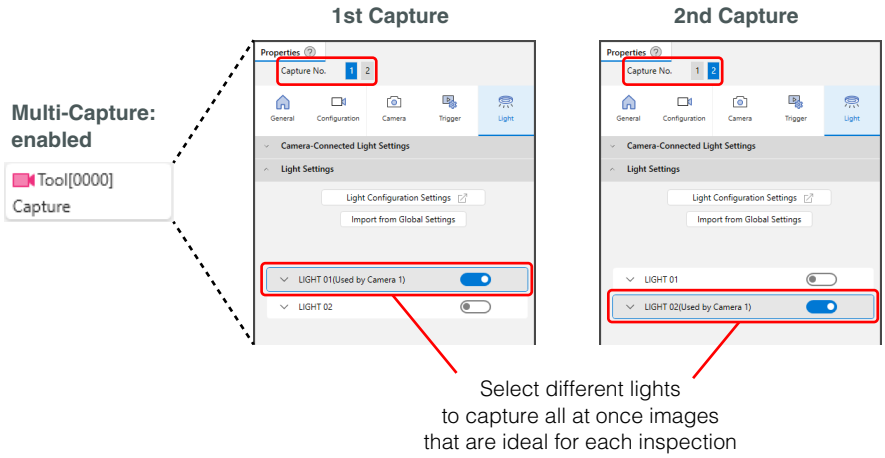
(3) After the first capturing ends, the Image Capture Buffer function enters the wait-trigger-input state so that when there is a trigger input, the second and subsequent capturing is made without waiting for the second execution of the Capture tool.

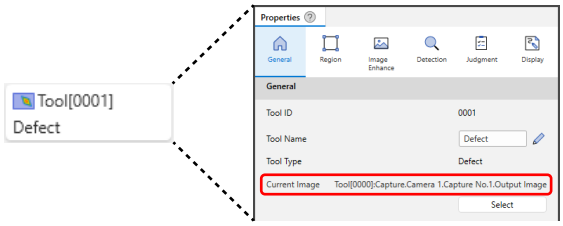
(4) With the execution of the Capture tool, the second captured image is retrieved from the Image Capture Buffer function for the execution of the second image processing of the task.

(5) With the execution of the Capture tool, the third captured image is retrieved from the Image Capture Buffer function for the execution of the third image processing of the task.

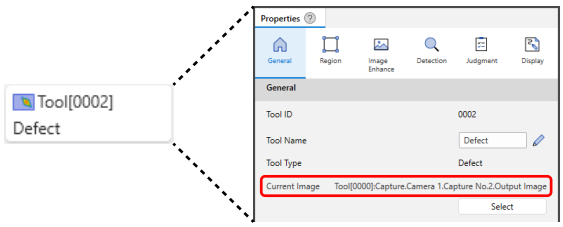
Multi-Capture

This is the capture method where multiple images are captured and they are processed as one measurement. Each capturing can be made with different light settings and capturing conditions. For example, consider a case of object appearance inspection in which some defects can only be detected with a low-angle light and other defects can only be detected with a coaxial light. You can enable the Multi-Capture and configure different light settings for individual rounds of capturing to obtain optimal images for detecting the two types of defects with one trigger.





Select the **1st** captured image as the input image



Select the **2nd** captured image as the input image

Capture (Standard Lighting Mode)

#E002

Outputs captured images as output images.

Properties

Configure the settings of the [Capture] tool in the [Properties] view. The [Properties] view for the [Capture] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments.
Configuration	Set the configuration for the images to capture including the size, position, orientation, and multi-capture of images.
Camera	Configure the quality of the captured images and the setting for background image capture.
Trigger	Configure trigger input conditions.
Light	Configure the brightness of the light used for image capturing and the setting related to turning on the light, as well as the conditions for turning on the light for the case when an external lighting device is used for flashing.

Configuration

Set the configuration for the images to capture including the size, position, orientation, and multi-capture of images.

Configuration Settings

Camera Model

Displays the model of the camera currently connected.

Pixel Count

Select the pixel count of images to be captured by the connected camera.

Point [Pixel Count] is a setting item used when the connected camera is a VS standard zoom smart camera (VS-L*CX/MX) or a VS close-range zoom smart camera (VS-S*CX/MX). This item is not displayed for the VS C-mount smart camera (VS-C*CX/MX).

Size

Select a pixel mode that can be used for the connected camera or specify the values of the width and length.

Point Configurable sizes vary depending on the connected camera.

Custom

When turned ON, the width and height can be further specified within the set pixel count to narrow down the capture area.

Point When the pixel count or size is changed, [Custom] is automatically turned off and the set values of the width and height are initialized.

Field of View Center X / Field of View Center Y

Set the coordinate of the center of the capturing region from within the CMOS sensor region of the camera.

Point [Field of View Center X] and [Field of View Center Y] are setting items used when the connected camera is a VS C-mount smart camera. These items are not displayed for the VS standard zoom smart camera and the VS close-range zoom smart camera.

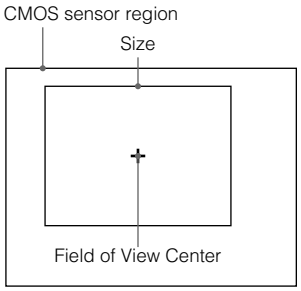


Image Inversion

Select whether to capture images with mirror inversion.

- **None** (default): Images are captured without mirror inversion.
- **Horizontal**: Images are captured horizontally inverted.
- **Vertical**: Images are captured vertically inverted.
- **Horizontal And Vertical**: Images are captured vertically and horizontally inverted.

Point This setting can also be used in combination with Image Rotation.

Image Rotation

Select whether to rotate captured images 90 or -90 degrees.

- **None** (default): Captured images are not rotated.
- **Rotate 90˚**: Captured images are rotated 90 degrees.
- **Rotate -90˚**: Captured images are rotated -90 degrees.

Point
- If Rotate 90° or -90° is enabled, the rotation processing time will be added to the program time.
- This setting can also be used in combination with Image Inversion.

Multi-Capture

Click [Settings], and configure the number of times of capturing of multi-capture in the [Multi-Capture Settings] dialog that is displayed. When you set a capturing count, buttons for switching between capture numbers appear at the top of the [Properties] view. By switching between capture numbers, you can configure properties of the [Capture] tool with respect to each capture number.

Point A larger image memory is required for multi-capture. Watch for the shortage of remaining memory. You can check the image memory usage on the Status Bar.

Camera Attitude

Monitor Camera Attitude

When this item is enabled, the camera angle is acquired from the connected camera and it is output as result data.

Point The Capture tool takes a longer time for processing when [Monitor Camera Attitude] is enabled.

Camera Attitude Setting

Clicking [Settings] displays the [Camera Attitude Verification] dialog. In the [Camera Attitude Verification] dialog, you can check the current installation angle (current value), the reference angle (reference value) at the time of installation, and the relative angle (attitude difference) relative to the reference angle.
→ [Camera Attitude Verification] Dialog

Camera

Configure the quality of the captured images and the setting for background image capture.

Point Point defects and fine lines may occur in the screen due to capturing conditions (such as high camera sensitivity and slow shutter speed) and the ambient temperature. These defects are not due to a faulty device but are phenomena inherent to the structure of the device and the CMOS sensor. When you experience such a phenomenon, lower the ambient temperature, lower the camera sensitivity, raise the shutter speed, or secure enough illuminance by an external auxiliary light. Also, the situation may improve by synchronizing the light and shutter speed.

Capture Settings

Configure the conditions for image capture.

ZoomTrax Setting

When the connected camera is a VS standard zoom smart camera or a VS close-range zoom smart camera, configure ZoomTrax settings for capture settings such as focusing and zoom magnification and field-of-view settings such as the camera attitude. Clicking [ZoomTrax Settings] opens the [ZoomTrax Settings] dialog, in which you can make a new ZoomTrax setting.
→ [ZoomTrax Settings] Dialog

Point

- If a [ZoomTrax Setting] has not been set, a dialog appears in which you choose to create a new ZoomTrax setting or use an existing setting.
  - –To create a new setting, select [Create New], fill out [ZoomTrax Setting No.] and [ZoomTrax Setting Name], and then click [OK]. The [ZoomTrax Settings] dialog appears with default settings.
  - –To use an existing setting, select [Use Existing File] and click [Browse]. In the [Select ZoomTrax Setting] dialog displayed, select a ZoomTrax setting file to use and click [OK]. Then, the [ZoomTrax Settings] dialog is displayed with the ZoomTrax settings of the selected file.
- Click ··· to perform the following operation.
  - –**Browse Files**: Select a ZoomTrax setting file in the [Select ZoomTrax Setting] dialog.

Capture Mode

Select the capture mode to use.

- **Standard Lighting Mode** (default): Outputs captured images as output images.
- **LumiTrax Mode**: Generates shape/topography (bumps and dips) images and texture (pattern) images by analyzing images captured with lighting from different directions.
  → "Capture (LumiTrax Mode)"
- **MultiSpectrum Mode**: Captures images with lighting of up to eight different colors to obtain more detailed color information than ordinary color cameras to enable the detection of subtle color differences and the accurate specification of color ranges.
  → "Capture (MultiSpectrum Mode)"
- **Flickerless Mode**: Turns on and off the light repeatedly in a frequency that human eyes cannot perceive and automatically changes and synchronizes the camera exposure to match this frequency. This makes it possible to capture significantly brighter images compared to those captured with continuous lighting.
  → "Capture (Flickerless Mode)"

Point

If you change the capture mode, unused settings will be initialized.

Exposure Time (ms)

Enter the value of the exposure time for the connected camera. Set this item in accordance with the speed of the flow of objects and lighting conditions. If you set the exposure time tailoring it to faster lines, prepare a light of adequate illuminance needed for capturing.
Shortening the exposure time improves the situation when light reflected from the target object is too strong or the light reception image is blurred because the target object is moving too fast.

Point

When intense light enters the camera during a short exposure time, cameras of some models may have a smear phenomenon (in which a vertical bright stripe appears in the image). If it affects measurement, adjust the aperture or the light.

Exposure Delay (µs)

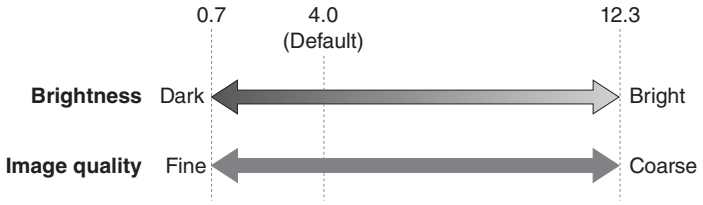
Set a delay time (µs) (default: 0) if you want to delay the start of exposure. For example, in the case of a light that takes time until it reaches the maximum illuminance, set a delay time so that exposure is made at the time of the maximum illuminance.

Sensitivity

Camera sensitivity can be adjusted. To adjust the brightness of images, basically, conditions such as the camera aperture, shutter speed, and lighting are changed. However, in an environment such as a fast-moving line where you cannot improve brightness with only these conditions, adjust the camera sensitivity.

Point

- A higher camera sensitivity makes images brighter overall, but noises become more distinct in images (makes images coarse). Conversely, a lower camera sensitivity makes images darker overall, but it also reduces noises (makes images finer).



(In the case of VS-C160MX)

- The adjustment range of camera sensitivity varies depending on the connected camera.
  - –VS-C160CX/MX, VS-C320CX/MX, and VS-C500CX/MX: 0.7 to 12.3 (default: 4)
  - –VS-C1500CX/MX and VS-C2500CX/MX: 2.2 to 10.7 (default: 4)
  - –VS-L160CX/MX, VS-L320CX/MX, VS-L500CX/MX, VS-L1500CX/MX, VS-S160CX/MX, VS-S320CX/MX, VS-S500CX/MX, and VS-S1500CX/MX: 3.0 to 11.3 (default: 4)

Fine HDR

With this item enabled, you can capture images with an enhanced dynamic range. Fine HDR provides images suitable for processing, even for inspection targets having uneven shines and a mix of bright and dark areas. Clicking [Detailed Settings] displays the [Fine HDR] dialog, where you can change the Fine HDR settings.

→ [Fine HDR] Dialog

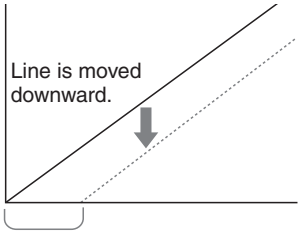
Image Intensity Adjustment

Adjust the balance of image display for low tone areas and high tone areas.

Offset

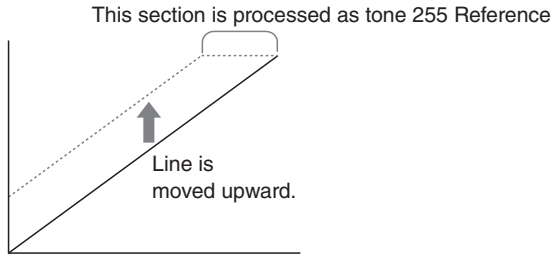
Adjust the lifting (-255 to +255, default: 0) of overall image signal levels.

- To make images darker, specify a negative value to shift the entire line downward. The portion of the line below the Y axis is processed as tone 0.



This section is processed as tone 0

- To make images brighter, specify a positive value to shift the entire line upward. The portion of the line above the maximum value of the Y axis is processed as tone 255.



Gain

Adjust the correction level (0.0 to 7.0, default: 1.0) of the tone gradation.

- To obtain images of a larger gradation, specify a larger value to make the line angle larger.
- To obtain images of a smaller gradation, specify a smaller value to make the line angle smaller.

Gamma Correction

Adjust the balance (0.1 to 5.0, default: 1.0) of the image brightness. A larger value emphasizes brightness changes in darker areas.

Image Capture Buffer (Common within Task)

Make settings related to background image capture.

Point The setting of [Image Capture Buffer (Common within Task)] is shared by different tasks.

Image Buffer Capacity

Specify the number of images to be stored in the buffer between 1 to 1024 (default: 1). The number of images that can be stored depends on the type of cameras used and the amount of free image memory space.

Point If there is insufficient image memory, errors will occur.

Type

Select the image capture buffer operating mode.

- **Fixed** (default): When the number of unprocessed images in the buffer reaches the setting number of captured images, image capture stops.
- **Overwriting**: When the number of unprocessed images in the buffer reaches the setting number of captured images, image capture continues with the oldest images being overwritten.

Trigger

Image capture is made upon the input of an internal/external trigger. Configure trigger input conditions.

Trigger Settings

Trigger Mode

Select the type of triggers to be used.

- **External** (default): Capture is made upon a trigger signal from an external device. Only one time processing is conducted for every trigger input.
- **Internal**: With a trigger interval being set, triggers are generated at a constant interval to prompt capturing.

Point If the device is a simulator, the internal trigger will not operate.

Trigger Source

When [Trigger Mode] is [External], select a trigger source to receive trigger inputs from.

- **Industrial Ethernet Protocol** (default: enabled): With this item enabled, trigger inputs from the communication protocol (EtherNet/IP®, PROFINET, PLC-Link) enabled in [Global Settings] - [Industrial Ethernet Settings] are accepted.
- **Non-Procedural Command** (default: enabled): With this item enabled, trigger inputs from non-procedural commands are accepted.
- **Terminal** (default: enabled): With this item enabled, trigger inputs from input terminals are accepted.
- **OPC UA** (default: enabled): With this item enabled, trigger inputs from OPC UA clients are accepted.

Trigger Cycle (ms)

When [Trigger Mode] is [Internal], enter the cycle (ms) of trigger inputs (1 to 999, default: 1).

Trigger Delay (ms)

If you want to start capturing after a certain period from the input of the selected trigger, set a trigger delay time (0 to 999.999, default: 0).

Wait for Trigger Input

Select whether to wait for a trigger signal input in the capture processing of the [Capture] tool when [Trigger Mode] is [External] (default: enabled). When disabled, capture is made in accordance with the capture processing regardless of trigger signals.
In the case when [Image Buffer Capacity] in [Image Capture Buffer (Common within Task)] is set to 2 or a larger value, the processing is made as described above if the buffer is empty at the start of capturing by the [Capture] tool, but if the buffer contains images that satisfy the processing completion condition, capturing is finished and the next tool is executed regardless of this setting.

Screen Update in Run Mode

Choose whether to update the camera image continuously in the state of waiting for a trigger signal.

- **Trigger**: The image is updated only at a trigger input.
- **Live Image**: The latest image is constantly displayed when waiting for a trigger signal.

Point
- The device must be running for the live image to be provided.
- [Live Image] cannot be used when [Wait for Trigger Input] is disabled.
- In [Live Image] mode, there is a time lag between an external trigger input and the actual capturing of an image, so you should be careful when you capture a moving object.
- [Live Image] is applied when the [Capture] tool that you are editing is running (waiting for a trigger input).

Light

Configure the brightness of the light used for image capturing and the setting related to turning on the light, as well as the conditions for turning on the light for the case when an external lighting device is used for flashing.

Camera-Connected Light Settings

Make settings related to the brightness and lighting of the camera-connected light.

Camera-Connected Light

Enable it when using a camera-connected light.

Light Model

Displays the model of the camera-connected light. Clicking [Import from Global Settings] reads the model of the camera-connected light from the Global Settings.
→ [Global Settings] - [Light Settings] - [Camera-Connected Light Settings]
The applicability of setting items listed below depends on the light model. For details, see "Light settings for individual light models".

Light Settings

Make settings related to the brightness and lighting of the light connected to the environmentally-resistant lighting controller.

Light Configuration Settings

Configure settings for the light configuration used in this [Capture] tool.
→ [Global Settings] - [Light Configuration Settings]
Clicking [Import from Global Settings] loads the information of the light connected to the environmentally-resistant lighting controller from the Global Settings.
→ [Global Settings] - [Light Settings] - [Lighting Controller Settings]

LIGHT n

For each light, specify whether to use it.

Point

- In the case of a VS zoom smart camera that does not use a camera-connected light, the exposure delay is automatically set to 1000 µs when the toggle switch is turned on to use the light connected to the environmentally-resistant lighting controller. This setting is made to cater to network latency that causes lighting delay after a trigger input. The automatic delay setting is made only when [Flash Input Mode] for the enabled light is [Ethernet]. The automatic delay setting is not made in the case of [Terminal].
- The automatically set exposure delay remains 1000 µs after you turn off the toggle switch.

The applicability of setting items listed below depends on the light model. For details, see "Light settings for individual light models".

Light settings for individual light models

The applicability of setting items depends on the light model. Configure settings related to the brightness and lighting with reference to the table below.

	High-intensity smart ring light *1	MultiSpectrum light*2	LumiTrax 400 mm large-size light *3	Light connected via environmentally-resistant lighting controller*4	Light connected via camera-connected light conversion unit*4
Light Settings Source	✓	✓	✓	✓	✓
Light Volume	✓	✓	✓	✓	✓
Volume Limit	-	✓	✓	✓	✓
Continuous Lighting	✓	✓	✓	✓	✓
Output Timing	-	-	-	✓	✓
Lighting Delay (µs)	-	-	-	✓	✓
Output Duration (ms)	-	-	-	✓	✓
Synchronize With Shutter Speed	-	-	-	-	✓
Lighting Color	-	✓	-	-	-
Select from Images	-	✓	-	-	-
Overdrive Lighting	✓	-	-	-	-
Apply Max Brightness	✓	-	-	-	-
Overdrive Factor	✓	-	-	-	-
Control Light Intensity	✓	✓	-	-	-
LED Segment Selection	✓	-	-	-	-

*1: CA-DEW10X/CA-DER10X/CA-DEB10X/CA-DEIR10X

*2: CA-DRM*X

*3: CA-DQW40X

*4: Environmentally-resistant lighting controller (CG-LC100), camera-connected light conversion unit (CG-LC10, CG-LC20)

Light Settings Source

Choose to control the volume, output timing, and other parameters of the light by the program setting or by the environmentally-resistant lighting controller.

- **Program Setting**: Lights are controlled by program settings.
- **Lighting Controller**: Lights are controlled by the environmentally-resistant lighting controller.

Point [Light Settings Source] is displayed only for lights connected to the environmentally-resistant lighting controller (CG-LC100).

Light Volume

Set the brightness of the light (0 to 1023, default: 511). Change this setting in accordance with the [Exposure Time (ms)] setting to ensure the light volume required for image capturing.

Point
- If [Volume Limit] is [ON], this item is limited to 511 when you enter 512 or a larger value.
- If you set the volume to 512 or a larger value when [Volume Limit] is [OFF], beware of damage caused by heat.
- If [Capture Mode] is [MultiSpectrum Mode], set the light volume in [MultiSpectrum Capture Settings].

Volume Limit

Displays the state of light output limitation for preventing the deterioration of the LED light by overheating (default: ON). To disable light output limitation, change the setting in [Global Settings] - [Light Settings] - [Camera-Connected Light Settings].

Point
For the light connected to the camera-connected light conversion unit (CG-LC20), [Volume Limit] will not be displayed.

Continuous Lighting

Enabling this item keeps the light continuously on.

Point
- For the MultiSpectrum light (CA-DRM*X), [Continuous Lighting] is not applicable when [Volume Limit] is OFF.
- If [Capture Settings] -[Fine HDR] on the [Camera] tab is ON, [Continuous Lighting] cannot be used.

Output Timing

Specify the light emission timing in relation to camera operation.

Point
- [Output Timing] is not applicable when [Continuous Lighting] is enabled.
- When CA-DRM*X is connected, [Output Timing] is fixed and cannot be changed.

Lighting Delay (µs)

Set the delay of lighting from the start of capturing (0 to 100000 (µs), default: 0 µs = at the start of capturing).

Output Duration (ms)

Set the duration of lighting (0.1 to 999.9 (ms), default: 100).

Point
[Output Duration (ms)] is not applicable when [Synchronize With Shutter Speed] is enabled.

Synchronize With Shutter Speed

With this setting enabled, the shutter speed (Exposure Time (ms)) and the output duration are interlocked.

Point
When [Synchronize With Shutter Speed] is enabled, the output duration is clipped to the maximum value of 999.9 ms, even if [Exposure Time (ms)] is set to 1000 ms or longer.

Lighting Color

Specify the color of lighting (default: W). Typically, W is used. But you can select a color similar to the work to eliminate unwanted features of the work surface or a color complementary to the work to make features of the work surface more distinct.

- **UV**: Ultraviolet
- **B**: Blue
- **G**: Green
- **AM**: Amber
- **R**: Red
- **FR**: Far-red
- **IR**: Infrared
- **W**: White

Point

- [Lighting Color] is applicable only when a MultiSpectrum light is used.
- With a visible light (B, G, AM, R, or W), you can obtain an image that emphasizes the color complementary to the selected lighting color and eliminates the color similar to the selected lighting color.
- An infrared light (IR or FR) has a higher transmission ratio and less scattering than visible lights. Using these characteristics of an infrared light, you can obtain an image that highlights only the black letters in the pictorial pattern of the work or an image that highlights foreign objects in a liquid.
- The ultraviolet light (UV) has greater scattering. With this characteristic, you can obtain an image that emphasizes small defects that are difficult to capture with a visible light. By applying a luminous paint on the work beforehand, you can obtain an image using the excitation effect of the ultraviolet light.
- The peak frequency of each lighting color is as follows:
  Approx. 405 nm (UV), Approx. 457 nm (B), Approx. 527 nm (G), Approx. 600 nm (AM), Approx. 660 nm (R), Approx. 730 nm (FR), Approx. 860 nm (IR), Approx. 450 nm (W)

Select from Images

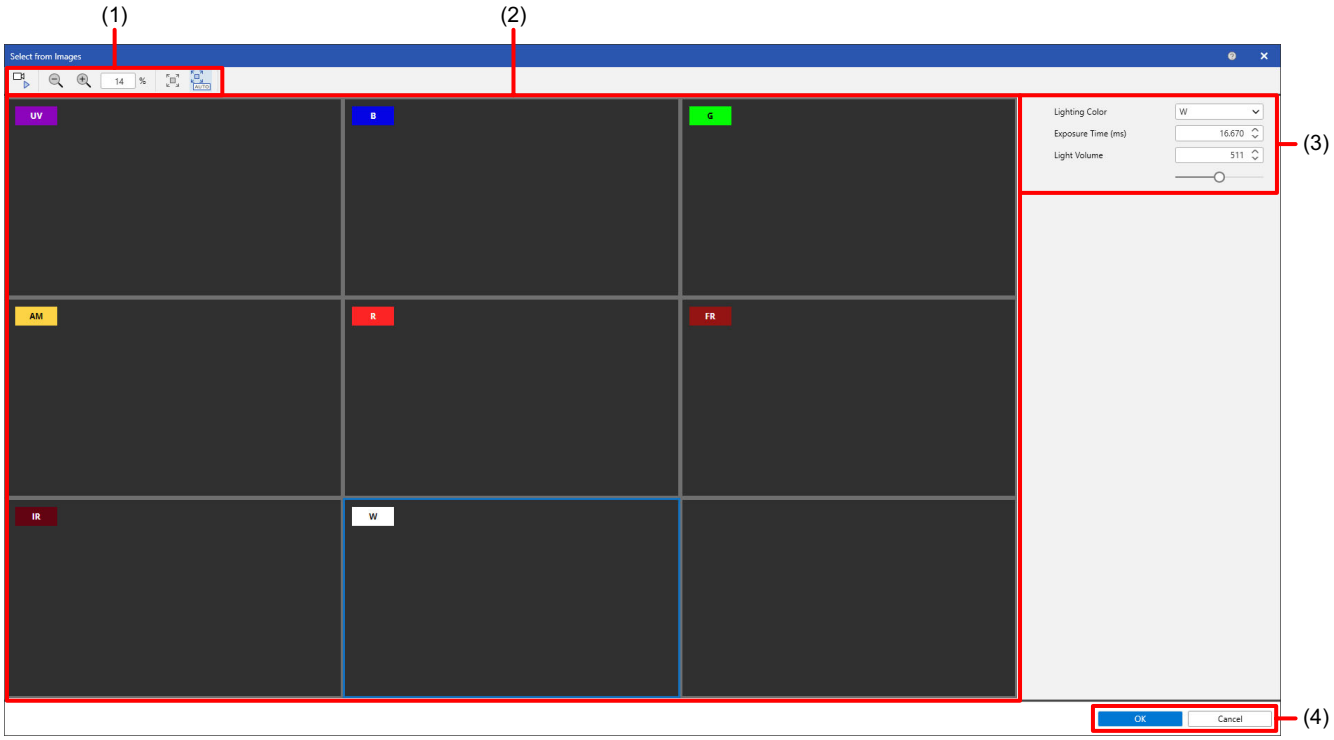
Clicking this button opens the [Select from Images] dialog. Images of lighting colors are displayed. You can select a light to use, while changing the volume and exposure time of the lighting color to confirm the resulting lighting condition.

Point

- [Select from Images] is applicable only when a MultiSpectrum light is used.
- The [Select from Images] cannot be used if the device is [Simulator].

[Select from Images] dialog

In the image display area, select the image of a lighting color and change the light setting. Clicking [OK] sets the lighting color selected in the image display area as the lighting color to be used for image capturing.



(1) Toolbar

– **(Trigger)**: Clicking this button makes a trigger input.

– **(Zoom Out / Zoom In / Zoom setting)**: Clicking this button allows you to change the zoom rate. You can also set the zoom rate by specifying a number.

– **(Fit / Auto Fit)**: Clicking this button automatically adjusts the zoom rate so that the whole displayed image fits in the camera image. With Auto Fit enabled, the zoom rate of the displayed image automatically changes in accordance with the change of the display area size.

(2) Camera image

An image is displayed for each lighting color. Selecting an image, you can change the setting of the selected lighting color.

(3) Settings

– **Lighting Color**: Specify the color of lighting (default: W).

– **Exposure Time (ms)**: Select or enter a value of the exposure time for the connected camera.

– **Light Volume**: Set the brightness of the light (0 to 1023, default: 511).

(4) OK/Cancel

– **OK**: Saves the settings.

– **Cancel**: Discards the settings.

Overdrive Lighting

By enabling this item, you can instantaneously brighten the light by letting current with a current value exceeding that of standard lighting flow for a certain period of time (default: OFF). Select [Apply Max Brightness] or [Overdrive Factor] as the overdrive method.

Point
- [Overdrive Lighting] is applicable only when a high-intensity smart ring light is used.
- When [Overdrive Lighting] is enabled, [Continuous Lighting] cannot be used.
- After overdrive is turned on, the lighting will be prohibited for the time required for heat dissipation and recharging of the lighting. During this time, Trigger Ready will be turned off and trigger inputs will be ignored.
- [Overdrive Lighting] cannot be enabled if the following setting is made for [Fine HDR].
  –[Capture Image Count] is set to a number other than 1.
  –[Stack Average] is enabled in [Fine HDR].
  –[Ambient Light Cut] is enabled in [Fine HDR].

Apply Max Brightness

With this item enabled, overdrive is made by setting an electric current that makes the light radiate the maximum illuminance.

Point When [Apply Max Brightness] is enabled, [Overdrive Factor] cannot be configured.

Overdrive Factor

Specify the multiplication factor of overdrive lighting (2 to 10, default: 2).

Point To specify [Overdrive Factor], you have to disable [Apply Max Brightness].

Check Lighting Time

Click the button to display the [Check Lighting Time] dialog box.

– **Lighting Time (ms)**: Displays the lighting time calculated from the exposure time.
– **Lighting Off Time (ms)**: Displays the lighting off time calculated from the lighting time and the [Overdrive Factor].

Control Light Intensity

When this item is enabled, light intensity is kept constant by automatic control. The feedback control of light intensity mitigates the fluctuation of light intensity caused by temperature and aging. When [Control Light Intensity] is turned on, the light intensity is controlled under a certain limitation. So, turn it off if the light intensity is not high enough.

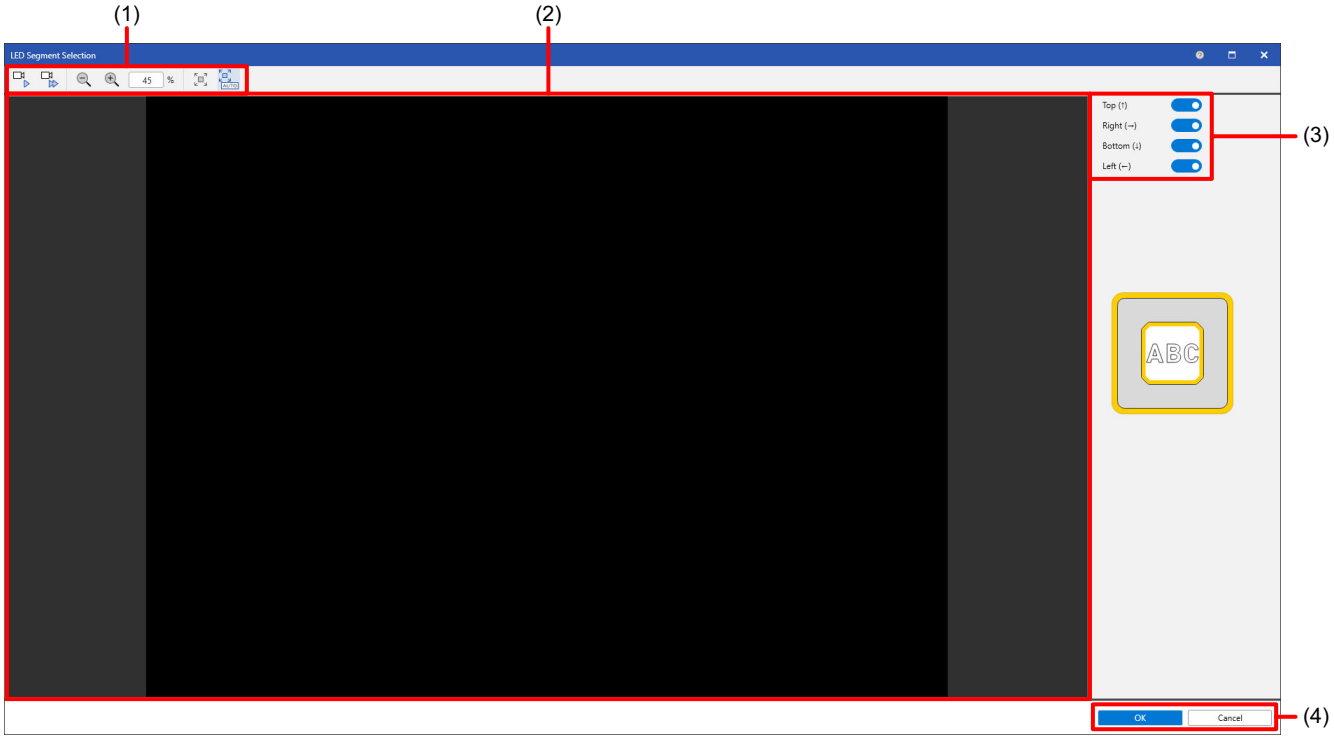
Point [Control Light Intensity] is applicable when a high-intensity smart ring light (CA-DE*10X) or MultiSpectrum light (CA-DRM*X) is connected.

LED Segment Selection

Clicking the [Settings] button opens the [LED Segment Selection] dialog for selecting the position of the LED to be lighted for capturing.

Point [LED Segment Selection] is applicable when a high-intensity smart ring light is connected.

[LED Segment Selection] dialog



(1) Toolbar

– **(Trigger / Continuous Trigger)**: Clicking this button inputs a trigger.

– **(Zoom Out / Zoom In / Zoom setting)**: Clicking this button allows you to change the zoom rate. You can also set the zoom rate by specifying a number.

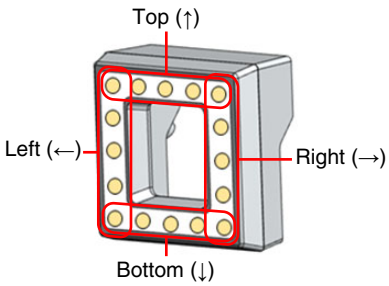
– **(Fit / Auto Fit)**: Clicking this button automatically adjusts the zoom rate so that the image fits in the image display area. With Auto Fit enabled, the zoom rate of the displayed image automatically changes in accordance with the change of the display area size.

(2) Camera image

The screen displays a real-time image showing the lighting of the LED of the position currently selected by [LED Segment Selection].

(3) Settings

– **LED Segment Selection**: Enable the toggle switch of lighting positions (Top (↑), Right (→), Bottom (↓), and Left (←)).



(4) OK/Cancel

– **OK**: Saves the settings.

– **Cancel**: Discards the settings.

External Flash

Specify the conditions for the case when flash is used for image capturing with an external lighting device. Enable the external flash terminal number to be used, and make settings related to flashing.

Terminal Assignment

Displays the terminal assigned with the function as configured in Global Settings.
→ [Global Settings] - [Terminal I/O Settings]

Lighting Delay (µs)

Set the delay of flashing from the start of capturing (0 to 100000 (µs), default: 0 µs = at the start of capturing).

Output Duration (ms)

Set the duration of flashing (0.1 to 999.9 (ms), default: 100).

Point [Output Duration (ms)] is not applicable when [Synchronize With Shutter Speed] is enabled.

Synchronize With Shutter Speed

With this setting enabled, the shutter speed (Exposure Time (ms)) and the output duration are interlocked.

Point When [Synchronize With Shutter Speed] is enabled, the output duration is clipped to the maximum value of 999.9 ms, even if [Exposure Time (ms)] is set to 1000 ms or longer.

Capture (LumiTrax Mode)

#E003

Generates shape/topography (bumps and dips) images and texture (pattern) images by analyzing images captured with lighting from different directions. This mode eliminates the effect of variations in works and the ambient environment, which hinder stable inspection, to enable measurement focusing on shapes and surface textures of works.

Cameras compatible with LumiTrax Mode

- **VS standard zoom smart camera** VS-L*CX/MX
- **VS close-range zoom smart camera** VS-S*CX/MX
- **VS C-mount smart camera** VS-C*CX/MX

Lights compatible with LumiTrax Mode

- **High-intensity smart ring light** CA-DE*10X
- **MultiSpectrum light** CA-DRM*X
- **LumiTrax 400 mm large-size light** CA-DQW40X

Point

- The LumiTrax Mode cannot be used for lights connected via the environmentally-resistant lighting controller (CG-LC100) or the camera-connected light conversion unit (CG-LC10, CG-LC20).
- The MultiSpectrum light cannot be used when using a VS camera with PoE power supply.

Properties

Make the setting of the [Capture] tool in the [Properties] view. The [Properties] view for the [Capture] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments.
Configuration	Set the configuration of captured images including the size, position, orientation, and multi-capture of images.
Camera	Configure the quality of the captured images and the setting for background image capture.
LumiTrax	Configure the lighting position and image capturing settings for image capturing in LumiTrax Mode.
Processed Image	Select the image types to be captured in LumiTrax Mode, and configure the capturing conditions for the image types to be captured.
Trigger	Configure trigger input conditions.
Light	Configure the brightness of the light used for image capturing and the setting related to turning on the light, as well as the conditions for turning on the light for the case when an external lighting device is used for flashing.

Point

- [General], [Configuration], and [Trigger] are the same as for the case of [Standard Lighting Mode].
- If you select the [Execute Capture Only] check box and click on the (Capture) button at the bottom of the [Properties] view when performing Multi-Capture, only image capture is performed without measuring.

Configuration

Set the configuration of captured images including the size, position, orientation, and multi-capture of images.

Point

The setting items in the [Configuration] tab are the same as for the case of [Standard Lighting Mode]. For details, see [Configuration] of [Standard Lighting Mode].

Camera

Configure the quality of the captured images and the setting for background image capture.
To capture images in LumiTrax Mode, select [LumiTrax Mode] as [Capture Mode]. Selecting [LumiTrax Mode] adds the [LumiTrax] and [Processed Image] tabs in the [Properties] view.

Point

- [Fine HDR] cannot be used in [LumiTrax Mode].
- Other setting items in the [Camera] tab, as well as [Image Capture Buffer] are the same as for the case of [Standard Lighting Mode]. For details, see [Camera] of [Standard Lighting Mode].

LumiTrax

For image capturing in LumiTrax Mode, configure the lighting position and tracking of moving objects.

LumiTrax Capture Settings

Lighting Position Adjustment

Adjust the lighting position (Top, Bottom, Left, Right). Click [Lighting Position Adjustment] to open the [Lighting Position Adjustment] dialog, and adjust the lighting position of the light to its installation orientation.
→ [Lighting Position Adjustment] Dialog

Track Moving Object

Enable this item if the target works are moving at the time of image capturing. When this setting item is enabled, LumiTrax Mode capturing is made with the tracking of the moving object. In the [Track Moving Object] dialog, which appears when [Detailed Settings] is clicked, configure the pattern region, search region, and pattern detection condition for tracking works that move.
→ [Track Moving Object] Dialog

Point

- In LumiTrax Mode with [Track Moving Object] enabled, additional images are captured for the calculation of the movement of moving works, and LumiTrax processing is made based on the position change of the pattern specified within the image. This way, the LumiTrax Mode can be used even if works move within the screen area during the capturing period.
- In order to capture additional images for the calculation of the movement of moving works, a larger image memory is required. Watch for the amount of remaining image memory.

Ambient Light Cut

With this item enabled, the impact of the ambient light on the measurement is mitigated.

Point With [Ambient Light Cut] enabled, an additional image is taken to capture the ambient light, and the element of ambient light is removed based on that image. A larger image memory is required due to this additional image capturing. Watch for the amount of remaining image memory.

Lighting Width

Specify the width of each lighting. Specify a narrower width if halation occurs at the same position in multiple images.

- **Standard** (default)
- **Narrow**

Point [Lighting Width] is applicable only when a LumiTrax 400 mm large-size light (CA-DQW40X) is used.

Processed Image

Select the image types to be captured in LumiTrax Mode, and configure the capturing conditions for the image types to be captured.
→ "Images that Can be Generated with LumiTrax Mode"

List of captured image types

The list of image types captured in LumiTrax Mode is displayed. In default setting, [Normal Image], [Shape / Topography Image 1], and [Texture Pattern Image] are displayed. The images of the types listed here can be captured in LumiTrax Mode. Except for [Normal Image], you can configure the capturing conditions of each image type by opening the accordion menu.

- Shape / Topography Image 1, 2, 3
- Texture Pattern Image
- Gradient X Image, Gradient Y Image

To change image types to be captured, select an image type in the [Add/Delete Images] dialog, which appears when you click [Add].

Add

Click this button to display the [Add/Delete Images] dialog. The image types that can be captured in LumiTrax Mode are displayed in a tree format. Select the check boxes of image types and click [OK] to update the list of image types to be captured.

Point Select at least one image type by the check box. You cannot leave all check boxes unselected.

Shape / Topography Image 1, 2, 3

Configure the conditions for capturing shape/topography images.

Easy Setup Navigation

Click this button to open the [Easy Setup Navigation] dialog. In the [Easy Setup Navigation] dialog, you can configure capturing conditions easily just by selecting the best image among those captured in different conditions.
→ [Easy Setup Navigation] Dialog

Feature Size (pixel)

Specify the size (1 to 999, default: 4) of the feature (scratch, dent, letter, etc.) that you want to highlight.

Reference A graphic (purple rectangle) of the specified feature size appears over the image in the [Image Viewer].

Feature Size Margin

Specify the size margin of the feature to be highlighted (0 to 5, default: 2). Setting a smaller value only highlights features of sizes near [Feature Size], and setting a larger value highlights features of sizes not near [Feature Size] as well.

Reference A graphic (orange rectangle) of the specified size margin appears over the image in the [Image Viewer].

Contrast

Adjust the contrast (0.1 to 9.9, default: 1.0) of images. A larger value provides a stronger contrast of images.

Level

Adjust the overall brightness (0 to 255, default: 128) of shape/topography images.

Noise Cut (tone)

This feature eliminates slight background noises. Noises equal to or smaller than the specified tone (0 to 255, default: 0) are removed.

Texture Pattern Cut

Removes the effect of patterns and printing on the work surface. Use this feature in the inspection of scratches or dents if the printing on the work surface is distinct.

- **None** (default)
- **Weak**
- **Strong**
- **Very Strong**

Shape/Gradient Image Common Settings

Point The [Shape/Gradient Image Common Settings] contains settings shared by the Shape / Topography Image 1, Shape / Topography Image 2, Shape / Topography Image 3, Gradient X Image, and Gradient Y Image. A change of a setting item is reflected to the other images as well.

Halation Cut (Common)

Specify the degree of halation removal.

– **None** (default)
– **Weak**
– **Strong**
– **Very Strong**

Directional Emphasis (Common)
Highlights concave and convex points in the specified direction and withholds them in the other direction. Use this feature when concave and convex points to be examined have directionality.
– **None** (default)
– **X Direction**
– **Y Direction**

Emphasis Degree (Common)
Specify the degree of highlighting when using [Directional Emphasis].
– **Weak**
– **Strong** (default)
– **Very Strong**

Texture Pattern Image

Configure the conditions for capturing texture pattern images.

Halation Cut

Specify the degree of halation removal.
• **None**
• **Weak**
• **Strong** (default)
• **Very Strong**

Contrast

Adjust the contrast (0.1 to 9.9, default: 1.0) of images. A larger value provides a stronger contrast of images.

Gradient X Image, Gradient Y Image

Configure the conditions for capturing gradient X image and gradient Y image.

Halation Cut (Common)

Specify the degree of halation removal.
• **None** (default)
• **Weak**
• **Strong**
• **Very Strong**

Directional Emphasis (Common)

Highlights concave and convex points in the specified direction and withholds them in the other direction. Use this feature when concave and convex points to be examined have directionality.
• **None** (default)

- **X Direction**
- **Y Direction**

Emphasis Degree (Common)

Specify the degree of highlighting when using [Directional Emphasis].

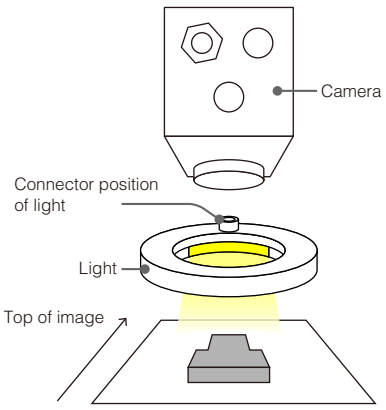
- **Weak**
- **Strong** (default)
- **Very Strong**

[Lighting Position Adjustment] Dialog

In the [Lighting Position Adjustment] dialog, adjust the lighting position in accordance with the installation orientation of the light.

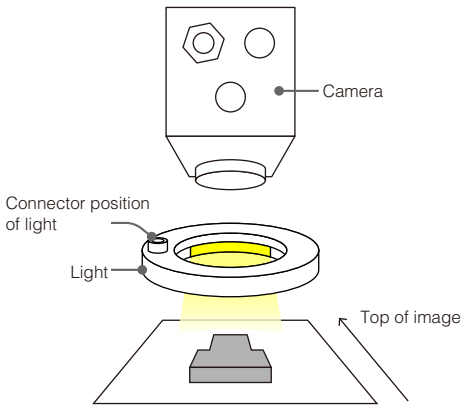
Point [Lighting Position Adjustment] is used when the orientation of the light is not aligned with the camera. By rotating the lighting position (-90˚, +90˚, or +180˚), you can capture images with correct partial lighting.

Orientation aligned between camera and light



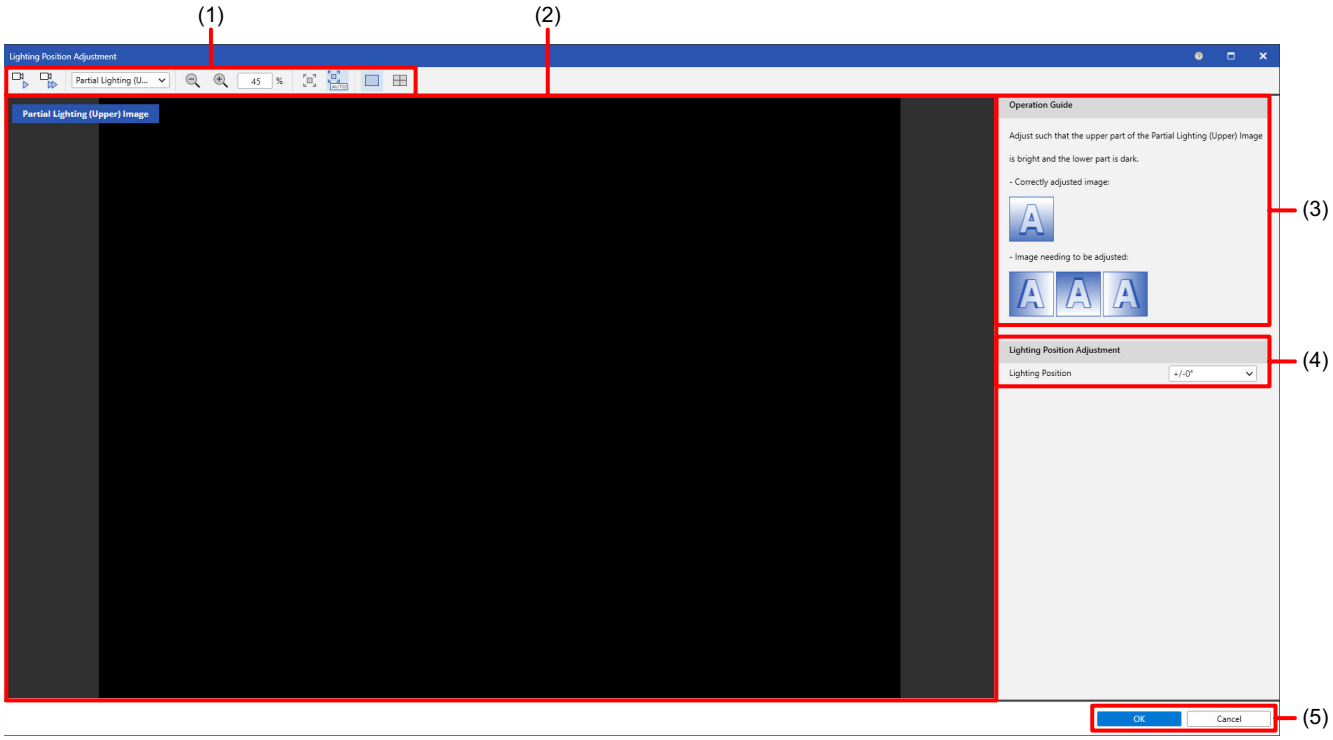
Standard Partial Lighting (Upper) position

Orientation not aligned between camera and light



Partial Lighting (Upper) position with +90° rotation

Screen details



(1) Toolbar

- **(Trigger / Continuous Trigger)**: Clicking this button inputs a trigger.
- **(Switch Displayed Image)**: From the drop-down menu, select the image of the lighting position to be adjusted (partial lighting (upper) image, partial lighting (right) image, partial lighting (lower) image, or partial lighting (left) image) to display the corresponding image in the camera image.
- **(Zoom Out / Zoom In / Zoom setting)**: Clicking these buttons changes the zoom rate of the displayed image. You can also set the zoom rate by specifying a number.
- **(Fit / Auto Fit)**: Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.
- **(Switch Screens)**: Change the number of images (1 or 4 images) displayed in the camera image. With the 4-screen setting, all lighting position images can be displayed.

(2) Camera image

The image selected by [Display Image] on the toolbar is displayed. Property changes are reflected to the camera image.

(3) Operation Guide

Operation guide of lighting position adjustment. Adjust the lighting angle of each lighting position with reference to this guide.

(4) Properties

Setting properties of lighting position adjustment.

→ "Properties of lighting position adjustment"

(5) OK/Cancel

– **OK**: Saves the settings.
– **Cancel**: Discards the settings.

Properties of lighting position adjustment

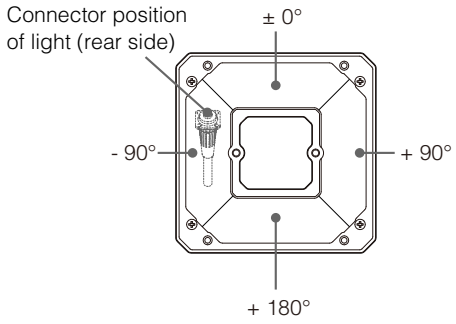
Switch to the partial lighting image to be adjusted in [Display Image] on the toolbar and follow the operation guide to adjust the lighting position according to the installation position.

Lighting Position

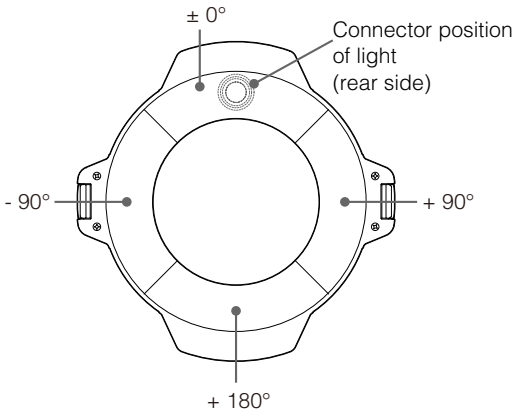
Select the angle of the light to be turned on in accordance with the partial lighting image being displayed.

- **-90˚**: Turns on the light at the position of -90˚ from the light connector.
- **±0˚**: Turns on the light at the position of the light connector.
- **+90˚**: Turns on the light at the position of +90˚ from the light connector.
- **+180˚**: Turns on the light at the position of +180˚ from the light connector.

High-Intensity Smart Ring Light

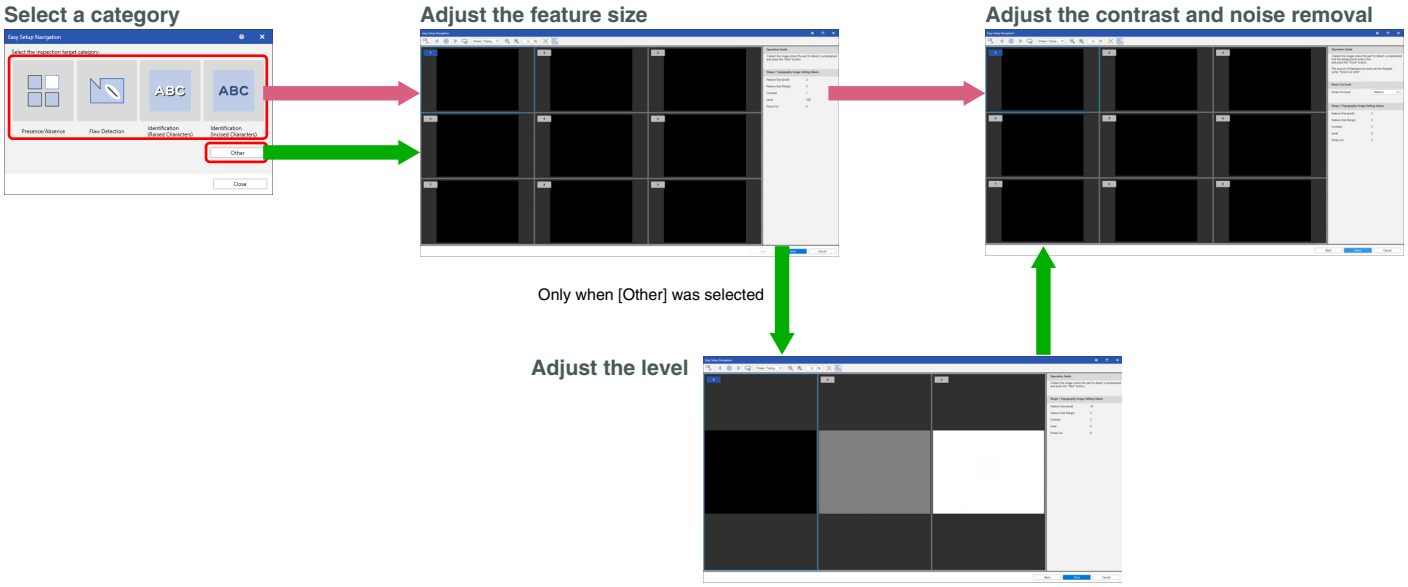


MultiSpectrum Light



[Easy Setup Navigation] Dialog

In the [Easy Setup Navigation] dialog, you can configure capturing conditions easily just by selecting the best image among those captured in different conditions.



Point The [Adjust the level] step can be configured only when [Other] is selected as category.

Select a category

Select a category for the inspection that uses the captured shape/topography image.

Presence/Absence

Select this category if the image is used as an input of a tool that makes area search, pattern search, region detection, or identification of a specific pattern.

Flaw Detection

Select this category if the image is used as an input of a tool that detects scratches and smears.

Identification (Raised Characters)

Select this category if the image is used as an input of a tool that identifies convex character strings (raised characters).

Identification (Incised Characters)

Select this category if the image is used as an input of a tool that identifies concave character strings (incised characters).

Other

Select this category if the image is used as an input of a tool that does not belong to any of the above category. You can adjust the brightness level, so this category is suitable when obtaining a shape/topography image from a dark image.

Point Depending on the selected category, different parameters of capture conditions for candidate images are displayed in each step.

After selecting a category, the [Adjust the feature size] step is displayed.

Adjust the feature size

Among nine candidate images of different feature size settings, select the image that highlights the desired portion best.
You can find the setting value of the feature size of the selected image in [Shape / Topography Image Setting Values].

Reference From the toolbar ( ) at the top of the dialog, you can display archived images and simulation images to update the candidate image.

Clicking [Next] displays the [Adjust the level] step or the [Adjust the contrast and noise removal] step.

Point The [Adjust the level] step is displayed only when [Other] is selected as category.

Adjust the level

Among three candidate images of different brightness, select the image that highlights the desired portion best.

You can find the setting value of the level of the selected image in [Shape / Topography Image Setting Values].

Reference From the toolbar ( ) at the top of the dialog, you can display archived images and simulation images to update the candidate image.

Clicking [Next] displays the [Adjust the contrast and noise removal] step.

Adjust the contrast and noise removal

Among nine images of different contrast settings, select the image that highlights the desired portion best.

Reference From the toolbar ( ) at the top of the dialog, you can display archived images and simulation images to update the candidate image.

Noise Cut Level

Adjust the noise tone level to be removed from the selected image.
Clicking [Done] saves the settings and close the [Easy Setup Navigation] dialog.

Trigger

Configure trigger input conditions.

Point The setting items in the [Trigger] tab are the same as for the case of [Standard Lighting Mode]. For details, see [Trigger] of [Standard Lighting Mode].

Light

Configure the brightness of the light used for image capturing and the setting related to turning on the light, as well as the conditions for turning on the light for the case when an external lighting device is used for flashing.

Point The setting items in the [Light] tab are the same as for the case of [Standard Lighting Mode]. For details, see [Light] of [Standard Lighting Mode].

Capture (MultiSpectrum Mode)

#E004

In this mode, images are captured with lighting of up to eight different colors to obtain more detailed color information than ordinary color cameras to enable the detection of subtle color differences and the accurate specification of color ranges. You can use functions for selecting/deselecting multiple colors, so stable color extraction is also possible.

MultiSpectrum Mode compatible camera

- **VS standard zoom smart camera** VS-L*MX
- **VS close-range zoom smart camera** VS-S*MX
- **VS C-mount smart camera** VS-C*MX

MultiSpectrum Mode compatible light

- **MultiSpectrum light** CA-DRM*X

Point

- The MultiSpectrum Mode cannot be used for lights connected via the environmentally-resistant lighting controller (CG-LC100) or the camera-connected light conversion unit (CG-LC10, CG-LC20).
- A MultiSpectrum light cannot be used when using a VS camera with PoE power supply.

Properties

Make the setting of the [Capture] tool in the [Properties] view. The [Properties] view for the [Capture] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments.
Configuration	Set the configuration of captured images including the size, position, orientation, and multi-capture of images.
Camera	Configure the quality of the captured images and the setting for background image capture.
MultiSpectrum	Configure the light volume for each lighting color of the MultiSpectrum light.
Processed Image	From the list of images, select the image of the target lighting color for capturing in MultiSpectrum Mode to display it in the [Image Viewer], and check the setting condition of the MultiSpectrum Capture Settings.
Trigger	Configure trigger input conditions.
Light	Configure the brightness of the light used for image capturing and the setting related to turning on the light, as well as the conditions for turning on the light for the case when an external lighting device is used for flashing.

Point

- [General], [Configuration], and [Trigger] are the same as for the case of [Standard Lighting Mode].
- If you select the [Execute Capture Only] check box and click on the (Capture) button at the bottom of the [Properties] view when performing Multi-Capture, only image capture is performed without measuring.

Camera

Configure the quality of the captured images and the setting for background image capture.
To capture images in MultiSpectrum Mode, select [MultiSpectrum Mode] as [Capture Mode]. Selecting [MultiSpectrum Mode] adds the [MultiSpectrum] and [Processed Image] tabs in the [Properties] view.

Point

- [Fine HDR] cannot be used in [MultiSpectrum Mode].
- Other setting items in the [Camera] tab, as well as [Image Capture Buffer] are the same as for the case of [Standard Lighting Mode]. For details, see [Camera] of [Standard Lighting Mode].

MultiSpectrum

Configure the light volume for each lighting color of the MultiSpectrum light.

MultiSpectrum Capture Settings

Light Volume

When [Specify Individually] is disabled, select the common brightness of all lighting colors of the MultiSpectrum light (0 to 1023, default: 511). For correct color identification, you need to adjust the light to a proper volume that does not cause overexposure or underexposure.

Point

When CA-DRM10X or CA-DRM20X is used in MultiSpectrum Mode or Standard Lighting Mode, the volume is restricted to 700 or under.

Specify Individually

With this item enabled, you can specify the volume (0 to 1023, default: 511) of each lighting color individually.

Point

- When CA-DRM10X or CA-DRM20X is used in MultiSpectrum Mode or Standard Lighting Mode, the volume is restricted to 700 or under.
- You cannot set the volume of a lighting color that is disabled in [Lighting Color Selection].

Track Moving Object

Enable this item if the target works are moving at the time of image capturing. When this setting item is enabled, MultiSpectrum Mode capturing is made with the tracking of the moving object. In the [Track Moving Object] dialog, which appears when [Detailed Settings] is clicked, configure the pattern region, search region, and pattern detection condition for tracking works that move.
→ "[Track Moving Object] Dialog"

Point
- In MultiSpectrum Mode with [Track Moving Object] enabled, additional images are captured for the calculation of the movement of moving works, and MultiSpectrum processing is made based on the position change of the pattern specified within the image. This way, the MultiSpectrum Mode can be used even if works move within the screen area during the capturing period.
- In order to capture additional images for the calculation of the movement of moving works, a larger image memory is required. Watch for the amount of remaining image memory.

Ambient Light Cut

With this item enabled, the impact of the ambient light on the measurement is mitigated.

Point
With [Ambient Light Cut] enabled, an additional image is taken to capture the ambient light, and the element of ambient light is removed based on that image. A larger image memory is required due to this additional image capturing. Watch for the amount of remaining image memory.

Output MultiSpectrum Color Images

Enabling this setting outputs a color image that combines individual color images.

Lighting Color Selection

Select the lighting colors to be used for capturing in MultiSpectrum Mode. Click [Lighting Color Selection] to open the [Lighting Color Selection Settings] dialog, and enable the toggle switches of the lighting colors to be used in capturing.
[Estimated Capture Time (ms)] indicates the estimated time required to capture images with the enabled lighting colors.

Point
- You cannot disable all colors.
- If you disable a visible lighting color (B, G, AM or R), captured images may not represent the true coloration.
- Some of the time required for measurement is not included in [Estimated Capture Time (ms)].

Processed Image

From the list of images, select the image of the target lighting color for capturing in MultiSpectrum Mode to display it in the [Image Viewer], and check the setting condition of [MultiSpectrum Capture Settings].

Point
- The list of images includes only those selected by [Lighting Color Selection].
- The image selection status is represented in [Display Image] on the toolbar of the [Image Viewer].

Trigger

Configure trigger input conditions.

Point The setting items in the [Trigger] tab are the same as for the case of [Standard Lighting Mode]. For details, see [Trigger] of [Standard Lighting Mode].

Light

Configure the brightness of the light used for image capturing and the setting related to turning on the light, as well as the conditions for turning on the light for the case when an external lighting device is used for flashing.

Point The setting items in the [Light] tab are the same as for the case of [Standard Lighting Mode]. For details, see [Light] of [Standard Lighting Mode].

Capture (Flickerless Mode)

#E005

In this mode, the light is turned on and off repeatedly in a frequency that humans cannot recognize and the camera exposure is automatically changed in synchronization with the frequency. This makes it possible to capture significantly brighter images compared to those captured with continuous lighting.

Cameras compatible with Flickerless Mode

- **VS standard zoom smart camera** VS-L*CX/MX
- **VS close-range zoom smart camera** VS-S*CX/MX
- **VS C-mount smart camera** VS-C*CX/MX

Lights compatible with Flickerless Mode

- **High-intensity smart ring light** CA-DE*10X

Point

- The Flickerless Mode cannot be used for lights connected via the environmentally-resistant lighting controller (CG-LC100) or the camera-connected light conversion unit (CG-LC10, CG-LC20).
- The Flickerless Mode cannot be used for VS cameras of 15 megapixels or more (VS-L1500CX/MX, VS-S1500CX/MX, VS-C1500CX/MX, and VS-C2500CX/MX).

Properties

Make the setting of the [Capture] tool in the [Properties] view. The [Properties] view for the [Capture] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments.
Configuration	Set the configuration of captured images including the size, position, orientation, and multi-capture of images.
Camera	Configure the quality of the captured images and the setting for background image capture.
Trigger	Configure trigger input conditions.
Light	Configure the brightness of the light used for image capturing and the setting related to turning on the light, as well as the conditions for turning on the light for the case when an external lighting device is used for flashing.

Point

- [General], [Configuration], and [Trigger] are the same as for the case of [Standard Lighting Mode].
- If you select the [Execute Capture Only] check box and click on the (Capture) button at the bottom of the [Properties] view when performing Multi-Capture, only image capture is performed without measuring.

Configuration

Set the configuration of captured images including the size, position, orientation, and multi-capture of images.

Point The setting items in the [Configuration] tab are the same as for the case of [Standard Lighting Mode]. For details, see [Configuration] of [Standard Lighting Mode].

Camera

Configure the quality of the captured images and the setting for background image capture. To capture images in Flickerless Mode, select [Flickerless Mode] as [Capture Mode].

Point
- For [Flickerless Mode], reference setting is disabled for all setting items. Reference setting is not possible.
- For [Flickerless Mode], you cannot specify the brightness of images by [Exposure Time (ms)] or [Exposure Delay (μs)]. Use [Brightness] instead. The setting items other than [Brightness] are the same as for the case of [Standard Lighting Mode]. For content details, see [Camera] of [Standard Lighting Mode].

Brightness

Set the brightness (0.010 to 16.000) of captured images.
The upper limit of the brightness varies by the type of camera.

Type of camera	Lower Limit Value	Upper Limit Value
VS C-mount smart camera (resolution: 5 megapixels or less)	0.015	16.000
VS C-mount smart camera (resolution: over 5 megapixels)	Not supported	Not supported
VS zoom smart camera (resolution: 5 megapixels or less)	0.010	14.400
VS zoom smart camera (resolution: over 5 megapixels)	Not supported	Not supported

Trigger

Configure trigger input conditions.

Point The setting items in the [Trigger] tab are the same as for the case of [Standard Lighting Mode]. For details, see [Trigger] of [Standard Lighting Mode].

Light

Configure the brightness of the light used for image capturing and the setting related to turning on the light, as well as the conditions for turning on the light for the case when an external lighting device is used for flashing.

Point

For Flickerless Mode, the following setting items related to lighting cannot be configured.

- Continuous Lighting
- Overdrive Lighting

The setting items other than the above are the same as for the case of [Standard Lighting Mode]. For details, see [Light] of [Standard Lighting Mode].

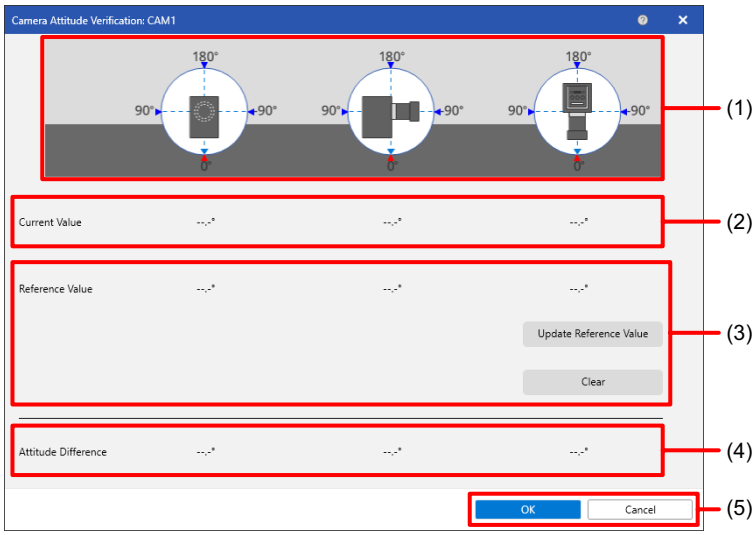
[Camera Attitude Verification] Dialog

#E006

A VS camera is equipped with the angle. In the [Camera Attitude Verification] dialog, you can check the current attitude of the camera and its difference from the reference attitude.

Screen details

This section explains the details of the [Camera Attitude Verification] dialog.



(1) Camera Attitude Indicator

Figures that illustrate the absolute values of angles are displayed.

(2) Current Value

The horizontal rotation angle viewed from the front, the up/down rotation angle view from size, and the right/left rotation angle viewed from the top are displayed to show the current camera attitude.

Point [Current Value] is the angle wherein the camera's factory default reference attitude is deemed as 0˚.

(3) Reference Value

This item displays the reference attitude (angles) of the camera that was registered by clicking [Update Reference Value] after the installation of the camera.
Reference values are cleared when [Clear] is clicked.

(4) Attitude Difference

This item displays the differences between the reference values and current values. You can find how much the camera attitude is different from the reference values.

(5) OK/Cancel

- **OK**: Saves the settings.
- **Cancel**: Discards the settings.

[ZoomTrax Settings] Dialog

#E007

When the connected camera is a VS standard zoom smart camera or a VS close-range zoom smart camera, configure ZoomTrax settings for capture settings such as focusing and zoom magnification and field-of-view settings such as the camera attitude. Created ZoomTrax settings are saved directly under the [Program] folder. When you want to add a VS zoom smart camera of the same standard/close-range type, the same color/monochrome type, and the same image size ([Size] of configuration setting of Capture tool), you can easily configure the capture settings and field-of-view settings of the camera by loading the saved settings.
The [ZoomTrax Settings] dialog has two setting modes.

- **[Easy Setup] mode**: In this mode, you can use automatic setting of focus and graphic operations on the [Image Viewer] for setting. You can adjust the capture settings and field-of-view settings easily by more intuitive operations.
- **[Standard] mode**: In this mode, you configure capture settings and field-of-view settings individually. Because you can configure setting items individually, you can adjust ZoomTrax settings more in detail.

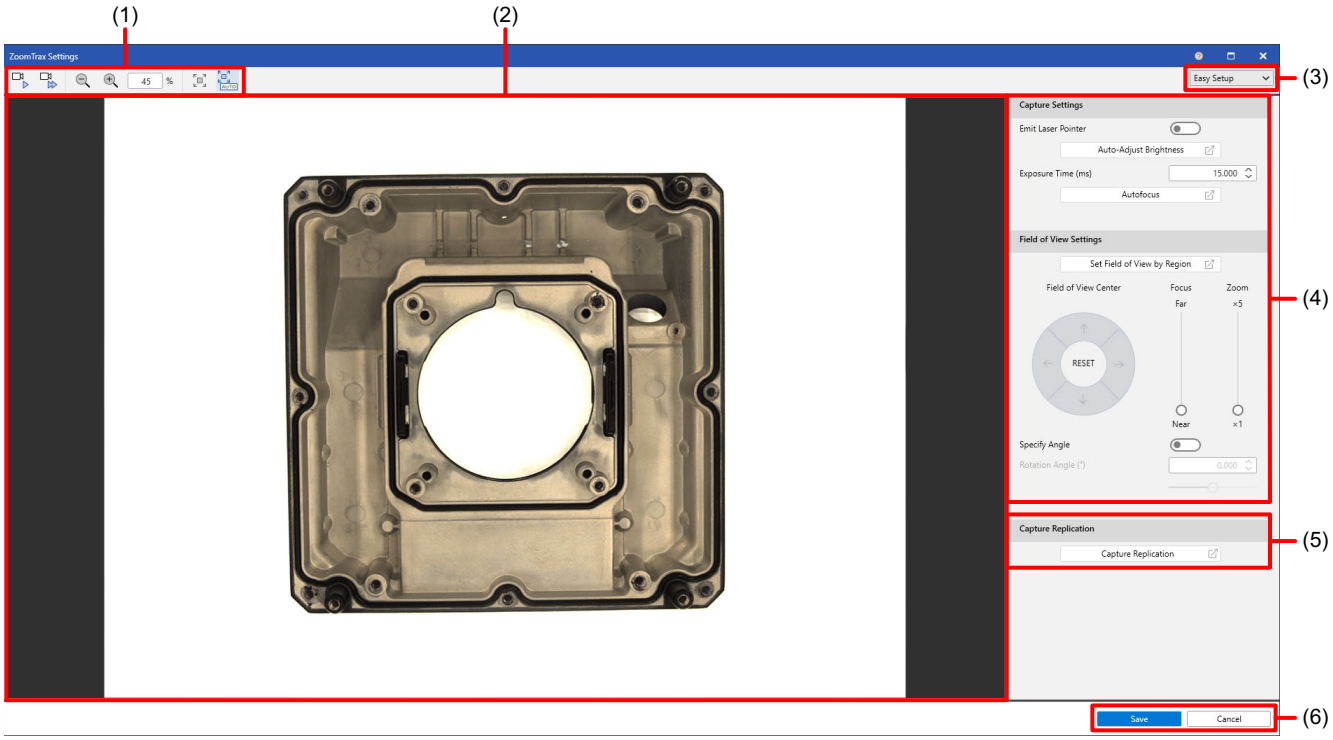
This section explains details of screens of these modes, and how to configure ZoomTrax settings.
→ [Easy Setup] Mode
→ [Standard] Mode

[Easy Setup] Mode

In this mode, you can use automatic setting of focus and graphic operations on the [Image Viewer] for setting. You can adjust the capture settings and field-of-view settings easily by more intuitive operations.

Screen details

This section explains the details of the [ZoomTrax Settings] dialog in [Easy Setup] mode.



(1) Toolbar

Toolbar for camera image operation.

– **(Trigger / Continuous Trigger)**: Clicking this button inputs a trigger.

–

(Zoom Out / Zoom In / Zoom setting): Clicking these buttons changes the zoom rate of the displayed image. You can also set the zoom rate by specifying a number.

–

(Fit / Auto Fit): Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.

(2) Camera image

Displays the camera image captured with a trigger input. Make ZoomTrax setting while checking the image in this screen.

(3) Mode Switching

Switches between the setting modes of the [ZoomTrax Settings] dialog. Select [Easy Setup].

(4) ZoomTrax settings

Settings that configure ZoomTrax. Capture settings are configured automatically by [Auto-Adjust Brightness] and [Autofocus], and the field of view of the camera image is configured by the region movement key and slider bar.

– **Capture Settings**: Make settings related to focusing.
→ [Capture Settings]

– **Field of View Settings**: Configure the conditions of the field of view (zoom factor, and the position and angle of the field of view) captured by the connected camera.
→ [Field of View Settings]

(5) Capture Replication

Automatically adjusts the settings of ZoomTrax to realize image capturing that replicates the reference image of an existing ZoomTrax Setting.
→ [Capture Replication] Dialog

(6) Save/Cancel

Saves or cancels the settings.

– **Save**: The ZoomTrax settings are saved and the image in the camera image is saves as the reference image.

Reference In cases other than the creation of new settings, the [Confirm] dialog is displayed for the confirmation of whether to overwrite the existing file or to save the setting with a different file name. Choose overwriting or saving with a different file name as necessary.

– **Cancel**: Discards the settings.

Capture Settings

Adjusts the exposure time for focusing.

Emit Laser Pointer

When enabled, a laser pointer is emitted. Adjust the positions of the work and the camera so that the laser pointer hits the center of works.

Auto-Adjust Brightness

Click this button to open the [Auto-Adjust Brightness] dialog and the region for brightness auto-adjustment is displayed on the camera image. Enclose the area that you want to adjust brightness by the auto-adjustment region and click [Execute]. Then, the exposure time is automatically adjusted for the region.

Exposure Time (ms)

Displays the automatically adjusted exposure time. You can also enter a number for adjustment.

Autofocus

Clicking this button opens the [Autofocus] dialog, which displays the focus region in the camera image. Enclose the area that you want to focus on by the focus region and click [Execute]. Then, focus is automatically adjusted for the focus region.

Field of View Settings

Specify a region as the field of view, and configure the position, focus, zoom factor, and other parameters for the field of view.

Set Field of View by Region

Clicking this button opens the [Set Field of View by Region] dialog, which displays the field of view in the camera image. By the field-of-view region, enclose an area of the work that you want to capture, and click [Execute]. Then, the zoom factor is adjusted so that the camera image fits the specified field-of-view region.

Point Clicking [Set Zoom Factor to 1x] in the [Set Field of View by Region] dialog sets the zoom factor of the camera image to 1x. By setting the zoom factor to 1x before auto adjustment, you can better grasp how focus adjustment is made.

Field of View Center / Focus / Zoom

Adjust the position, focus, and zoom factor of the field of view that has been automatically adjusted by [Set Field of View by Region], using the cross-shape keys of [Field of View Center], and the slider bars of [Focus] and [Zoom].

Specify Angle

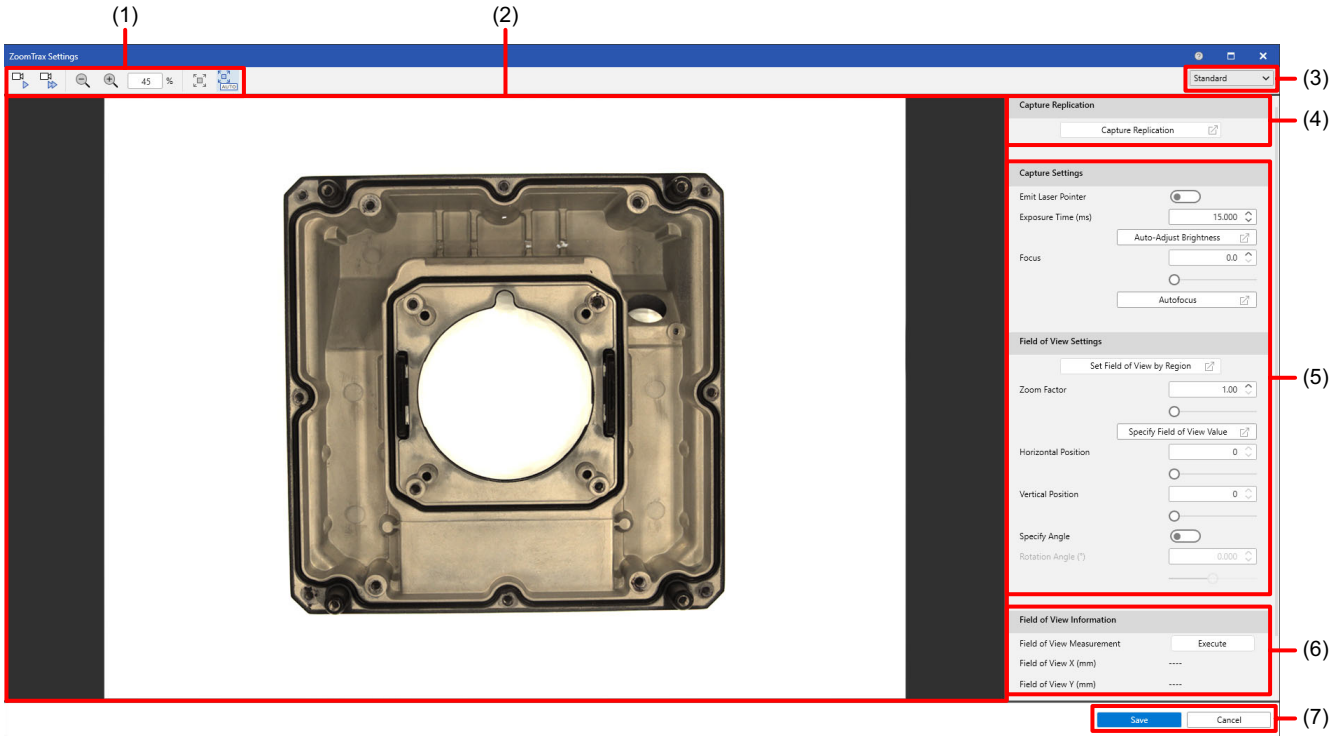
When enabled, you can specify the angle of the field of view. Configure the angle of the field of view by [Rotation Angle (˚)] (-10 to 10˚, default: 0).

[Standard] Mode

In this mode, you configure capture settings and field-of-view settings individually. Because you can configure setting items individually, you can adjust ZoomTrax settings more in detail.

Screen details

This section explains the details of the [ZoomTrax Settings] dialog in [Standard] mode.



(1) Toolbar

Toolbar for camera image operation.

– **(Trigger / Continuous Trigger)**: Clicking this button inputs a trigger.

– **(Zoom Out / Zoom In / Zoom setting)**: Clicking these buttons changes the zoom rate of the displayed image. You can also set the zoom rate by specifying a number.

– **(Fit / Auto Fit)**: Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.

(2) Camera image

Displays the camera image captured with a trigger input. Make ZoomTrax setting while checking the image in this screen.

(3) Mode Switching

Switches between the setting modes of the [ZoomTrax Settings] dialog. Select [Standard].

(4) Capture Replication

Automatically adjusts the settings of ZoomTrax to realize image capturing that replicates the reference image of an existing ZoomTrax Setting.

→ [Capture Replication] Dialog

(5) ZoomTrax settings

Settings that configure ZoomTrax.

– **Capture Settings**: Make settings related to focusing.

→ "Capture Settings"

– **Field of View Settings**: Configure the conditions of the field of view (zoom factor, and the position and angle of the field of view) captured by the connected camera.
→ "Field of View Settings"

(6) Field of View Information

Executing [Field of View Measurement] measures and displays the current field of view and image resolution.
→ "Field of View Information"

(7) Save/Cancel

Saves or cancels the settings.

– **Save**: The ZoomTrax settings are saved and the image in the camera image is saves as the reference image.

Reference In cases other than the creation of new settings, the [Confirm] dialog is displayed for the confirmation of whether to overwrite the existing file or to save the setting with a different file name. Choose overwriting or saving with a different file name as necessary.

– **Cancel**: Discards the settings.

Capture Settings

Make settings related to brightness and focusing.

Emit Laser Pointer

When enabled, a laser pointer is emitted. Adjust the positions of the work and the camera so that the laser pointer hits the center of works.

Exposure Time (ms)

In order to adjust the focus and field of view, adjust the exposure time by entering a number and using the slider bar. Clicking [Auto-Adjust Brightness] opens the [Auto-Adjust Brightness] dialog box, which displays the region for brightness auto-adjustment in the camera image. Enclose the area that you want to adjust brightness by the auto-adjustment region and click [Execute]. Then, the exposure time is automatically adjusted for the region.

Focus

Adjust the focus by entering a focus value (0 to 500, default: 0)
Clicking [Autofocus] opens the [Autofocus] dialog, which displays the focus region in the camera image. Enclose the area that you want to focus on by the focus region and click [Execute]. Then, focus is automatically adjusted for the focus region.

Field of View Settings

Configure the conditions of the field of view (zoom factor, and the position and angle of the field of view) captured by the connected camera.

Set Field of View by Region

Clicking this button opens the [Set Field of View by Region] dialog, which displays the field of view in the camera image. By the field-of-view region, enclose an area of the work that you want to capture, and click [Execute]. Then, the zoom factor is adjusted so that the camera image fits the specified field-of-view region.

Point Clicking [Set Zoom Factor to 1x] in the [Set Field of View by Region] dialog sets the zoom factor of the camera image to 1x. By setting the zoom factor to 1x before auto adjustment, you can better grasp how focus adjustment is made.

Zoom Factor

Configure the zoom factor of the camera by entering a number or using the slider bar. You can also set the zoom factor by specifying the width of the field of view in [Specify Field of View Value]. Clicking [Specify Field of View Value] opens the [Value Specification] dialog. Upon clicking, the field of view is measured and the current field of view that was measured is displayed in the [Value Specification] dialog. When you specify the width of the field of view in [Field of View X (mm)] and click [Execute], the zoom factor is adjusted so that [Field of View X (mm)] fits in the camera image.

Reference [Current Value] in the [Value Specification] dialog displays the [Field of View X (mm)], [Field of View Y (mm)], and [Pixel Resolution (μm/pixel)] of the current field of view. Configure [Field of View X (mm)] of [Specified Value] with reference to the current value.

Horizontal Position / Vertical Position

Configure the horizontal position and the vertical position of the field of view by entering a number or using the slider bar.

Specify Angle

When enabled, you can specify the angle of the field of view. Configure the angle of the field of view by [Rotation Angle (˚)] (-10 to 10˚, default: 0). If you enable rotation for a color camera, the number of history records that you can specify as the archive condition becomes smaller.

Field of View Information

Execute field-of-view measurement to measure and display the current field of view and image resolution.

Field of View Measurement

Click [Execute] to execute field-of-view measurement.

Field of View X (mm) / Field of View Y (mm) / Pixel Resolution (μm/pixel) / Working Distance (mm)

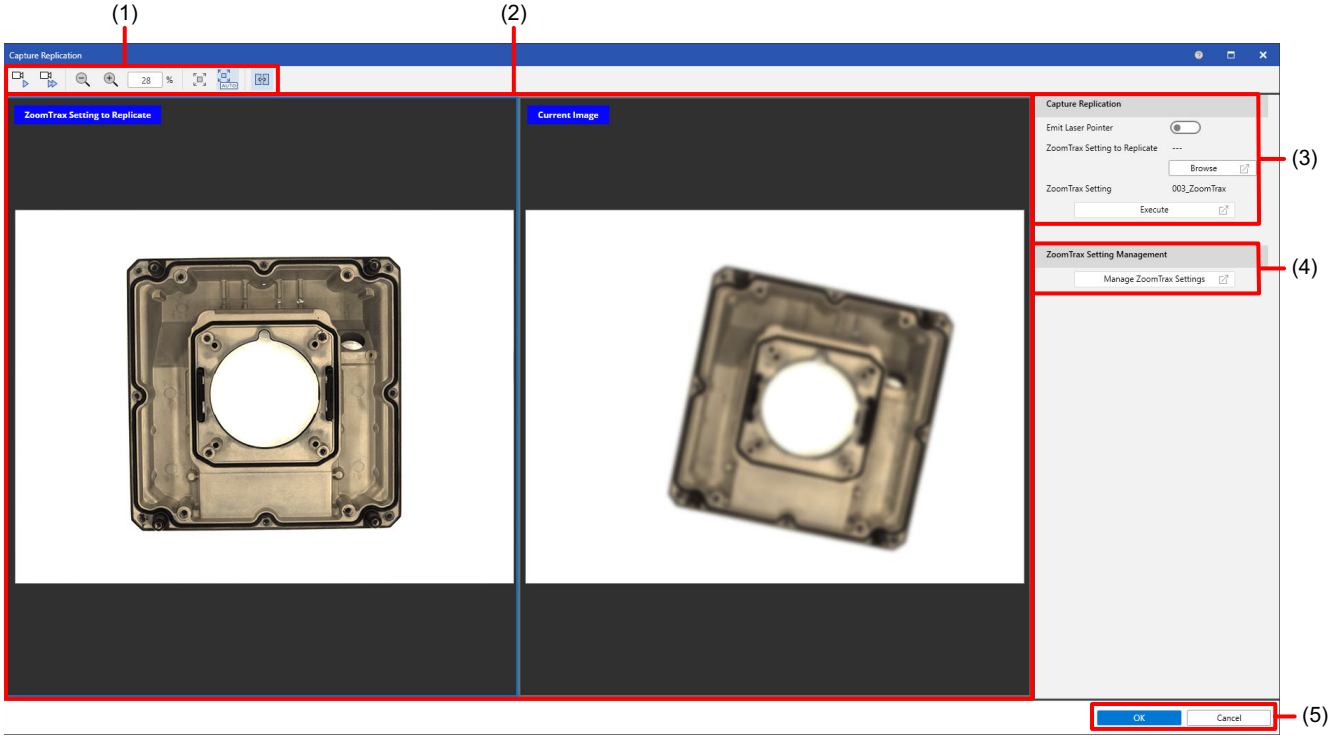
Displays the result of field-of-view measurement.

[Capture Replication] Dialog

Automatically adjusts the settings of ZoomTrax to realize image capturing that replicates the reference image of an existing ZoomTrax Setting.

Screen details

This section explains the details of the [Capture Replication] dialog.



(1) Toolbar

Toolbar for camera image operation.

- **(Trigger / Continuous Trigger)**: Clicking this button inputs a trigger.
- **(Zoom Out / Zoom In / Zoom setting)**: Clicking these buttons changes the zoom rate of the displayed image. You can also set the zoom rate by specifying a number.
- **(Fit / Auto Fit)**: Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.
- **(Zoom Link)**: When enabled, the zoom factors of the camera images of [ZoomTrax Setting to Replicate] and [Current Image] are synchronized.

(2) Camera image

On the left of the camera image, the reference image of the selected ZoomTrax setting is displayed. The current ZoomTrax settings are adjusted to reproduce image capturing close to this reference image.

On the right of the camera image, the image captured by the current ZoomTrax settings is displayed.

(3) Properties of Capture Replication

Select a ZoomTrax setting that you want to mimic, and adjust the current ZoomTrax settings to replicate image capturing close to the reference image of the selected ZoomTrax Setting.

→ "Properties of Capture Replication"

(4) ZoomTrax Setting Management

Displays the [Manage ZoomTrax Settings] dialog for copying the ZoomTrax settings.

→ "Manage ZoomTrax Settings"

(5) OK/Cancel

– **OK**: Saves the settings.
– **Cancel**: Discards the settings.

Properties of Capture Replication

Select a ZoomTrax setting that you want to mimic, and adjust the current ZoomTrax to reproduce image capturing close to the reference image of the selected ZoomTrax Setting.

Emit Laser Pointer

When enabled, a laser pointer is emitted. Adjust the positions of the work and the camera so that the laser pointer hits the center of works.

ZoomTrax Setting to Replicate

Click [Browse] to open the [Select ZoomTrax Setting] dialog. In the dialog, select the ZoomTrax setting to replicate and click [OK]. The reference image of the selected ZoomTrax setting is displayed on the left of the camera image.

Execute

Clicking this button displays the [Execute] dialog. Also, the setting of the current image is initialized, and a region is displayed over the current image. Place the region to enclose the work and click [Execute]. Then the region becomes the field of view, and the current ZoomTrax settings are adjusted so that the image capturing becomes close to the reference image of the ZoomTrax setting to be replicated.
When auto replication finishes, a completion message is displayed.
Clicking [Done] reflects the adjusted parameters to the ZoomTrax settings.

Restriction on the Number of Times of Switching between Different ZoomTrax Settings and Restriction on Capturing Interval

By switching between different ZoomTrax settings within a program setting, you can capture images of different conditions. This section explains the restriction on the number of times of switching between different ZoomTrax settings and the restriction on the capturing interval.

Restriction on the number of times of switching

The following restrictions are placed for different pixel counts of cameras.

- 1.6 megapixel zoom camera: up to 2 times
- 3.2 megapixel zoom camera: up to 4 times
- 5/15 megapixel zoom camera: no restriction

Setting that exceeds this limitation is prohibited with an error message.

Restriction on capturing interval

In default setting, a 1.5-second waiting time is placed after switching of ZoomTrax settings to secure a 1.5-second or longer interval between one motor driving and another to mitigate the

deterioration of the zoom lens. For more details, see [Global Settings] - [Camera Settings] - [Lens Drive Time Limit].
If you change [Lens Drive Limit Cancellation] of [Lens Drive Time Limit] from OFF (default) to ON, the 1.5-second waiting time is removed so that you can switch between ZoomTrax settings faster. However, depending on the manner of the usage of the system such as switching between ZoomTrax settings frequently in short intervals, the camera may be damaged due to the deterioration of the lens.

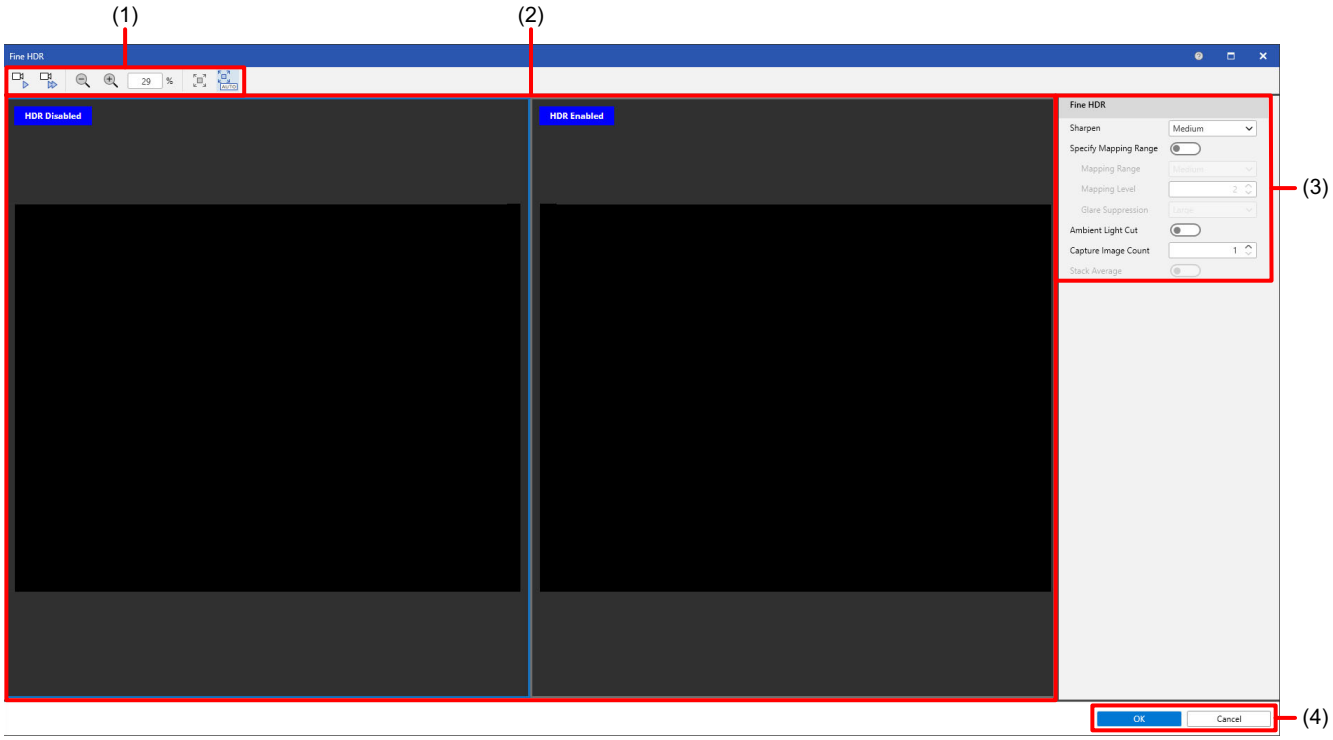
[Fine HDR] Dialog

#E008

You can capture images with an enhanced dynamic range. Fine HDR provides images suitable for processing, even for inspection targets having uneven shines and a mix of bright and dark areas. This section explains the Fine HDR settings of the [Fine HDR] dialog.

Screen details

This section explains the details of the [Fine HDR] dialog.



(1) Toolbar

Toolbar for camera image operation.

(Trigger / Continuous Trigger)

Clicking the button makes a trigger input.

(Zoom Out / Zoom In / Zoom setting)

You can change the zoom rate by clicking these buttons. You can also set the zoom rate by specifying a number.

(Fit / Auto Fit)

Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.

(2) Camera image

The image (left) for which Fine HDR capturing is disabled and the image (right) for which Fine HDR capturing is enabled are displayed side by side. Changes of Fine HDR settings are reflected in real time to the image for which Fine HDR capturing is enabled.

(3) Fine HDR settings

They are properties of Fine HDR processing. Adjust the properties while viewing the camera image to confirm the effect of the Fine HDR processing.
→ "Fine HDR"

(4) OK/Cancel

- **OK**: Saves the settings.
- **Cancel**: Discards the settings.

Fine HDR

Adjust the properties while viewing the camera image to confirm the effect of the Fine HDR processing.

Sharpen

Specify the intensity of edge highlighting.

- **Large**
- **Medium** (default)
- **Small**
- **Minuscule**

Specify Mapping Range

With this item enabled, you specify the range and level of tone value distribution to raise the robustness and edge highlighting level.

Point You cannot configure [Specify Mapping Range] when [Stack Average] is enabled.

Mapping Range

Specify the range in which tone values are distributed.

- **Medium** (default)
- **Small**
- **Flat**

Reference Setting [Mapping Range] to [Small] highlights low tone pixels more.

Mapping Level

Adjust the brightness within the range of 1 (dark) to 3 (bright) (default: 2).

Glare Suppression

Specify the degree of glare removal.

- **Large** (default)

– **Medium**
– **Small**

Ambient Light Cut

With this item enabled, the impact of the ambient light on the measurement is mitigated.

Point

- [Ambient Light Cut] is a setting item applicable only for [Standard Lighting Mode]. This item is not displayed in [Flickerless Mode].
- [Ambient Light Cut] can be enabled when the following lights are connected.
  – High-intensity smart ring light CA-DE*X
  – MultiSpectrum light CA-DRM*X
  – LumiTrax 400 mm large-size light CA-DQW40X
- With [Ambient Light Cut] enabled, an additional image is taken to capture the ambient light, and the element of ambient light is removed based on that image. A larger image memory is required due to this additional image capturing. Watch for the amount of remaining image memory.
- With [Ambient Light Cut] enabled, overdrive for high-intensity smart ring illumination will be disabled. If [Ambient Light Cut] is enabled while overdrive is enabled, a confirmation message will appear, and click the [OK] button to disable overdrive.

Capture Image Count

Select the number of times of capturing (1 to 8, default: 1) for multiple image capture.

Point

- [Capture Image Count] is a setting item applicable only for [Standard Lighting Mode]. This item is not displayed in [Flickerless Mode].
- [Capture Image Count] can be set to 2 or larger when the following lights are connected.
  – High-intensity smart ring light CA-DE*X
  – MultiSpectrum light CA-DRM*X
  – LumiTrax 400 mm large-size light CA-DQW40X
- When [Capture Image Count] is set to 2 or larger, you cannot enable [Overdrive Lighting] of Light settings.
- When [Capture Image Count] is set to 2 or larger, multiple images are captured and synthesized into one image. Therefore, this cannot be used for objects that are moving.

Stack Average

When multiple images are captured with this item enabled, they are averaged to mitigate noise.

Point

- [Stack Average] is a setting item applicable only for [Standard Lighting Mode]. This item is not displayed in [Flickerless Mode].
- You cannot enable it when [Capture Image Count] is set to 1.
- You cannot configure [Specify Mapping Range] and [Overdrive Lighting] of Light Settings when [Stack Average] is enabled.

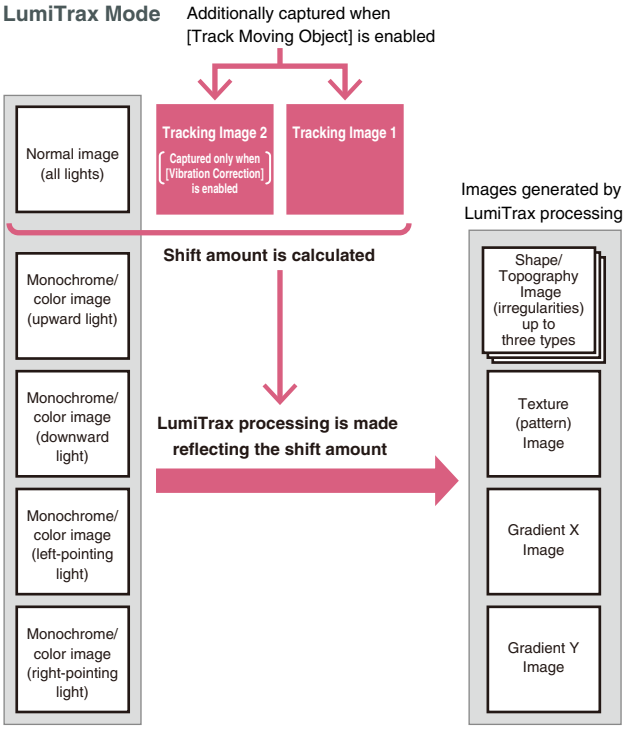
[Track Moving Object] Dialog

#E009

In the [Track Moving Object] dialog, configure the pattern region, search region, and pattern detection condition for tracking works that move.

Point Moving object tracking can be used in LumiTrax Mode and MultiSpectrum Mode.

Example: LumiTrax Mode



Screen details

This section explains the details of the [Track Moving Object] dialog.

Example: LumiTrax Mode

(1) Toolbar

(Trigger / Continuous Trigger)

Clicking the button makes a trigger input.

(Previous Image / Repeat Image / Next Image / 1 Round)

Clicking these buttons displays history images or simulation images.

(Switch Displayed Image)

From the drop-down menu, select the image to be displayed in the camera image. When the camera image is (4-screen display), the content of the selected camera image changes. Adjust the properties of moving object tracking while switching between the image before the processing of moving object tracking, image after the processing, and images generated in LumiTrax Mode to confirm the processing result.

Common between LumiTrax Mode and MultiSpectrum Mode

- **Pre-move Image**: Image before moving object tracking (Normal Image).
- **Post-move Image**: Image after moving object tracking. Vibration Correction has been made in this image if [Vibration Correction] is enabled. The amount of movement is calculated from the Normal Image and Post-move Image.
- **In-motion Image**: This image is captured with moving object tracking with [Vibration Correction] enabled, but at a point in time when Vibration Correction has not yet been made. Vibration and the speed change of the work are detected/estimated from the In-motion Image and the Post-move Image.

In the case of LumiTrax Mode

- **Texture Pattern Image**: Texture pattern image generated by LumiTrax Mode capture that reflects the result of moving object tracking
- **Shape / Topography Image 1**: Shape/Topography image 1 generated by LumiTrax Mode capture that reflects the result of moving object tracking
- **Shape / Topography Image 2**: Shape/Topography image 2 generated by LumiTrax Mode capture that reflects the result of moving object tracking
- **Shape / Topography Image 3**: Shape/Topography image 3 generated by LumiTrax Mode capture that reflects the result of moving object tracking
- **Gradient X Image**: Gradient X image generated by LumiTrax Mode capture that reflects the result of moving object tracking
- **Gradient Y Image**: Gradient Y image generated by LumiTrax Mode capture that reflects the result of moving object tracking
- **Partial Lighting (Upper) Image**: Partial lighting (upper) image that is a source of the generated image
- **Partial Lighting (Right) Image**: Partial lighting (right) image that is a source of the generated image
- **Partial Lighting (Lower) Image**: Partial lighting (lower) image that is a source of the generated image
- **Partial Lighting (Left) Image**: Partial lighting (left) image that is a source of the generated image

Point Images generated by the LumiTrax Mode (Texture Pattern Image, Shape / Topography Image 1-3, Gradient X Image, and Gradient Y Image) are displayed only if they are added to the [Processed Image] tab as images to be captured.

In the case of MultiSpectrum Mode

- **MultiSpectrum Color Image**: Color image generated by combining different lighting colors
- **UV Image**: Image captured by flashing UV (Ultraviolet) by the MultiSpectrum light
- **B Image**: Image captured by flashing B (Blue) by the MultiSpectrum light
- **G Image**: Image captured by flashing G (Green) by the MultiSpectrum light
- **AM Image**: Image captured by flashing AM (Amber) by the MultiSpectrum light
- **R Image**: Image captured by flashing R (Red) by the MultiSpectrum light
- **FR Image**: Image captured by flashing FR (Farred) by the MultiSpectrum light
- **IR Image**: Image captured by flashing IR (Infrared) by the MultiSpectrum light
- **W Image**: Image captured by flashing W (White) by the MultiSpectrum light

(Zoom Out / Zoom In / Zoom setting)

You can change the zoom rate by clicking these buttons. You can also set the zoom rate by specifying a number. Zoom rates of different camera Images are synchronized.

(Fit / Auto Fit)

Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.

(2) Camera image

The image selected by [Display Image] on the toolbar is displayed. Changes of the properties of the Track Moving Object are reflected to the camera Image.

Reference The initial setting of the camera images (top left, top right, bottom left, and bottom right) depends on the setting of [Vibration Correction].

- In the case of LumiTrax Mode
  - –When [Vibration Correction] is disabled: Pre-move image, post-move image, texture pattern image (the bottom-right area is not used)
  - –When [Vibration Correction] is enabled: Pre-move image, post-move image, in-motion image, texture pattern image
- In the case of MultiSpectrum Mode
  - –When [Vibration Correction] is disabled: Pre-move image, post-move image, MultiSpectrum color image (the bottom-right area is not used)
  - –When [Vibration Correction] is enabled: Pre-move image, post-move image, in-motion image, MultiSpectrum color image

(3) Operation Guide

This is the operation guide of the setting of moving object tracking. Adjust the properties of Track Moving Object with reference to the guide.

(4) Properties

Properties of the Track Moving Object.
→ "Settings of Track Moving Object"

(5) Search Result

The processing results of the post-move and in-motion images are displayed.

- **Post-move Image**: Displays the processing result of the post-move image.
  - **Positon X / Position Y**: Displays the X-direction and Y-direction shift amounts that have been corrected.
  - **Angle**: Displays the corrected amount of angle.
  - **Match %**: Displays the correlation value of the detected pattern.
- **In-motion Image**: Displays the processing result of the in-motion image.
  - **Position X / Positon Y**: Displays the X-direction and Y-direction shift amounts that have been corrected.
  - **Angle**: Displays the corrected amount of angle.
  - **Match %**: Displays the correlation value of the detected pattern.

(6) OK/Cancel

- **OK**: Saves the settings.
- **Cancel**: Discards the settings.

Settings of Track Moving Object

Adjust the properties of moving object tracking, while switching between images by [Display Image] on the toolbar to check processing results.

Pattern Region

Set the model to be detected from the post-move image by drawing a pattern region (green rectangle) on the image (pre-move image) in the camera image or by specifying the values of the center coordinates, width, height, and rotation angle of the pattern region.
→ "Drawing a rectangle"

Point The pattern region can only be edited in the pre-move image.

Center X/Center Y

Specify the X and Y coordinates (-16382 to 16382) of the center of the rectangle.

Width

Specify the width (1 to 16383) of the rectangle.

Height

Specify the height (1 to 16383) of the rectangle.

Rotation Angle

Specify the rotation angle (0 to 359.9) of the rectangle.

Search Region

Set the scope of search for the model configured by [Pattern Region] by drawing a search region (blue rectangle) on the images (pre-move image, post-move image, and in-motion image) in the camera image, or by specifying the values of the center coordinates, width, height, and rotation angle of the search region.
→ "Drawing a rectangle"

Point The search region can only be edited in the pre-move image, post-move image, and in-motion image.

Center X/Center Y

Specify the X and Y coordinates (-16382 to 16382) of the center of the rectangle.

Width

Specify the width (1 to 16383) of the rectangle.

Height

Specify the height (1 to 16383) of the rectangle.

Rotation Angle

Specify the rotation angle (0 to 359.9) of the rectangle.

Detection Conditions

Set the conditions for detecting the pattern configured by [Pattern Region].

Point The setting content is the same as the [Pattern Search] tool.
→ [Pattern Search] - [Detection] - [Detection Conditions].

Options

Set other conditions as necessary that can be set for moving object tracking.

Vibration Correction

Select this check box if the work vibrates or the moving speed of the work fluctuates during capturing.

Point With [Vibration Correction] enabled, in-motion images can also be captured because the vibration and speed fluctuation of works can be detected/estimated. The capture time will increase because the number of captured images increases.

Lighting Color

Select a lighting color for use in moving object tracking.

Point [Lighting Color] is a setting item applicable when [Capture Mode] is [MultiSpectrum Mode]. This item is not displayed in [LumiTrax Mode].

Calibration

#E010

Corrects *lens distortion* caused by lens properties and *perspective distortion* caused by camera installation conditions.

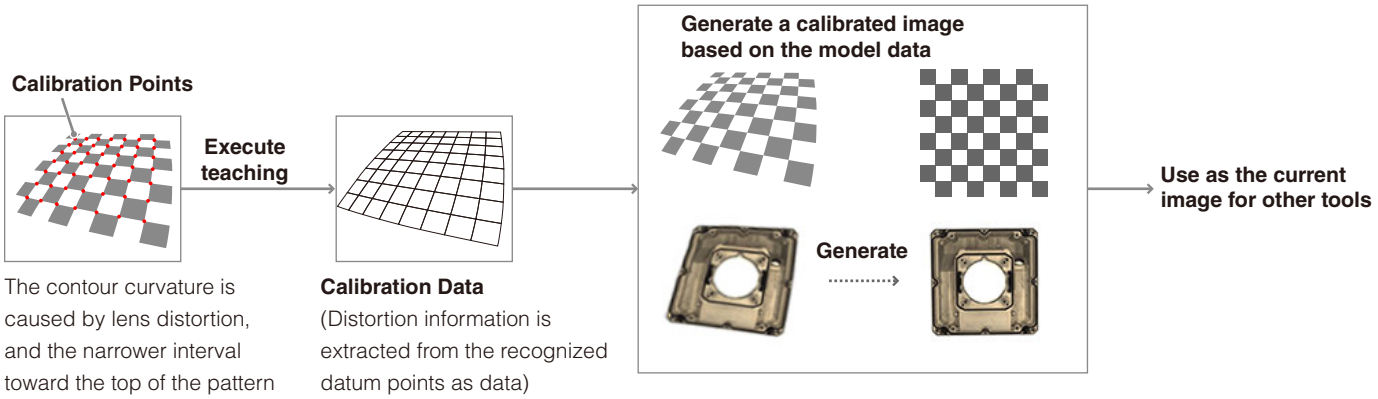
Point

- To use the [Calibration] tool, you need to execute teaching by calibration pattern images captured in the actual installation condition. When the camera installation condition is changed, teaching must be executed again.
- There will be errors if you capture images of works at a different height from the height of the calibration pattern plane at the time of teaching.

Function overview

Image of the Measurement

At the time of setting, construct the [Calibration Data] necessary for calibration from the coordinate data of calibration points obtained by capturing the image of a chessboard pattern or a dot pattern. During operation, corrected images are generated based on the calibration data.



The contour curvature is caused by lens distortion, and the narrower interval toward the top of the pattern is caused by perspective distortion

Calibration Data
(Distortion information is extracted from the recognized datum points as data)

Measurement Results Output

The main measurement result that is output by the Calibration tool is as follows:

Measurement result	Description
Scale	Outputs the scaling coefficient that is used when correcting measured values in scaling.

Reference For details of the measurement results that can be output, see “Appendix” - “Results Data List.”

Properties

When setting the Calibration tool, use the [Properties] view. The [Properties] view for the Calibration tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Calibration	Create or specify the calibration data for correcting lens distortion and perspective distortion.
Image Correction	Configure the image correction conditions based on the calibration result of the [Teaching] dialog or the setting of the specified calibration data.
Display	Configure how the correction region is displayed.

Calibration

Generate or specify the calibration data for correcting lens distortion and perspective distortion.

- Creation of calibration data: Edit Calibration
- Specification of calibration data: Detailed Settings

Reference For details on the range of setting values and numerical format for each setting item, see "Appendix" - "Settings Parameters List."

Edit Calibration

Obtain the degree of distortion in the captured image by teaching based on calibration points detected in the captured calibration pattern. Also, execute calibration based on the obtained distortion information to generate the calibration data for correcting distortion.

Teaching

Click this button to display the [Teaching] dialog. In the [Teaching] dialog, set the type of distortion to be corrected, a calibration pattern, the method of detecting calibration points, and other parameters, and then execute calibration to generate the calibration data.
→ "[Teaching] Dialog"

Detailed Settings

Specify an existing calibration data file (.clb) to load calibration data for correcting lens distortion and perspective distortion.

Calibration Data Specification

Click [Browse] to display the [Browse] dialog. Select the target calibration data and click [OK] to load the calibration data.

(File Name)

The file name of the specified calibration data file appears.
Clicking [...] displays the menu of file operations from which you can rename the file, or create a new file by saving with a different file name. Also, you can make file operations in the [Manage Files] dialog.

Edit File Name

Selecting this item displays the [Edit Name] dialog. You can change the file name by entering any file name in [File Name] and clicking [OK].

Create New File

Selecting this item displays the [Create New] dialog. Enter any file name (default: CAM_CalibrationModel0.clb) in [File Name] and click [Create] to save the data you are currently setting as a calibration data file.

Manage Files

Selecting this item displays the [Manage Files] dialog. In this dialog, you can copy or delete a file.

→ "Manage Files"

Point You cannot rename or delete a file that is currently used.

Image Correction

Configure the image correction conditions based on the calibration data generated by the [Teaching] dialog or the setting of the specified calibration data.

Image Setting

Distortion Correction

The [Distortion Correction] configured in Edit Calibration is displayed.

Point The setting of [Distortion Correction] cannot be changed in [Image Setting]. To change the setting, configure the setting again from [Calibration] - [Teaching], or specify a calibration data file again that has the correct distortion correction setting by [Detailed Settings] - [Calibration Data Specification].

Coordinate Conversion Settings

Calculate the scaling coefficient from the pattern interval (full scale) of the calibration pattern used in teaching.

Point [Coordinate Conversion Settings] is a setting item applicable when [Distortion Correction] is [Lens & Perspective] or [Perspective Only]. This item is not displayed for [Lens Only].

Pattern Interval (Full Scale)

Configure the interval of the calibration pattern (0.001 to 999.999, default: 10.000) in full scale.

Unit

Select the unit of the pattern interval in full scale.

- **None**
- **cm**
- **m**
- **mm** (default)
- **µm**
- **inch**

- **mil**

Scaling Coefficient

Displays the scaling coefficient calculated from the teaching result, [Pattern Interval (Full Scale)], and [Unit].

Image Adjustment

Configure the adjustment method of corrected images that are generated.

Point [Image Adjustment] is a setting item applicable when [Distortion Correction] is [Lens & Perspective] or [Perspective Only]. This item is not displayed for [Lens Only].

Correction Region

Select the region from which corrected images are to be generated.

- **Full Image** (default): Select this item to generate corrected images from the whole captured images.
- **Rectangle**: Select this item to generate corrected images from only the specified region. To specify the region for generating corrected images, draw a graphic on the camera image in the [Image Viewer] or enter numbers in [Upper Left Position X], [Upper Left Position Y], [Lower Right Position X], and [Lower Right Position Y].

Rotation Correction

Configure whether to correct the rotation element (default: OFF).

Corrective Angle

Configure the rotation angle (0.000 to 359.999, default: 0.000) of corrected images when [Rotation Correction] is ON.

Size

Select the method for adjusting the scale of corrected images.

- **By Scaling** (default): Select this item to specify the scale of corrected images by a multiplier.
- **By Pixel**: Select this item to specify the scale of corrected images by the interval (pixel) of the calibration pattern.

Scale

Specify the scale of corrected images by a multiplier (0.200 to 5.000, default: 1.000) when [By Scaling] is selected for [Size].

Pattern Interval (pixel)

Specify the scale of corrected images by the interval of the calibration pattern (5.000 to 1000.000, default: 50.000) when [By Pixel] is selected for [Size].

Current Pattern Interval (pixel)

Displays the pattern interval calculated by the setting of [Scale] or [Pattern Interval (pixel)].

Shift X (pixel) / Shift Y (pixel)

Specify the shift amount of the configured region in the X direction and Y direction (-9999.999 to 9999.999, default: 0.000).

Display

Configure how the correction region is displayed. You can change the display color to any color. You can hide or show the region by a toggle switch.

Display Settings

> **Point** [Correction Region] is a setting item that is only for when [Rectangle] is selected for [Correction Region] of [Image Adjustment]. If [Full Image] is selected, this setting item is ignored even if it is configured because the correction region is not displayed in the camera image.

Correction Region

Select whether to display the correction region.

- **ON** (default): The correction region is displayed. Configure the line thickness and display color of the correction region.
- **OFF**: The correction region is not displayed.

Reset

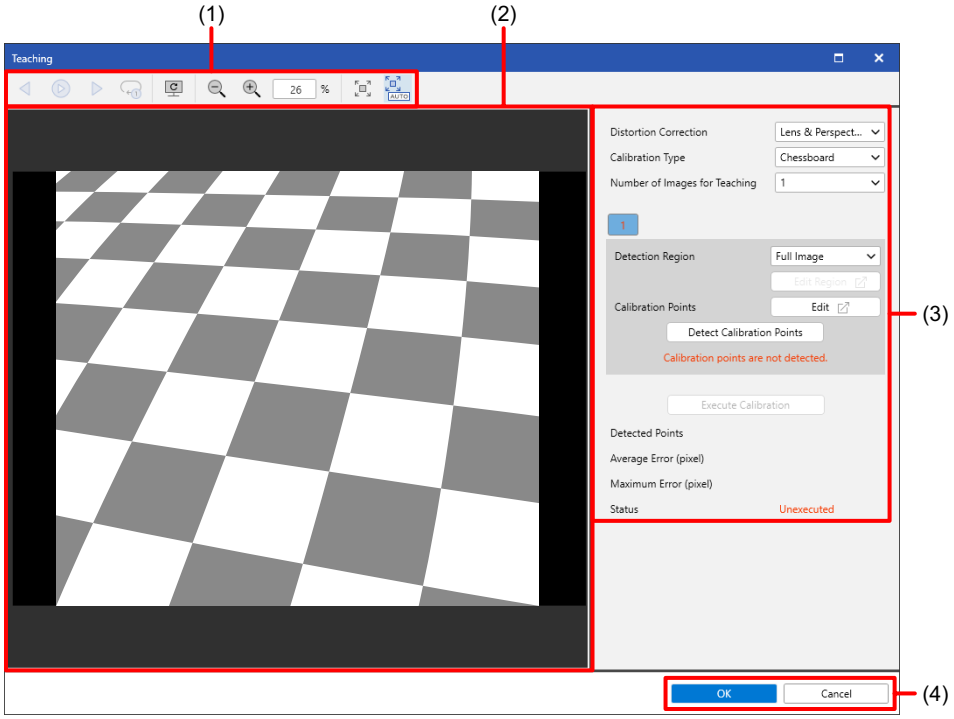
Restores the display options to their default settings.

[Teaching] Dialog

Configure the type of distortion to be corrected, a calibration pattern, the number of teaching images, the method of detecting calibration points, and other parameters, and then execute teaching. Then, execute calibration to generate a calibration data file.

Screen details

This section explains the details of the [Teaching] dialog.



(1) Toolbar

Toolbar for camera image operation.

- **(Previous Image / Repeat Image / Next Image / 1 Round)**: Clicking these buttons replays archived images or simulation images.
- **(Live Image)**: Clicking this button inputs a trigger to continuously update the camera image.
- 14 % **(Zoom Out / Zoom In / Zoom setting)**: Clicking these buttons changes the zoom rate of the displayed image. You can also set the zoom rate by specifying a number.
- **(Fit / Auto Fit)**: Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.

(2) Camera Image

The captured image is displayed. Executing [Detect Calibration Points] displays the calibration points as red dots on the image. Also, executing [Execute Calibration] corrects the image based on the generated calibration data.

(3) Properties

These are setting properties of teaching.

→ "Settings of teaching"

(4) OK/Cancel

– **OK**: Saves the calibration data file (.clb) and closes the [Teaching] dialog.
– **Cancel**: Cancels the edited setting, and closes the dialog.

Point In the calibration data file (.clb), the following data items are saved:
- Calibration data
- Scaling coefficient
- Pattern interval
- Unit

Settings of teaching

Distortion Correction

Select the type of distortion to be corrected.
- **Lens & Perspective** (default): Corrects both lens distortion and perspective distortion.
- **Lens Only**: Corrects only the distortion of the image contour caused by lens properties.
- **Perspective Only**: Corrects only the distortion caused by the tilt of the camera (far objects being small, and near objects being large).

Calibration Type

Select the calibration pattern to be used for teaching.
- **Chessboard** (default): Pattern of a chessboard (checker pattern)
- **Dot Grid**: Pattern of dots arranged in a constant interval

Number of Images for Teaching

Set the number of images to be captured in teaching (1 to 16, default: 1). Specify this item when you will generate the calibration data from multiple images of different pattern placements captured on the same plane. This feature is useful when the whole image cannot be covered by one calibration pattern.
When you increase the number of images, tabs for switching between captured images are added. Selecting a tab changes the image displayed on the Camera Image.

Point
- If you increase the number of images, the execution time may become longer.
- The selected tab is displayed in blue.
- The tab number is displayed in red if calibration points have not been detected for the tab.

Detection Region

Select a region from which to detect calibration points. If stable detection is hampered by the background in the image or other things, you can stabilize the detection of calibration points by narrowing the detection region.

Point Set [Detection Region] for each image (tab) captured in teaching.

- **Full Image** (default): Calibration points are detected from the whole image.
- **Quadrangle**: Specify the vertexes of a quadrangle from which to detect calibration points. In the [Edit Region] dialog that appears when you click [Edit Region], specify the coordinate of each vertex by entering its value.

Point You can place a quadrangle at any position of the same plane.

Calibration Points

Clicking [Edit] opens the [Calibration Points] dialog. Set conditions for detecting calibration points from the captured calibration pattern.

Point Set [Calibration Points] for each image (tab) captured in teaching.

Detection Threshold (%)

Set a threshold (1 to 100, default: 10) for calibration point detection.

Maximum Number of Points

Set the maximum number (100 to 4000, default: 1000) of calibration points to be detected.

Detected Points

Displays the number of calibration points detected from the captured image based on the configured [Detection Threshold (%)] and [Maximum Number of Points].

Point
- If you decrease the value of [Detection Threshold (%)] too much to increase the number of detected calibration points, detection may become unstable due to false detection of noises.
- If you set [Maximum Number of Points] to a large value, the execution time of calibration point detection and teaching may become longer.

Detect Calibration Points

Clicking this button executes calibration point detection and depicts red calibration points on the image.

Point When you execute calibration point detection, the text displayed on the button changes to [Redetect Calibration Points]. If calibration point detection fails, correct the setting of [Calibration Points], and then click [Redetect Calibration Points] to execute calibration point detection again.

Execute Calibration

Clicking this button executes calibration and generates the calibration data. The image on the Camera Image is corrected based on the calibration data. Also, the number of calibration points used in teaching and the result of calibration are displayed.

Detected Points

Displays the number of calibration points used in teaching.

Average Error (pixel)

Displays the average of calibration errors.

Maximum Error (pixel)

Displays the maximum value of calibration errors.

Status

Displays the calibration status.

– **Unexecuted**: Calibration has not been executed.
– **Done**: Calibration was successful.
– **Failed**: Could not extract calibration points correctly, or failed in calibration.

Point When calibration finishes successfully, the text on the button changes to [Redo Calibration].

Scaling

#E011

Converts values measured in images captured by a camera to actual dimensions or values in any specified tool.

Function overview

Pixel is used as the unit of the object position coordinates and dimensions that are detected/measured by image processing. To display these values in full scale (e.g., mm), measured values in pixel must be converted to values in full scale. A measured value in full scale can be obtained by multiplying the pixel value by the resolution (full scale value of one pixel). This resolution is called "scaling coefficient."
A measurement tool can obtain a full scale value by referencing the [Scaling] tool.
A measurement tool can also make scaling by using the coefficient calculated by itself rather than referencing the scaling tool.

Point If an object is distorted in its image due to photological distortion, the scaling coefficient must be calculated based on the resolution of an image generated by distortion correction.

Properties

When setting the Scaling tool, use the [Properties] view. The [Properties] view for the Scaling tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Scaling	Calculate the scaling coefficient by entering the edge detection conditions and the full scale of the measurement target object.

Scaling

Set the scaling coefficient by entering its value or by calculating it from the measured value of the captured image and the full scale value of the captured object. You can also configure the scaling coefficient by specifying an existing scaling coefficient file.

- Entering a scaling coefficient value or calculating it from the measured value of the captured image and the full scale value of the captured object: Scaling
- Specifying an existing scaling coefficient file: Detailed Settings

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - ”Settings Parameters List.”

Scaling

Scale/X/Y/Lengthwise/Unit

Displays the current scaling settings.

Edit

Clicking this button displays the [Edit] dialog. Enter a scaling coefficient and unit, or set a scaling coefficient by measuring the full scale value using a captured image. Clicking [OK] saves the scaling coefficient file.

Specify by Direction

Specify whether to set scaling coefficients for different directions individually.

- **Disabled** (default): Specify a scaling coefficient that applies to both X and Y directions. Set a scaling coefficient by [Scale] and [Unit].
- **Enabled**: Set scaling coefficients for different directions individually. Set a scaling coefficient by [X], [Y], and [Lengthwise].

Scale

Set a scaling coefficient (-9999.999999 to 9999.999999, default: 1.000000) when [Specify by Direction] is disabled.

X/Y/Lengthwise

Set a scaling coefficient when [Specify by Direction] is enabled.

- **X/Y**: Set a scaling coefficient for the X direction and Y direction (-9999.999999 to 9999.999999, default: 1.000000).
- **Lengthwise**: Set a scaling coefficient for the length (0000.000000 to 9999.999999, default: 1.000000).

Unit

Set the unit of the scaling coefficient.

- **None**
- **cm/pixel**
- **m/pixel**
- **mm/pixel** (default)
- **µm/pixel**
- **inch/pixel**
- **mil/pixel**

Specify by Full Scale Value

Click this button when you do not use the settings above but calculate the scaling coefficient using the full scale value of an area in the captured image. Clicking this button displays the [Specification Method] dialog. Select the method of measuring the full scale value and the direction of calculating the scale value.

- **Specification Method**: Select a method (Width/Pitch) of measuring the full scale value (default: Width).
- **Scale Direction**: Select the direction of calculating the scaling coefficient (X, Y, or Lengthwise, default: X) when [Specify by Direction] is enabled.

After setting [Specification Method] and [Scale Direction], clicking [OK] opens the [Scaling Coefficient Settings] dialog.

→ [Scaling Coefficient Settings] Dialog

Reference The scaling coefficients ([Scale], [X], [Y], and [Lengthwise]) and [Unit] configured in the [Edit] dialog, and [Specification Method] and [Scale Direction] configured in the [Specification Method] dialog are passed to the [Scaling Coefficient Settings] dialog.

Detailed Settings

Load the scaling coefficient by specifying an existing scaling coefficient file (*.scl).

External File Specification

Clicking [Browse] displays the [Browse] dialog. Select the target scaling coefficient file and click [OK]. Then the scaling coefficient is loaded.

(File Name)

Displays the file name of the specified scaling coefficient file.

Point If you have set the scaling coefficient by entering values in the [Edit] dialog or by calculating it from the full scale value, a scaling coefficient file was saved when you clicked [OK]. The file name is now displayed here.

Clicking [...] displays the menu of file operations from which you can rename the file, or create a new file by saving with a different file name. Also, you can make file operations in the [Manage Files] dialog.

Edit File Name

Selecting this item displays the [Edit Name] dialog. You can change the file name by entering any file name in [File Name] and clicking [OK].

Create New File

Selecting this item displays the [Create New] dialog. Enter any file name (default: CAM_Scale.scl) in [File Name] and click [Create] to save the data you are currently editing as a scaling coefficient file.

Manage Files

Selecting this item displays the [Manage Files] dialog. In this dialog, you can copy or delete a file.

→ "Manage Files"

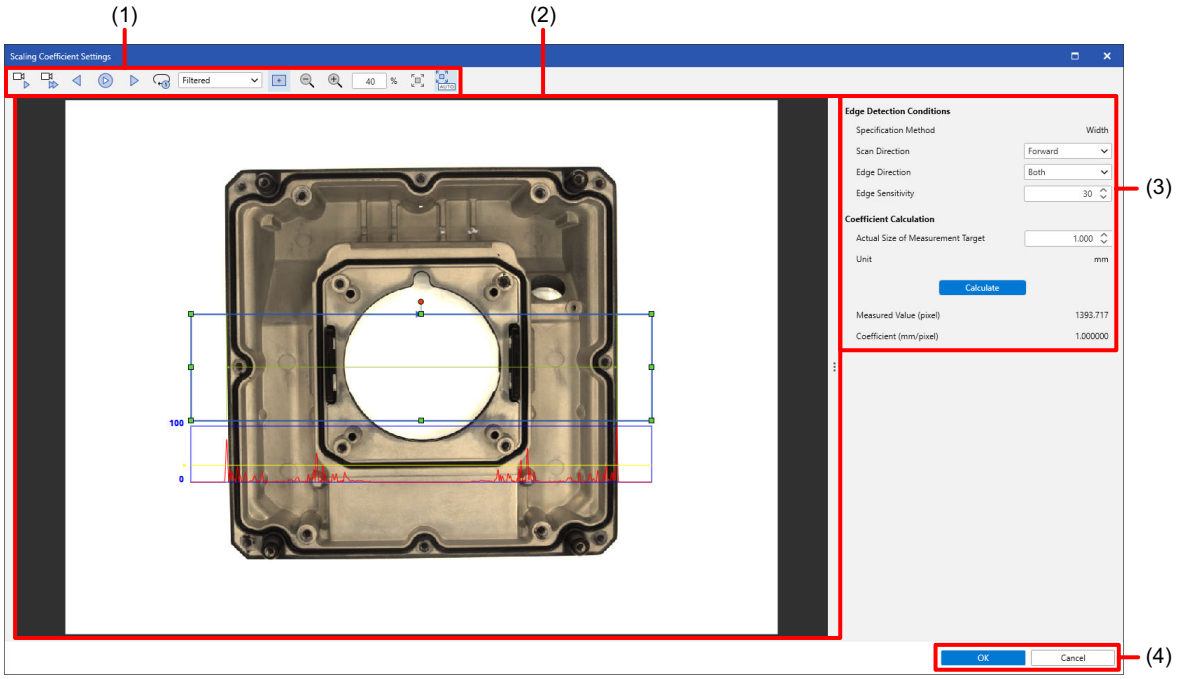
Point You cannot rename or delete a file that is currently used.

[Scaling Coefficient Settings] Dialog

In the [Scaling Coefficient Settings] dialog, you capture a work whose edge interval is known. Then, you calculate the scaling coefficient by the known edge-to-edge full scale value and the edge-to-edge distance measured in the captured image.

Screen details

This section explains the details of the [Scaling Coefficient Settings] dialog.



(1) Toolbar

Toolbar for camera image operation.

– **(Trigger / Continuous Trigger)**: Clicking this button inputs a trigger.

– **(Previous Image / Repeat Image / Next Image / 1 Round)**: Clicking these buttons replays archived images or simulation images.

– **(Image Type)**: Switches the display type of the image displayed on the screen.

– **(Graphic)**: Shows or hides graphics (edge detection region, detected edges, edge graph, and dimension line) in the camera image.

– **(Zoom Out / Zoom In / Zoom setting)**: Clicking these buttons changes the zoom rate of the displayed image. You can also set the zoom rate by specifying a number.

– **(Fit / Auto Fit)**: Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.

(2) Camera Image

Displays the camera image and a rectangle detection region. Edit the region in accordance with the [Specification Method] and [Scale Direction] specified in the [Specification Method] dialog.

(3) Properties

These are properties of the scaling coefficient setting.

→ "Setting properties of Scaling Coefficient Settings"

(4) OK/Cancel

– **OK**: Saves the settings.

– **Cancel**: Discards the settings.

Setting properties of Scaling Coefficient Settings

Scale Direction

Displays the scale direction (X, Y, or Lengthwise) selected by [Scale Direction] of the [Specification Method] dialog when [Specify by Direction] of the [Edit] dialog is ON.

Specification Method

Displays the [Specification Method] selected in the [Specification Method] dialog.

Scan Direction

Select a direction (Forward or Reverse, default: Forward) for scanning for edges.

Edge Direction

Select a light-dark change direction for the edge detection.

- **Both** (default)
- **Dark to Bright**
- **Bright to Dark**

Edge Sensitivity

Set a threshold (0 to 100, default: 30) for detecting edges.

Actual Size of Measurement Target

Set the known full scale value of the work (0.000 to 999999.999, default: 1.000).

Unit

Displays the unit of the full scale value specified by [Unit] of the [Edit] dialog.

Calculate

Clicking this button calculates [Coefficient] from [Actual Size of Measurement Target] and [Measured Value (pixel)].

Measured Value (pixel)

Displays the measurement value of the edge.

Coefficient

Displays the calculated coefficient (default: 1.000000).

- **X/Y**: -9999.999999 to 9999.999999
- **Lengthwise**: 0000.000000 to 9999.999999

Inspection

Inspection tools are tools for defining measurement methods and conditions for each unit of inspection or measurement. The below inspection tools are included with this device.

Inspection Tool List

Vision tools	Overview of functions
Area	A tool that measures the [White] or [Black] area after binarization (black-and-white processing) of the image.
Intensity	A tool that measures the average value, maximum value, minimum value, and deviation of the intensity (brightness) in the inspection region.
Color Detection	A tool that measures the average value, deviation, and intensity of the color information in the inspection region.
Pattern Search	A tool that detects portions in the current image that resemble the pre-registered image pattern and measures the number of patterns, their positions, tilt angles, and correlation values.
ShapeTrax3A	A tool that detects portions in the current image that resemble pre-registered edge patterns and measures the number of patterns, their positions, tilt angles, and correlation values.
Edge Position	A tool that can scan in any direction in the inspection region and measures the position of the specified edge.
Edge Width	A tool that can scan in any direction in the inspection region and measures the width between the two detected edges.
Edge Pitch	A tool that can scan in any direction in the inspection region and measures the average, maximum, and minimum values of the distances between the detected edges.
Edge Pairs	A tool that pairs edges detected by two scans with the desired conditions to measure width and pitch.
Profile Position	A tool that scans in the specified direction the segments in the inspection region and measures the position of the edge in each segment.
Profile Width	A tool that scans in the specified direction the segments in the inspection region and measures the width between the edges in each segment.
Profile Defect	A tool that calculates the contour of the inspection target (reference model line) from the edge position information obtained by scanning segments in the inspection region and detects significant variations in shape (protrusions and dents) as defects.
Defect	A tool that moves a small detection region (segment) in the inspection region, calculates the average intensity, and detects places where there is a difference in intensity above the threshold value as defects.
Blob	A tool that measures the number of blobs (groups of white or black pixels) and features such as area and center of gravity.
Grayscale Blob	A tool that detects places where there is a difference in intensity above the threshold value as blobs and measures the number of blobs and features such as area and center of gravity.
OCR2	A tool that recognizes character strings in captured images by matching character information extracted from the inspection region against library data.
1D Code Reader	A tool that detects 1D code information in the inspection region and reads the character strings contained in the 1D codes in the captured image.
2D Code Reader	A tool that detects 2D code information in the inspection region and reads the character strings contained in the 2D codes in the captured image.

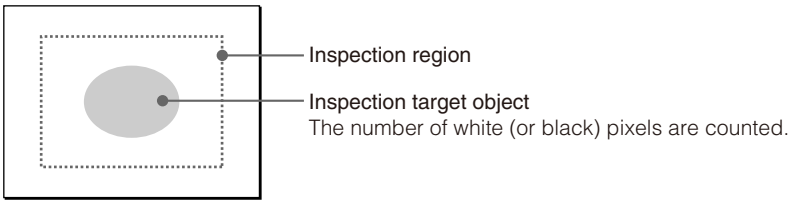
Area

#E012

The white or black area of an image captured with the camera can be measured after binarization (black-and-white processing) of the image.

Overview of functions

Image of the Measurement



Measurement Results Output

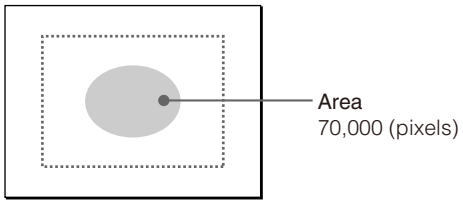
The measurement results output by the Area tool are as follows.

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Area	Outputs the area in pixels.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

Measurement color: Black



Properties

When setting the Area tool, use the [Properties] view. The [Properties] view for the Area tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Sets the reference position for the tool's coordinate system. Additionally, specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image. [Binary] is selected by default.
Detection	Sets which color area of the black and white image is to be measured. Additionally, set the other conditions that can be set for the Area tool as necessary.
Judgment	Sets the tolerances (upper and lower limits) for the measured value.
Display	Sets the display methods for the inspection and mask regions.

Detection

Sets which color area of the black and white pixels is to be measured. You can also set the other conditions that can be set for the Area tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Detection Color

Sets which color part of the binarized (black and white processed) image is to be detected.

- **White** (default): Measures the area of white pixels.
- **Black**: Measures the area of black pixels.

Detailed Settings

You can set the other conditions that can be set for the Area tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured value. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement result is displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point

- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Area

Set the tolerances (upper and lower limits) for the measured area.

- Unit: Pixel Count
- Range: 0 to 99999999

Display

Sets the display methods for the inspection and mask regions. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Reset

Restores the display options to their default settings.

Intensity

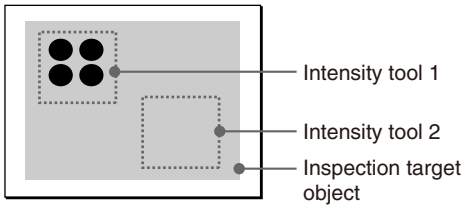
#E013

You can measure the average value, maximum value, minimum value, and deviation of the intensity (brightness) in the set inspection region. If the average intensity of the background and the area where the object is present are measured, the presence/absence of parts can be inspected by comparing the difference in intensity between them.

Overview of functions

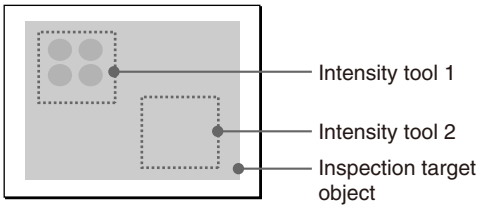
Images of the Measurement

When the intensity difference is large



- Average intensity of Intensity tool 1: 50
- Average intensity of Intensity tool 2: 200
- Intensity difference: 150

When the intensity difference is small



- Average intensity of Intensity tool 1: 150
- Average intensity of Intensity tool 2: 200
- Intensity difference: 50

Measurement Results Output

The measurement results output by the Intensity tool are as follows.

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Gray Intensity Average	Outputs the average intensity of the inspection region in the range of 0 to 255 (tone).
Intensity Deviation	Outputs the intensity deviation of the inspection region. The deviation indicates the degree of variation of the intensity value of each pixel within the inspection region.
Maximum Intensity	Outputs the maximum intensity (brightest point) of the inspection region.
Minimum Intensity	Outputs the minimum intensity (darkest point) of the inspection region.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Point If the "Color to Binary" or "Color to Grayscale" color extraction was performed, the black and white image after color extraction becomes the target of the Intensity tool.

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Properties

When setting the Intensity tool, use the [Properties] view. The [Properties] view for the Intensity tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Sets the reference position for the tool's coordinate system. Additionally, specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Details	Sets the other conditions that can be set for the Intensity tool as necessary.
Judgment	Sets the tolerances (upper and lower limits) for the measured values.
Display	Sets the display methods for the inspection and mask regions.

Details

Detailed Settings

You can set the other conditions that can be set for the Intensity tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Average

Set the tolerances for the detected intensity average.

- Unit: Number

- Range: 0.000 to 255.000

Deviation

Set the tolerances for the detected intensity deviation.

- Unit: Number
- Range: 0.000 to 255.000

Intensity

Set the tolerances for the detected maximum and minimum intensity.

- Unit: Number
- Range: 0 to 255

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Display

Sets the display methods for the inspection and mask regions. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Reset

Restores the display options to their default settings.

Color Detection

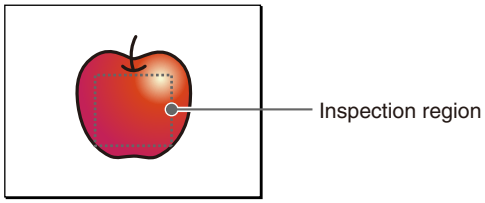
#E014

You can measure the average value, deviation, and intensity of the color information in the set inspection region. By measuring the object's color information in advance, inspections can be carried out to determine if objects of different colors have been mixed in, or if the object itself has been discolored.

Overview of functions

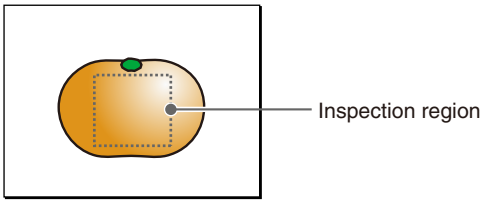
Images of the Measurement

Example of measuring a red object



- Average Red Intensity: 200
- Average Green Intensity: 50
- Average Blue Intensity: 50

Example of measuring an orange object



- Average Red Intensity: 250
- Average Green Intensity: 200
- Average Blue Intensity: 40

Measurement Results Output

Point The measurement results obtained by Color Detection of the device may be affected by the camera's image sensor, white balance and lighting conditions, in addition to changes in the surrounding environment. Additionally, due to the measurement principle, errors in measurement results may be larger when inspecting in an environment with achromatic or dark colors, or in environments with insufficient ambient light. Be sure to check the settings and results of the actual inspection after changes have been made to the camera, lighting, measurement target, or surrounding environment.

The measurement results output by the Color Detection tool are as follows.

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Average Intensity	Outputs the average intensity of each of RGB or HSB in the inspection region in the range of 0 to 255 (tone).
Intensity Deviation	Outputs the intensity deviation of each of RGB or HSB in the inspection region.
Maximum Intensity	Outputs the maximum intensity of each of RGB or HSB in the inspection region.
Minimum Intensity	Outputs the minimum intensity of each of RGB or HSB in the inspection region.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Point
- The maximum and minimum intensity of “H” in the HSB format are fixed at 0.
- For details about the color information parameters of the HSB format, see "What is the HSB color system?".
- For MultiSpectrum mode images, the measurement results are values for UV, B, G, AM, R, FR, IR, and W respectively.

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Properties

When setting the Color Detection tool, use the [Properties] view. The [Properties] view for the Color Detection tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Sets the reference position for the tool's coordinate system. Additionally, specify the area on the captured image to be used for measurement.
Detection	Sets the type of color measurement parameters. You can also set the other conditions that can be set for the Color Detection tool as necessary.
Judgment	Sets the tolerances (upper and lower limits) for the measured values.
Display	Sets the display methods for the inspection and mask regions.

Detection

Set the type of color measurement parameters. You can also set the other conditions that can be set for the Color Detection tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Colorspace

Select the measurement parameters.
- **RGB** (default): Measures colors using the RGB parameters.
- **HSB**: Measures colors using the HSB parameters.

Point You cannot measure both RGB and HSB parameters simultaneously with the same tool. If HSB is selected, the maximum and minimum intensity of “H” (hue) is not measured (it is always zero). When a near achromatic object is measured with [HSB], the measured value of “H” (hue) may become unstable due to the parameter calculation principle.

Detailed Settings

You can set the other conditions that can be set for the Color Detection tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

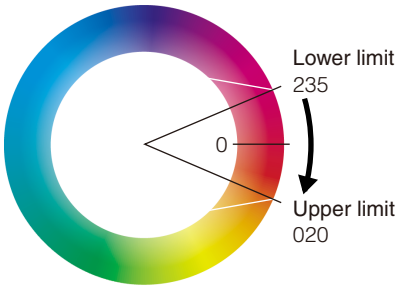
Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point

- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.
- The upper intensity limit applies to the maximum value and the lower limit to the minimum value.
- When using a color camera, settings can be configured for R/G/B or H/S/B, and for each color of UV/B/G/AM/R/FR/IR/W when using MultiSpectrum Light.
- When [HSB] is selected for [Colorspace], “H” (hue) is output in a cycle from 0 to 255, so the upper and lower limit values can also be set in reverse.

Example: When the range around Red (hue value: 0) is to be judged Pass



For details about hue, see “Appendix” - “Technical Description” - "What is the HSB color system?".

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Average

Set the tolerances for the detected intensity average.

- Unit: Number
- Range:
  - For RGB: 0.000 to 255.000
  - For HSB: 0.000 to 256.000

Deviation

Set the tolerances for the detected intensity deviation.

- Unit: Number
- Range:
  - For RGB: 0.000 to 255.000
  - For HSB: 0.000 to 256.000

Intensity

Set the tolerances for the detected maximum and minimum intensity.

- Unit: Number
- Range: 0 to 255

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Display

Sets the display methods for the inspection and mask regions. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Reset

Restores the display options to their default settings.

Pattern Search

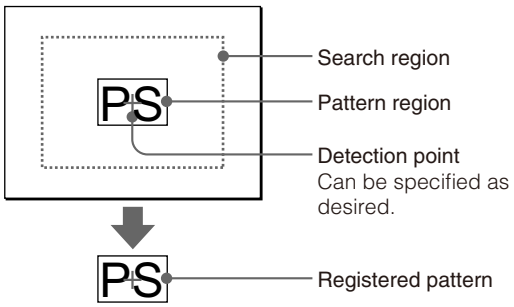
#E015

By registering an image pattern in advance, portions that most resemble the registered pattern can be detected in the current image and the position, tilt angle, and correlation value of the patterns can be measured.

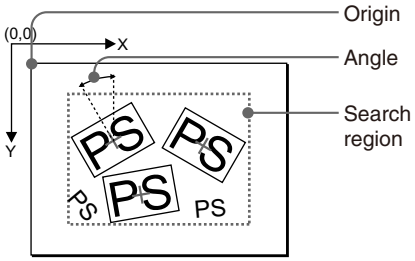
Overview of functions

Images of the Measurement

When a pattern is registered



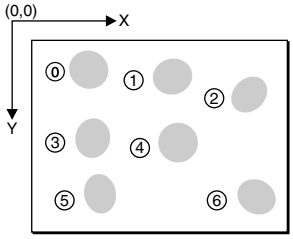
When the system is in operation



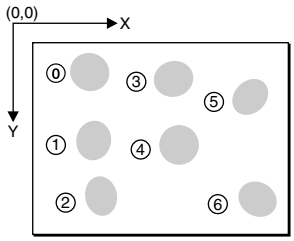
Detected patterns are managed by label number

The following are the 16 different ways to number labels:

- X: Ascending
- X: Descending
- Y: Ascending
- Y: Descending
- Match %: Ascending
- Match %: Descending
- Clockwise
- Counterclockwise
- From Upper Left (Left to Right)



- From Upper Left (Downward)



- From Upper Right (Right to Left)
- From Upper Right (Downward)
- From Lower Left (Left to Right)
- From Lower Left (Upward)
- From Lower Right (Right to Left)
- From Lower Right (Upward)

To change the way labels are numbered, see "Detection Order".

Measurement Results Output

The measurement results output by the Pattern Search tool are as follows.

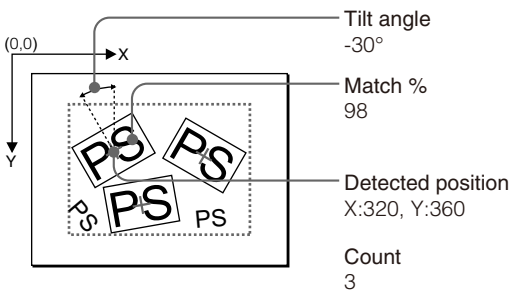
Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Count	Outputs the number of detected patterns.
Position (X, Y) [ ]	Outputs the positional coordinate for all detected patterns in pixels.
Angle [ ]	Outputs all angle deviations between the registered pattern and the detected pattern. Clockwise deviations are positive and counterclockwise deviations are negative.
Match % [ ]	Outputs all of how resemblant, represented by a numerical value from 0 to 99.999, to the registered pattern the pattern detected in the search region is.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

Example of measurement under the following conditions:

- Detection Order: From Upper Left (Downward)
- Judged Label: 0



Properties

When setting the Pattern Search tool, use the [Properties] view. The [Properties] view for the Pattern Search tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Sets the reference position for the tool's coordinate system. Additionally, set the “Search Region” as the range on the captured image in which to detect the pattern region. Register the image of the model to be detected as the “Pattern Region”.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Sets the conditions to detect the pattern during measurement. You can also set the other conditions that can be set for the Pattern Search tool as necessary.
Judgment	Sets the tolerances (upper and lower limits) for the measured values.
Display	Sets the display methods for the search and mask regions and other items.

Region

Sets the reference position for the tool's coordinate system. Additionally, set the “Search Region” as the range on the captured image in which to detect the pattern region. Register the image of the model to be detected as the “Pattern Region”.

Point The size of the pattern region that can be registered is limited by the amount of processing or image memory remaining. As memory is shared in one program, if several tools perform memory-intensive operations, the total memory usage must be kept to within the memory size.

Reference For details about how to set regions, see “Tool Common Setting Items” - "Region" - "Region Settings".

Detection

Set the conditions to detect the pattern during measurement. You can also set the other conditions that can be set for the Pattern Search tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Angle Range (+ Direction)

If the pattern is rotating, set the maximum angle in the positive direction (clockwise) to be measured in the range of 0.000° to 180.000° (default: 30.000).

Angle Range (- Direction)

If the pattern is rotating, set the maximum angle in the negative direction (counterclockwise) to be measured in the range of -179.999° to 0.000° (default: -30.000).

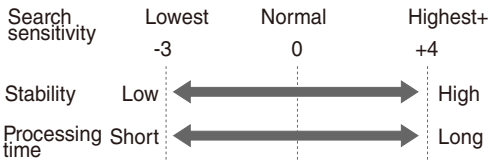
Detection Count

Set the maximum number of patterns to be detected by the Pattern Search tool to between 1 and 99 (default: 1). For example, setting “3” will detect a maximum of three patterns.

Point Even if there is only one detection target, setting the detection count to a multiple number increases the internal search processing which may result in more stable detection.

Search Sensitivity

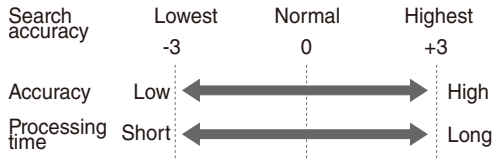
Select the sensitivity of the search. If detection is unstable, set the sensitivity to a higher setting.



Point Although increasing the search sensitivity improves detection stability, processing time also increases.

Search Accuracy

Select the accuracy of the search. If you want to measure with high accuracy, set the search accuracy to a higher setting.



Point Although increasing the search accuracy improves detection accuracy, processing time also increases.

Minimum Match %

Set the lower limit for the correlation value for deeming a pattern as a detection candidate of the measurement within the range of 0.000 to 99.999 (default: 40.000). This is useful when you want to prevent false positives. For example, if the lower correlation value limit is set to 80.000, only patterns with a correlation value of 80.000 or more will be detected and patterns with a correlation value below 80.000 can be excluded from detection in advance.

Label

Detection Order

Set how to assign numbers in order to manage multiple detected patterns.

- **X: Ascending**
- **X: Descending**
- **Y: Ascending**

- **Y: Descending**
- **Match %: Ascending**
- **Match %: Descending** (default): Sorts the patterns in order from the one with the highest correlation value to the one with the lowest correlation value.
- **Clockwise**
- **Counterclockwise**
- **From Upper Left (Left to Right)**
- **From Upper Left (Downward)**
- **From Upper Right (Right to Left)**
- **From Upper Right (Downward)**
- **From Lower Left (Left to Right)**
- **From Lower Left (Upward)**
- **From Lower Right (Right to Left)**
- **From Lower Right (Upward)**

Starting Angle

Set the angle that is the start position for ordering within the range of 0.000 to 359.999 (default: 0.000) when [Clockwise] or [Counterclockwise] is selected for [Detection Order].

Point If [Detection Order] is set to an option other than [Clockwise] or [Counterclockwise], the content is not used.

Grouping Method

Set the range for treating patterns to be ordered as being on the same row or column when sorting using detection order if you selected [From Upper Left (Left to Right)], [From Upper Left (Downward)], [From Upper Right (Right to Left)], [From Upper Right (Downward)], [From Lower Left (Left to Right)], [From Lower Left (Upward)], [From Lower Right (Right to Left)], or [From Lower Right (Upward)] for [Detection Order].

- **Pattern Length (Long Side)** (default): Uses the long side of the rectangle bounding the pattern region as the length of the range in the XY direction.
- **Pattern Length (XY)**: Uses the vertical side of the rectangle bounding the pattern region for the range for considering patterns as being on the same row. And, uses the horizontal side for the range for considering patterns as being on the same column.
- **User Specified**: Sets the range in pixels. The number of pixels is set in [Grouping Range].

Grouping Range (pixel)

Set the number of pixels within the range of 1 to 9999 if you selected [User Specified] for [Grouping Method] (default: 20).

Judged Label

Set the number of the label to judge within the range of 0 to 99 (default: 0). The pattern bearing the label number set here will be selected in the [Image Viewer]. The measurement results of the pattern are also displayed in the [Results] view.

Detailed Settings

You can set the other conditions that can be set for the Pattern Search tool as necessary.

Reference For details about the items other than [Detection Point Offset], see “Tool Common Setting Items” -"Detailed Settings".

Detection Point Offset

If you want to set an offset to the detection point, click the [Edit] button, and then set the offset values.

Point The offset origin is the center point of the pattern region.

Reference You can also directly configure the setting by clicking on the [Image Viewer].

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Count

Set the tolerance for the number of detected patterns.
- Unit: Number of patterns
- Range: 0 to 99

Position X/Position Y

Set the tolerance for the position coordinates of detected patterns.
- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Angle

Set the tolerance for the pattern tilt angle.
- Unit: Angle
- Range: -180.000 to 180.000

Match %

Set the tolerance for the pattern correlation value.

- Unit: Number
- Range: 0 to 99.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

> **Point** The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set the display methods for the search and mask regions and other items. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Search Region

Select whether or not to display the search region.

- **ON** (default): Displays the search region. Set the line thickness and display color of the search region.
- **OFF**: Does not display the search region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the detected position of the detected pattern set in [Judged Label].

- **ON** (default): Displays the detected position. Set the shape, size, thickness, and display color of the pattern region and detection point (center of the pattern region).
- **OFF**: Does not display the detected position.

> **Point** If an offset has been set for the detection point, the position of the detection point moves according to the offset.

Detected Position (Excluding Judged Label)

Select whether or not to display the detected position of the detected patterns other than the one set in [Judged Label].

- **ON** (default): Displays the detected position. Set the shape, size, thickness, and display color of the pattern region and detection point (center of the pattern region).
- **OFF**: Does not display the detected position.

Point If an offset has been set for the detection point, the position of the detection point moves according to the offset.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The detected position setting is applied for the display color.

Display Label Number

Display Match %

Display Position X

Display Position Y

Angle

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all results.

Reset

Restores the display options to their default settings.

ShapeTrax3A

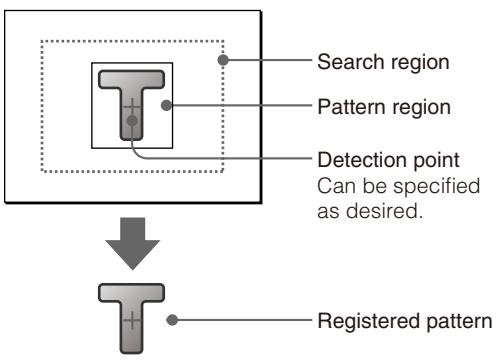
#E016

By comparing the registered image pattern with the edge information from the current image, the most similar locations can be detected and the pattern positions, tilt angles, and correlation values can be measured. This function differs from "Pattern Search" in that it references edge information, mainly the contour of the object, and is suitable for position detection where accuracy and stability against surface condition variations and defects on the object are required. Not only does the function operate at a high speed, but it is also easy to use and measures objects stably due to the automation of some of the settings.

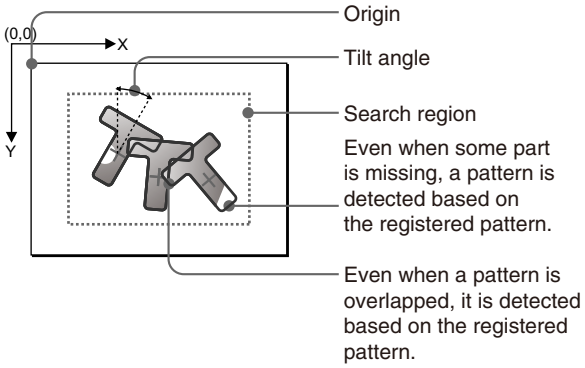
Overview of functions

Images of the Measurement

When a pattern is registered



When the system is in operation



Detected patterns are managed by label number

24 different label numbering methods are available for different applications. To change the way labels are numbered, see "Detection Order".

Measurement Results Output

The measurement results output by the ShapeTrax3A tool are as follows.

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Count	Outputs the number of detected patterns.
Position (X, Y) [ ]	Outputs the positional coordinate for all detected patterns in pixels.
Angle [ ]	Outputs all angle deviations between the registered pattern and the detected pattern. Clockwise deviations are positive and counterclockwise deviations are negative.
Match % [ ]	Outputs all of how resemblant, represented by a numerical value from 0 to 99.999, to the registered pattern the pattern detected in the search region is.
Pattern Scale [ ]	For all detected patterns, the approximate size variation from the registered pattern is output as a numerical value with the model image as 1.000.

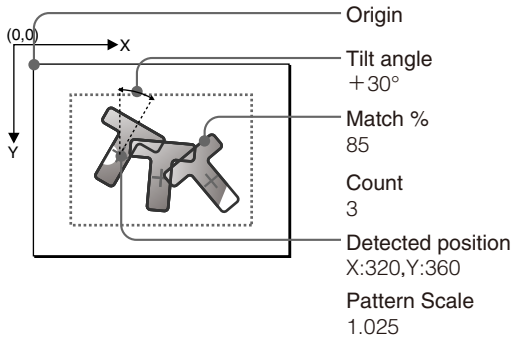
Measurement results	Description
Feature Pixel Count 1 [ ]/ Feature Pixel Count 2 [ ]	Outputs the number of feature pixels within the detection target selection region set in and out of the detected pattern. Pixels are only output when [Detection Target Selection Condition 1/2] respectively are set.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

Example of measurement under the following conditions:

- Detection Order: From Upper Left (Downward)
- Judged Label: 0



Properties

When setting the ShapeTrax3A tool, use the [Properties] view. The [Properties] view for the ShapeTrax3A tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Sets the reference position for the tool's coordinate system. Additionally, set the “Search Region” as the range on the captured image in which to detect the pattern region. Register the image of the model to be detected as the “Pattern Region”.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Sets the conditions to detect the pattern during measurement. Additionally, set the other conditions that can be set for the ShapeTrax3A tool as necessary.
Feature Extraction	Sets the detailed conditions for detecting the model and current image edges.
Judgment	Sets the tolerances (upper and lower limits) for the measured values.
Display	Sets the display methods for the search and mask regions and other items.

Region

Sets the reference position for the tool's coordinate system. Additionally, set the “Search Region” as the range on the captured image in which to detect the pattern region. Register the image of the model to be detected as the “Pattern Region”.

Point Processing memory is consumed to register the image pattern. As the processing memory is shared among the tools within one program setting, it is necessary to ensure that the memory usage of all tools, including the ShapeTrax3A tool, does not exceed the device’s processing memory. The amount of processing memory used is displayed on the status bar when configuring the region and pre-processing settings, and may not be configurable when the value is close to 100%.

Reference
- For details about how to set regions, see “Tool Common Setting Items” - "Region" - "Region Settings".
- The pattern region set with the [Shared Pattern (ShapeTrax3A)] tool can also be referred to. For details, see "Tool Common Setting Items" - "Region" - "Pattern Region".
- Turning on [Enable Eraser Tool] enables the use of the eraser tool which removes unnecessary feature information in the image. Click the [Edit] button to display the [Edit Eraser] dialog box. For details, see "Erasing Unnecessary Feature Information/ Boundary Information (Eraser Tool)".

Detection

Set the conditions to detect the pattern during measurement. You can also set the other conditions that can be set for the ShapeTrax3A tool as necessary.
→Detection Conditions
→Rotation Direction-Added Search
→Overlap Elimination
→Detection Target Selection Conditions
→Adjacent Processing
→Options
→Detailed Settings

Point Processing times may vary in accordance with changes in the state of the current image. As edge information is detected and processed from the current image, the processing time may vary depending on changes in the amount of edge detections. If processing time fluctuations are a problem, you should check the actual line after setting [Timeout (sec)].

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Angle Range (+ Direction)

If the pattern is rotating, set the maximum angle in the positive direction (clockwise) to be measured in the range of 0.000° to 180.000° (default: 30.000).

Angle Range (- Direction)

If the pattern is rotating, set the maximum angle in the negative direction (counterclockwise) to be measured in the range of -179.999° to 0.000° (default: -30.000).

Point
- Reducing the angle range can shorten the processing time.
- For objects with high rotational symmetry, turning the [Enable Rotation Direction-Added Search] option on may stabilize the angle measurement results.
- Turning the [Enable Rotation Direction-Added Search] option on may make the measurement result angle exceed the angle range.

Detection Count

Set the maximum number of patterns to be detected by the ShapeTrax3A tool within the range of 1 to 2000 (default: 1). For example, setting “3” will detect a maximum of three pattern positions.

Point
Even if there is only one detection target, setting the detection count to a multiple number increases the internal search processing which may result in more stable detection.

Minimum Match %

Set the lower limit for the correlation value for deeming a pattern as a detection candidate of the measurement within the range of 0.000 to 99.999 (default: 60.000). This is useful when you want to prevent false positives. For example, if the lower correlation value limit is set to 80.000, only patterns with a correlation value of 80.000 or more will be measured and patterns with a correlation value below 80.000 can be excluded from being measured in advance.

Scale Range (Upper Limit)/Scale Range (Lower Limit)

Set the size fluctuation range of the search target against the registered features in the range from upper limit: 2.000 times to lower limit: 0.500 times with the registered features as 1.000.

Point
The greater the scale range, the longer the processing time.

Fine Search Accuracy

Set the accuracy of the search.
- **Detailed** (default): Performing a fine search in greater detail enables higher accuracy.
- **Fast**: Select this setting when processing speed should be prioritized over accuracy.

Point
Although raising fine search accuracy improves detection accuracy, the processing time also increases.

Reverse Detection

Use this option to perform detection even in the case where black and white are reversed due to capture conditions.
- **OFF** (default): Does not detect if black and white are reversed.
- **ON**: Even if the shading is inverted, it is detected in the same way as before inversion.

Allowable Distortion

Set the allowable distortion within the range of 0 to 50 (default: 0). If each edge of the detection candidate is not aligned with the registered pattern due to the lens angle or object tilting, they are

detected as edges during fine search as long as it is a distortion of about the same level as the specified value (number of pixels).

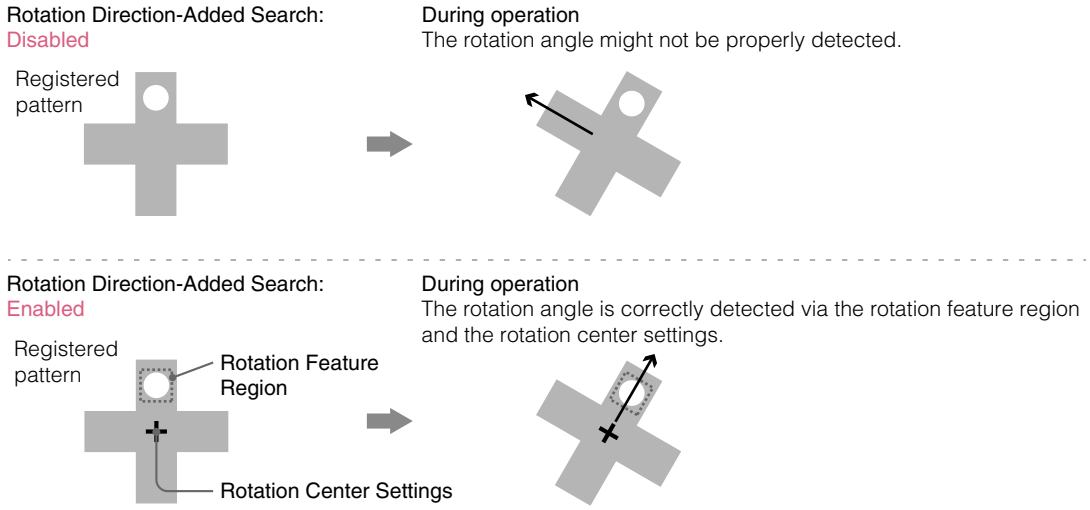
Detection Region Expansion

Select whether or not to detect the registered pattern outside the search region.

- **ON** (default): If the detection point is within the search region, targets that, when compared to the registered pattern, are up until halfway beyond the search region are also searched.
- **OFF**: Searches inside the search region by the short side of the bounding rectangle of the pattern region relative to the inside of the search region, so that targets outside the search region are not detected.

Rotation Direction-Added Search

If you want to calculate the rotation angle using a feature with a particular circumferential direction for objects characterized by point symmetry such as circles and regular n-sided polygons, enable the rotation direction-added search and set the conditions for the rotation direction-added search. As the search is carried out separately from the features of the entire object, it is effective when the feature point for determining the rotation angle is small. The precise angle is detected by means of a compensatory search using the feature that determines the rotation angle, which is performed after the general positioning is determined using the overall feature and just before the fine search is performed.



Point The Rotation Direction-Added Search may detect an angle that exceeds the angle range set in [Detection Conditions].

Enable Rotation Direction-Added Search

Turn on this item to enable rotation direction-added search.

Rotation Feature Region Settings

Register regions that have the features for determining the rotation angle from the model that you want to detect with the rotation direction-added search.
Click the [Edit] button to edit the rotation feature region.

Point If the bounding rectangle that encompasses the pattern and rotation feature regions exceeds 2544 pixels in width or 2544 pixels in height, [Large Area Search Mode] needs to be enabled. As the rotation feature region is handled as part of the pattern region, if you place the rotation feature region outside of the pattern region, the pattern region will substantially widen, which may affect the search results.

Add

Every time this button is clicked, a rotation feature region is added.

Shape

Select the shape for the rotation feature region.

- **Rectangle**: Set the width, height, center X, center Y, and rotation angle.
- **Circle**: Set the center X, center Y, and radius.
- **Oval**: Set the center X, center Y, radius 1, radius 2, and rotation angle.
- **Ring**: Set the center X, center Y, radius 1, and radius 2.
- **Arc**: Set the center X, center Y, radius 1, radius 2, starting angle, and ending angle.
- **Polygon**: Set vertex n, X and Y.

Mask

Turning this option on enables you to specify the areas you want to exclude from the rotation feature region.

Rotation Center Settings

Click the [Edit] button to set the position of the center of rotation.

Point Setting the center of rotation accurately stabilizes the Rotation Direction-Added Search.

Reference

- **Specified Point**: Specify any desired coordinate with reference to the center position of the set pattern region as the center of rotation.
- **Center of Gravity:** The center of rotation is the position of the center of gravity where the registered edges to the model image are the point group. As the center of rotation is set with reference to a group of registered edge points in the model image, the positional relationship between the center of rotation and the object is almost constant, irrespective of the setting status of the rotation feature region. This option is useful because as long as the registered edges are extracted properly, the center of the rotation will be in almost the same position regardless of the registration position of the object in the rotation feature region.

Offset X/Offset Y

Specify the coordinates of the center of rotation when [Specified Point] is specified in [Reference]. The coordinates to be specified are specified as a numerical value to be offset with reference to the center position of the set pattern region.

Point The offset origin is the center point of the pattern region.

Rotation Condition

Select the correction range for the rotation direction.

- **Whole Circumference** (default): This setting is effective for objects for which the overall shape is round.

- **180° Rotation**: This setting is effective for objects for which the overall shape is rectangular or elliptical.
- **Polygon**: This setting is effective for objects, such as gears, for which the overall shape is a polygon. Set the number of vertices (3 to 16) in [Polygon Setting].

Point

- When [Whole Circumference] is set, the measurement time may increase greatly. If you want to reduce the measurement time, set [180° Rotation] or [Polygon]. Alternatively, review the settings and reduce the detection count or the like. Review the [Timeout] setting at the same time as well.
- The search position for the rotation feature region is displayed in accordance to the rotation condition. This is useful for when checking whether the center of the rotation and the rotation condition are correctly set. Note that when [Polygon] or [180° Rotation] is set, all search positions are displayed, and when [Whole Circumference] is set, only a representative search position is displayed.

Follow Angle Range of Detection Conditions

Enable this setting to limit the angle range of the rotation direction-added search to that in the detection condition settings. If this setting is disabled, the rotation direction-added search is performed at a range of 360° (the setting is disabled when the rotation condition is [180° Rotation]).

Rotation Feature Densification

Enable this setting to capture and search for finer features in the rotation feature region.

Concentricity Margin Range

Detects rotation features if their shift is of about the specified value (number of pixels) in cases that the center of the rotation can easily shift due to the lens angle and object gradient. Set the concentricity margin range within the range of 0 to 50 (default: 0).

Overlap Elimination

If multiple search results overlap on the detection target, candidates are omitted by the degree in which the area of the detection candidates overlap.

Enable Overlap Elimination

To use overlap elimination, turn this setting on.

Elimination Target

Set the basis for omission from detection candidates if multiple search results overlap on the detection target.

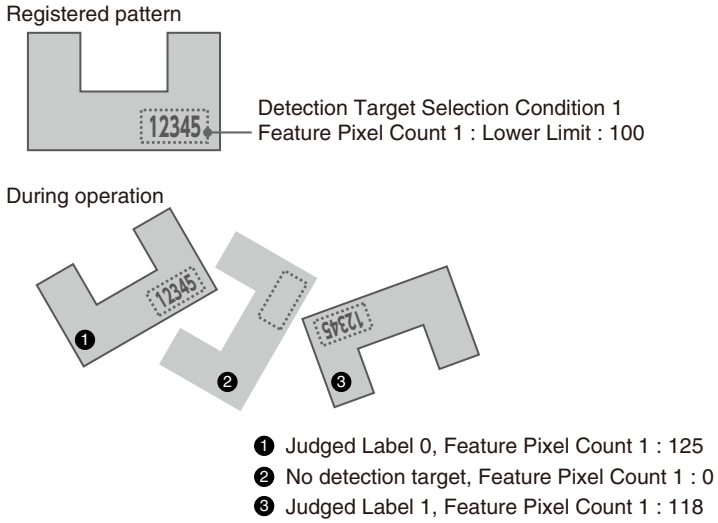
- **Other Than Best Match** (default): Of the multiple candidates that overlap, the candidate with the highest match percentage is left behind.
- **All**: If multiple candidates overlap, all candidates are omitted.

Elimination Basis Overlap Area (%)

Set the extent of overlap (%) of the areas of the detected candidates that is to serve as the criterion for exclusion from the detected candidates within the range of 0 to 100 (default: 30) when multiple search results overlap on the detection target.

Detection Target Selection Conditions

This function enables you to set a region that is different to the inspection region and select whether to include detection targets based on the feature amount in that region. This is useful for when you want to set special areas (such as marks) that exist only on the front face of the object and eliminate objects that are facing downwards from detection targets. It is also effective if you want to set around the object and eliminate overlap detections.



Point

- Two detection target selection conditions ([Detection Target Selection Condition 1] and [Detection Target Selection Condition 2]) can be set at the same time. For example, by setting [Detection Target Selection Condition 1] so that only objects that have certain features remain and setting [Detection Target Selection Condition 2] so that object overlap is eliminated, only detection targets that satisfy both conditions will remain.
- Processing of the detection target selection conditions is performed after fine search, exclusion of adjacent candidates, and overlap elimination processing are performed.
- Feature Pixel Count is calculated depending on the features in the detection target selection region.
- By specifying conditions according to the number of feature pixels, the detection target can be limited.

Enable Detection Target Selection Condition 1/Enable Detection Target Selection Condition 2

To enable Detection Target Selection Condition 1 or Detection Target Selection Condition 2, turn on the setting.

Region

Edit the region for calculating feature pixels.
Click the [Edit] button to edit the region for calculating feature pixels.

Add

Every time this button is clicked, a region for calculating feature pixels is added.

Shape

Select the shape of the region for calculating feature pixels.

– **Rectangle**: Set the width, height, center X, center Y, and rotation angle.
– **Circle**: Set the center X, center Y, and radius.
– **Oval**: Set the center X, center Y, radius 1, radius 2, and rotation angle.
– **Ring**: Set the center X, center Y, radius 1, and radius 2.

– **Arc**: Set the center X, center Y, radius 1, radius 2, starting angle, and ending angle.
– **Polygon**: Set vertex n, X and Y.

Mask

Turning this option on enables you to set the region for which you do not want to calculate feature pixels.

Feature Extraction Settings

Set the conditions for extracting feature pixels.

- **Link with Current Feature** (default): Use the feature threshold value used in a search as is.
- **Specified Value**: You can set any threshold value. This value can be adjusted if the default setting detects too many feature pixels or the special areas that you want to use for [Detection Target Selection Conditions] are not detected as feature pixels.

Feature Intensity Lower Limit

Set any threshold value when [Specified Value] is selected in [Feature Extraction Settings].

Detection Target Retainment Condition

- **Feature Pixel Count**: Set the feature pixel count for the detection targets to be output as the result within the range of 0 to 99 (default: 0).
  – **Or More are Retained** (default): Outputs the detection target that has more feature pixels than set for [Feature Pixel Count] as the result.
  – **Or Fewer are Retained**: Outputs the detection target that has less feature pixels than set for [Feature Pixel Count] as the result.

Adjacent Processing

Set the range of [Distance], [Angle], and [Scale] for exclusion from the candidates to set the conditions for excluding candidates close to the center of the bounding rectangle of the registered feature when search results overlap a detection target. Candidates that meet the AND condition of the respective setting are excluded. Increasing the exclusion amount may remedy the problems of duplicate detections of one object and erroneous detections of nearby similar objects. However, if objects are close to each other when performing multiple detections, they may not be detected correctly.

Minimum Distance

Set the range for excluding from the detection candidates in terms of distance (number of pixels) from the center of the bounding rectangle of the registered feature. Set the minimum distance within the range of 0 to 999 (default: 30).

Angle Range (+/-)

Set the angle range for excluding from the detection candidates with the angle of the detection target (starting angle) as the center. Set the angle range within the range of 0 to 180 (default: 180).

Starting Angle

Select the reference angle to exclude adjacent candidates by setting the angle to [0°] (default), [0/180°], [0/120/240°], or [0/90/180/270°]. With this angle as where the detection target's angle is deemed as 0°, features in the range specified in [Angle Range (+/-)] are excluded from the

detection candidates. To exclude the case where reversed patterns are erroneously detected, select [0/180°]. This excludes candidates with angles near 0° and inverted angles near 180° of the detection target, while leaving overlapping targets at intersecting angles (e.g. 90°) as detection candidates.

Minimum Scale (%) (+/-)

Set the range for excluding from the detection candidates by a scale (%) relative to the detection target. Set the minimum scale within the range of 0 to 100 (default: 10).

Options

Detection Order

Set how to assign numbers in order to manage multiple detected patterns.

- **X: Ascending**
- **X: Descending**
- **Y: Ascending**
- **Y: Descending**
- **Match %: Ascending**
- **Match %: Descending** (default): Orders the detected patterns by their correlation values from highest to lowest.
- **Feature Pixel Count 1: Ascending**
- **Feature Pixel Count 1: Descending**
- **Feature Pixel Count 2: Ascending**
- **Feature Pixel Count 2: Descending**
- **Clockwise**
- **Counterclockwise**
- **Scale: Ascending**
- **Scale: Descending**
- **Scale Disjunction: Ascending**
- **Scale Disjunction: Descending**
- **From Upper Left (Left to Right)**
- **From Upper Left (Downward)**
- **From Upper Right (Right to Left)**
- **From Upper Right (Downward)**
- **From Lower Left (Left to Right)**
- **From Lower Left (Upward)**
- **From Lower Right (Right to Left)**
- **From Lower Right (Upward)**

Starting Angle

Set the angle that is the start position for ordering within the range of 0.000 to 359.999 (default: 0.000) when [Clockwise] or [Counterclockwise] is selected for [Detection Order].

Grouping Method

Set the range for treating patterns as being on the same row or column when sorting using detection order if you selected [From Upper Left (Left to Right)], [From Upper Left (Downward)],

[From Upper Right (Right to Left)], [From Upper Right (Downward)], [From Lower Left (Left to Right)], [From Lower Left (Upward)], [From Lower Right (Right to Left)], or [From Lower Right (Upward)] for [Detection Order].

- **Pattern Length (Long Side)** (default): Uses the long side of the rectangle bounding the pattern region as the length of the range in the XY direction.
- **Pattern Length (XY)**: Uses the vertical side of the rectangle bounding the pattern region for the range for considering patterns as being on the same row. And, uses the horizontal side for the range for considering patterns as being on the same column.
- **User Specified**: Sets the range in pixels. The number of pixels is set in [Grouping Range (pixel)].

Grouping Range (pixel)

Set the range by the number of pixels if you selected [User Specified] for [Grouping Method] (1 to 9999, default: 20).

Judged Label

Set the judged label within the range of 0 to 1999 (default: 0). The pattern bearing the number that is set will be selected in the [Image Viewer]. Also, the measurement results of the pattern are the ones displayed in the [Results] view.

Timeout (sec)

Set the maximum processing time. When the processing time for a given single tool exceeds the set value (0.5 to 60.0 seconds, default: 5.0 seconds) due to the state of the current image, the tool will return a timeout error and all outputs will be set to 0.

Point The set value is a rough guide. Errors may occur before the actual timeout.

Detailed Settings

You can set the other conditions that can be set for the ShapeTrax3A tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Detection Point Offset

If you want to set an offset to the detection point, click the [Edit] button, and then set the offset value.

Point The offset origin can be set either by selecting [Specified Point] and entering the X/Y coordinates, or by selecting [Center of Gravity].

Reference You can also directly configure the setting by clicking on the [Image Viewer].

Feature Extraction

Set the advanced settings to detect the model and current image edges. Setting up the system to accurately detect edge information from the model and current images enables highly accurate measurements. The ShapeTrax3A tool runs a coarse search using a compressed image and pattern model to quickly detect the approximate position, and then uses a fine search to detect the

precise position. Set the specific feature detection conditions for the coarse and fine search independently here.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Feature Extraction Conditions

Display Feature

Select the features you want to display.

- **Coarse** (default): Displays the coarse features used for a coarse search.
- **Fine**: Displays the fine features used for a fine search.

Feature Extraction Settings

Set the conditions for detecting the model and current image edges. The ShapeTrax3A tool automatically detects optimal edges based on the model image and the pattern region. A coarse search is run using a compressed image and pattern model to quickly detect the approximate position, and then a fine search is run to detect the precise position.

- **Automatic** (default): Sets conditions for optimal edge detection based on the model image and pattern region.
- **Automatic (Low Contrast)**: This setting is effective for objects that are prone to changes in appearance during operation, such as blurred outlines or object contrast changes.
- **Custom**: If detection is not stable with the automatic setting, adjust the edge detection sensitivity manually.

Registered Feature Intensity Lower Limits

To allow only special features of the target to be extracted as edges, configure the settings while checking the edge display on the image displayed on the screen within the range of 1 to 255 (default: 30). Set values for the coarse features and fine features of the model image respectively.

Current Feature Intensity Lower Limits

To allow only special features of the target to be extracted as edges, configure the settings while checking the edge display on the image displayed on the screen within the range of 1 to 255 (default: 30). Set values for the coarse features and fine features of the current image respectively.

Search Sensitivity

You can change the amount of image and feature reduction to set the priority of search speed and stability. The image reduction amount is the degree of compression of the image used for the model image and the current image. Feature reduction is the degree of compression of the features extracted in the model and current images.

- **Fast**: Select this option to prioritize search speed.
- **Standard** (default): Select this option during normal operation.
- **Detailed**: Select this option to prioritize stability.
- **Custom**: If detection is not stable with the above settings, adjust the reduction rate of each item.

Coarse Search Image Reduction

0 (small reduction rate) to 10 (large reduction rate), default: 4

Coarse Search Feature Reduction

0 (small reduction rate) to 10 (large reduction rate), default: 4

Fine Search Image Reduction

0 (small reduction rate) to 4 (large reduction rate), default: 0

Point

- Setting all of the reduction rates to [0 (smallest)] will increase processing time and will not necessarily improve search accuracy.
- If [Fine Search Image Reduction] is set high, the change in match % may also be large.
- If the reduction rate is set high, features in the mask region may be extracted.
- A value greater than [Coarse Search Image Reduction] cannot be set for [Fine Search Image Reduction].
- If the size of the image that is the target of measurement is large, the features may deviate from the actual edge, even if [Large Area Search Mode] is disabled or the degree of reduction is set to a low value, and may be coarsely displayed.

Feature Densification

If you want to capture and search even finer features, select [High] (processing speed decreases). The [Automatic] (default) setting maintains stability while processing speed remains high.

Large Area Search Mode

If the search or pattern region size exceeds 2544 pixels in width or 2544 pixels in height, this setting needs to be turned on.

Point

When [Large Area Search Mode] is enabled, the reduction rate of [Coarse Search] and [Fine Search] is limited to a minimum of 4.

Eraser Tool

Enable Eraser Tool

Turning on [Enable Eraser Tool] enables the use of the eraser tool which removes unnecessary feature information in the image. Click the [Edit] button to display the [Edit Eraser] dialog box. For details, see "Erasing Unnecessary Feature Information/Boundary Information (Eraser Tool)".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Count

Set the tolerance for the number of detected patterns.
- Unit: Number of patterns
- Range: 0 to 9999

Position X/Position Y

Set the tolerance for the position coordinates of detected patterns.
- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Angle

Set the tolerance for the pattern tilt angle.
- Unit: Angle
- Range: -180.000 to 180.000

Match %

Set the tolerance for the pattern correlation value.
- Unit: Number
- Range: 0.000 to 99.999

Pattern Scale

Set the tolerance for the pattern scale.
- Unit: Number
- Range: 0.000 to 9.999

Feature Pixel Count 1/Feature Pixel Count 2

Set the tolerance for the number of feature pixels inside and outside of the pattern output by [Detection Target Selection Conditions]. The tolerance can be set for the feature pixel count of [Detection Target Selection Condition 1] and [Detection Target Selection Condition 2] respectively.
- Unit: Pixel Count
- Range: 0 to 999999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set the display methods for the search and mask regions and other items. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Search Region

Select whether or not to display the search region.

- **ON** (default): Displays the search region. Set the line thickness and display color of the search region.
- **OFF**: Does not display the search region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the detected position of the detected pattern set in [Judged Label].

- **ON** (default): Displays the detected position. Set the shape, size, thickness, and display color of the pattern region and detection point (center of the pattern region).
- **OFF**: Does not display the detected position.

Point If an offset has been set for the detection point, the position of the detection point moves according to the offset.

Detected Position (Excluding Judged Label)

Select whether or not to display the detected position of the detected patterns other than the one set in [Judged Label].

- **ON** (default): Displays the detected position. Set the shape, size, thickness, and display color of the pattern region and detection point (center of the pattern region).
- **OFF**: Does not display the detected position.

Point If an offset has been set for the detection point, the position of the detection point moves according to the offset.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The detected position setting is applied for the display color.

Display Label Number

Display Match %

Display Position X

Display Position Y

Angle

Pattern Scale

Display Feature Pixel Count 1

Display Feature Pixel Count 2

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all results.

Feature Point Display

Specify how to display the feature points displayed for [Filtered image] and [Contrast image].

Pattern Region Display

To hide the pattern region, turn off this setting (default: ON).

Registered Feature

Select what to display for registered features.

- **None**: Do not display the registered features.
- **Fine Feature** (default): Display fine features.
- **Coarse Feature**: Display coarse features.

Rotation Feature Region Display

To hide the rotation feature region set in [Rotation Direction-Added Search] under the [Detection] tab, turn off this setting (default: ON).

Detection Target Selection Region 1 Display/Detection Target Selection Region 2 Display

To hide the region set in [Detection Target Selection Conditions] under the [Detection] tab, turn off this setting (default: ON).

Rotation Feature Region

Set the display details for [Rotation Feature Region Display] in [Feature Point Display].

Rotation Feature Region

Set the line thickness and display color of the rotation feature region.

Detection Target Selection Region

Region 1 Display/Region 2 Display

Set the line thickness and display color of the Region 1/Region 2 for obtaining feature pixels set in [Detection Target Selection Conditions] under the [Detection] tab.

Reset

Restores the display options to their default settings.

Edge Position

#E017

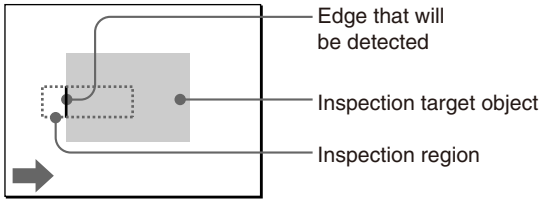
This is a tool that can scan in any direction in the set inspection region to detect edges. Edge position measurement measures the position of the edge that was specified from among the detected edges. Note that edge detection is based on the amount of change, not the absolute value of intensity, and is therefore less affected by light fluctuations during image capture.

Overview of functions

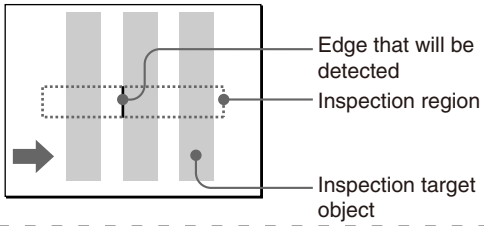
Images of the Measurement

When the inspection region is a rectangle

- Judged Label: 0
- Scan Direction: Forward
- Edge Direction: Bright to Dark

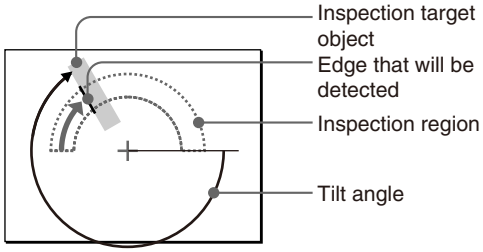


- Judged Label: 1
- Scan Direction: Forward
- Edge Direction: Bright to Dark



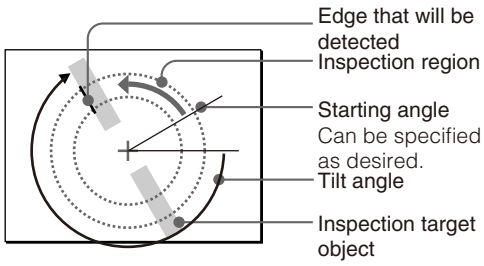
When the inspection region is an arc

- Judged Label: 0
- Scan Direction: (Clockwise)
- Edge Direction: Bright to Dark



When the inspection region is a ring

- Judged Label: 0
- Scan Direction: (Counterclockwise)
- Edge Direction: Dark to Bright



Reference For a technical description of edge detection, see “Appendix” - “Technical Description” - "What is an Edge?".

Measurement Results Output

The measurement results output by the Edge Position tool are as follows.

Point The measurement items differ depending on the shape of the inspection region. The value of an item that is not measured is always zero.

When the inspection region is not a ring or arc

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code

Measurement results	Description
Number of Detected Edges	Outputs the number of detected edges.
Position (X, Y) [ ]	Outputs the position for all detected edges in pixels.
Distance [ ]	Outputs all distances from the start point of the inspection region to the edge position coordinates in pixels.
Intensity [ ]	Outputs the edge intensity values for all detected edges.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits) or the specified edge does not exist, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

When the inspection region is a ring or arc

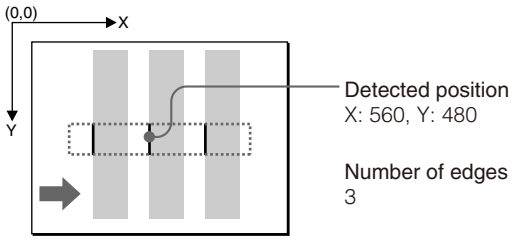
Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Number of Detected Edges	Outputs the number of detected edges.
Angle [ ]	Outputs the angle of all detected edges.
Distance [ ]	Outputs all angles from the start point of the inspection region to the edge position.
Intensity [ ]	Outputs all the maximum edge intensity for the detected edges.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits) or the specified edge does not exist, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Examples

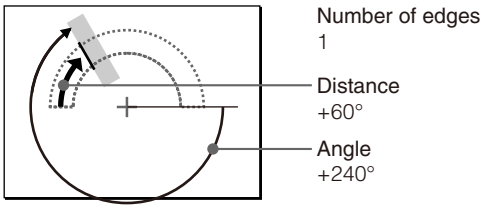
When the inspection region is a rectangle

- Judged Label: 1
- Scan Direction: Forward
- Edge Direction: Bright to Dark



When the inspection region is an arc

- Judged Label: 0
- Scan Direction: (Clockwise)
- Edge Direction: Bright to Dark



Properties

When setting the Edge Position tool, use the [Properties] view. The [Properties] view for the Edge Position tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. You can also set the other conditions that can be set for the Edge Position tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set the display methods for the inspection and mask regions, and the detected edge.

Region

Specify the area on the captured image to be used for measurement.

Point Changing the shape of the region resets some of the settings for [Detection] and [Judgment].

Reference For details about how to set regions, see “Tool Common Setting Items” - "Region" - "Region Settings".

Detection

Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. You can also set the other conditions that can be set for the Edge Position tool as necessary.

Point Changing the shape of the region resets [Detection Conditions] and some of its settings.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Scan Direction

Select the direction to detect edges.

- If the inspection region is a circle/oval/polygon: → (default), ←, ↑, ↓
- If the inspection region is a rectangle: **Forward** (default) or **Reverse** relative to the horizontal axis (X-axis) of the region. Note that since the scan direction depends on the rotation angle of the inspection region, this should be taken into consideration when setting the inspection region.
- When the inspection region is a ring or arc: **Clockwise** (default), **Counterclockwise**

Edge Direction

Select the direction for detecting an edge.

- **Both** (default): Detects both borders in a transition that changes from a bright area to a dark area or from a dark area to a bright area.
- **Bright to Dark**: Detects borders in a transition that changes from a bright area to a dark area.
- **Dark to Bright**: Detects borders in a transition that changes from a dark area to a bright area.

Starting Angle

Set the position to start scanning edges within the range of 0.000 to 359.999 (default: 0.000) when [Ring] is selected for the inspection region.

Point Even if the Starting Angle is changed, the reference position for the detected angle is fixed at the 3 o'clock position.

Edge Sensitivity (%)

Set the percentage threshold (0% to 100%) for identifying edges (default: 30).

Edge Filter Width

Set the width (0 to 100 pixels) of the smoothing filter applied to the differential graph for detecting edges (default: 5).

Edge Intensity Upper Limit

Set the upper limit (0.000 to 255.000) of edge intensity for detecting edges (default: 255.000).

Edge Intensity Lower Limit

Set the lower limit (0.000 to 255.000) of edge intensity for detecting edges (default: 5.000).

Reference Unwanted edges can be excluded from detection by adjusting the upper and lower edge intensity limit values while referring to the highest edge intensity in the inspection region (shown on the left of the edge graph). For details, see “Appendix” - “Technical Description” - "What is an Edge?".

Options

Judged Label

Set the number of the edge (0 to 3599) to be used as the primary target for judgment from among the detected edges (default: 0). Edge numbers are assigned in order in the direction set in [Scan Direction] (if the specified judged label is not detected, the measurement result for [Judged Label] defaults to 0).

Maximum Edge Count

Set the maximum number of edges (1 to 3600) to be detected (default: 1).

Point The actual maximum number of edges that can be set differs depending on resource memory use.

Angled Edge Detection

Turn on this option to stabilize the detection of slanted edges in the inspection region (default: OFF). Using this option under normal conditions may affect the accuracy of the measurement.

Edge Graph Display Position

When you open the [Detection] tab in Setup Mode, an edge graph is displayed in [Image Viewer]. From the drop-down menu, select which side of the inspection region to display the edge graph.

- When [Scan Direction] is [←], [→], [Forward], [Reverse], [Clockwise], or [Counterclockwise]: [Top] or [Bottom] (default)

  Reference When the inspection region is a rectangle, the position where the rotation angle is 0° is used as the reference.

- When [Scan Direction] is [↑] or [↓]: [Left] (default) or [Right]

Detailed Settings

You can set the other conditions that can be set for the Edge Position tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Number of Detected Edges

Set the tolerance for the detected edge count.

- Unit: Number of edges
- Range: 0 to 9999

Position X/Position Y

Set the tolerance of the edge detection position when the shape of the inspection region is not a ring or arc.

- Unit: Pixel Count

- Range: -99999.999 to 99999.999

Angle

Set the tolerance for the detected angle of the edge when there is one inspection region and the shape of the inspection region is a ring or arc.

- Unit: Angle
- Range: 0.000 to 360.000

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set the display methods for the inspection and mask regions, and the detected edge. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the detected position of the detected edge set in [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detected position.

- **OFF**: Does not display the detected position.

Detected Position (Excluding Judged Label)

Select whether or not to display the detected position of the detected edges other than the one set in [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detection position.
- **OFF**: Does not display the detected position.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The detected position setting is applied for the display color.

Display Label Number

Display Position X/Display Position Y

Display Angle

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all results.

Reset

Restores the display options to their default settings.

Edge Width

#E018

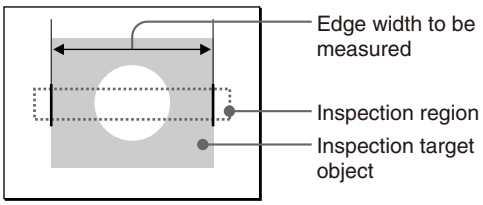
This is a tool that can scan in any direction in the set inspection region to detect multiple edges. Edge width measurement measures the width between two edges. Note that edge detection is based on the amount of change, not the absolute value of intensity, and is therefore less affected by light fluctuations during image capture.

Overview of functions

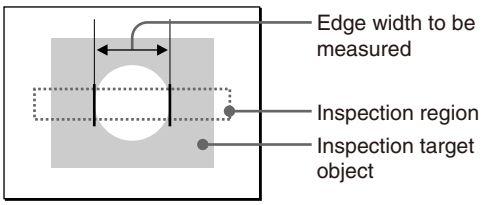
Images of the Measurement

When the inspection region is a rectangle

• When the [Select Mode] is [Outer Gap]



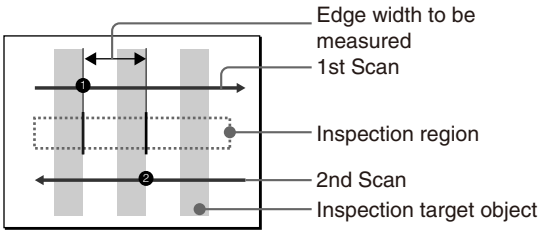
• When the [Select Mode] is [Inner Gap]



• When the [Select Mode] is [1st/2nd Edges]

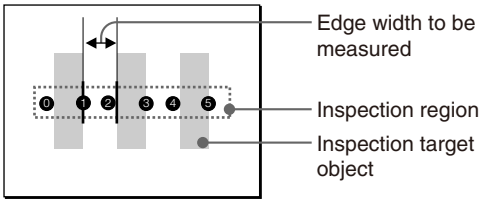
Specified Edge of [Edge Detection (1st Edge)] : 1

Specified Edge of [Edge Detection (2nd Edge)] : 2



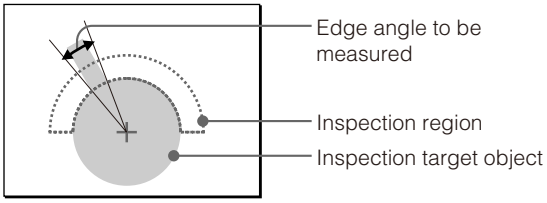
• When the [Select Mode] is [Specified Edges]

[Specified Edge]: 1→2

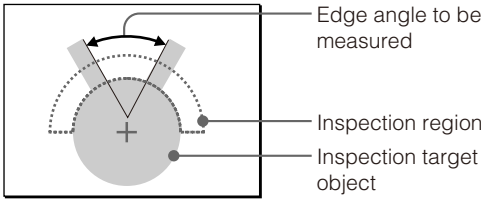


When the inspection region is a ring or an arc

• When the [Select Mode] is [Outer Gap]



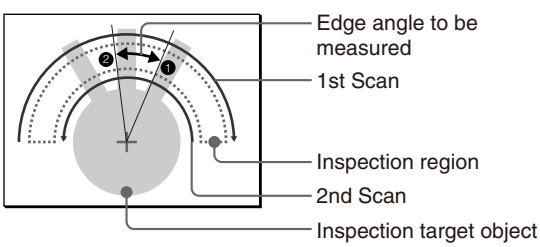
• When the [Select Mode] is [Inner Gap]



• When the [Select Mode] is [1st/2nd Edges]

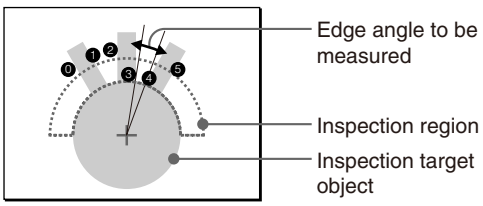
Specified Edge of [Edge Detection (1st Edge)] : 2

Specified Edge of [Edge Detection (2nd Edge)] : 1



• When the [Select Mode] is [Specified Edges]

[Specified Edge]: 3→4



Reference For a technical description of edge detection, see “Appendix” - “Technical Description” - "What is an Edge?".

Measurement Results Output

The measurement results output by the Edge Width tool are as follows.

Point The measurement items differ depending on the shape of the inspection region. The value of an item that is not measured is always zero.

When the inspection region is not a ring or arc

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Edge Width	Outputs the width in pixels.
Pair Count	Outputs (1) if a pair is detected or (0) if not.
Position 1 (X, Y)	Outputs the position coordinates for the edge nearest the measurement start position of the edges that constitute the pair in pixels.
Angle 1	Outputs the angle of edge position 1.
Distance 1	Outputs the distance from the measurement start position to the detected edge position for edge position 1 in pixels.
Intensity 1	Outputs the edge intensity for edge position 1.
Position 2 (X, Y)	Outputs the position coordinates for the edge furthest from the measurement start position of the edges that constitute the pair in pixels.
Angle 2	Outputs the angle of edge position 2.
Distance 2	Outputs the distance from the measurement start position to the detected edge position for edge position 2 in pixels.
Intensity 2	Outputs the edge intensity for edge position 2.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

When the inspection region is a ring or arc

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Edge Width	Outputs by angle.
Pair Count	Outputs (1) if a pair is detected or (0) if not.
Position 1 (X, Y)	Outputs the position of the intersection of the edge nearest the measurement start position and the center line of the region of the edges that constitute the pair in pixels.
Angle 1	Outputs the angle of edge position 1.
Distance 1	Outputs the distance from the measurement start position to the detected edge position for edge position 1 by angle.
Intensity 1	Outputs the edge intensity for edge position 1.
Position 2 (X, Y)	Outputs the position of the intersection of the edge furthest from the measurement start position and the center line of the region of the edges that constitute the pair in pixels.
Angle 2	Outputs the angle of edge position 2.

Measurement results	Description
Distance 2	Outputs the distance from the measurement start position to the detected edge position for edge position 2 by angle.
Intensity 2	Outputs the edge intensity for edge position 2.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

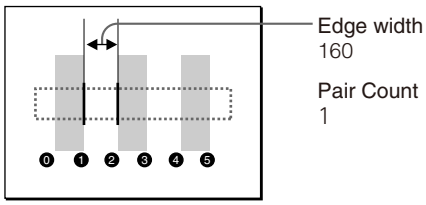
Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Examples

When the inspection region is a rectangle

Example showing the results of an Edge Width inspection performed under the following conditions:

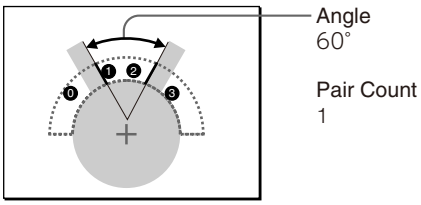
- Scan Direction: Forward
- Edge Direction: Both
- Specified Edge 1: 1
- Specified Edge 2: 2



When the inspection region is an arc

Example showing the results of an Edge Width inspection performed under the following conditions:

- Scan Direction: (Clockwise)
- Edge Direction: Both
- Specified Edge 1: 1
- Specified Edge 2: 2



Properties

When setting the Edge Width tool, use the [Properties] view. The [Properties] view for the Edge Width tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. Additionally, set the other conditions that can be set for the Edge Width tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set the display methods for the inspection and mask regions, and the detected edge.

Region

Specify the area on the captured image to be used for measurement.

Point Changing the shape of the region resets some of the settings under [Detection] and [Judgment].

Reference For details about how to set regions, see “Tool Common Setting Items” - “Region” tab - "Region Settings".

Detection

Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. You can also set the other conditions that can be set for the Edge Width tool as necessary.

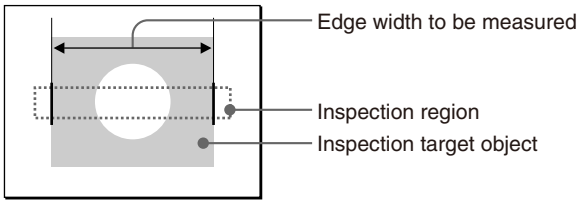
Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Mode

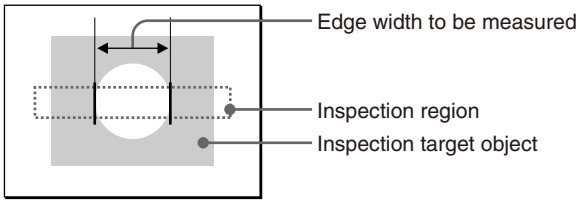
Select Mode

Select the type of edge width to be measured.

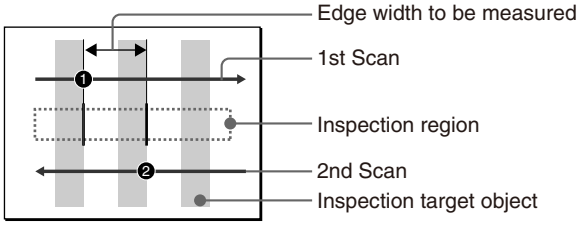
- **Outer Gap** (default): Measures the distance between the outermost edges in the inspection region.



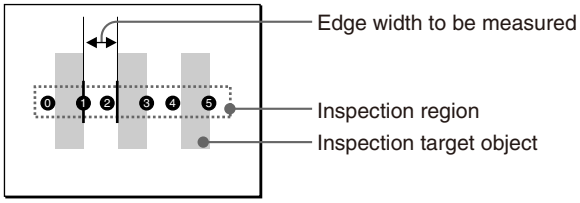
- **Inner Gap**: Measures the distance between the innermost edges in the inspection region.



- **1st/2nd Edges**: Measures the distance between the edges specified in the 1st and 2nd scan respectively.



- **Specified Edges**: Measures the distance between the specified edges.



Detection Conditions

Scan Direction

Select the direction to detect edges.

- If the inspection region is a circle/oval/polygon: → (default), ←, ↑, ↓
- If the inspection region is a rectangle: **Forward** (default) or **Reverse** relative to the horizontal axis (X-axis) of the region. Note that since the scan direction depends on the rotation angle of the inspection region, this should be taken into consideration when setting the inspection region.
- When the inspection region is a ring or arc: **Clockwise** (default), **Counterclockwise**

Edge Direction

Select the direction for detecting an edge.

- **Both** (default): Detects both borders in a transition that changes from a bright area to a dark area or from a dark area to a bright area.
- **Bright to Dark**: Detects borders in a transition that changes from a bright area to a dark area.
- **Dark to Bright**: Detects borders in a transition that changes from a dark area to a bright area.

Starting Angle

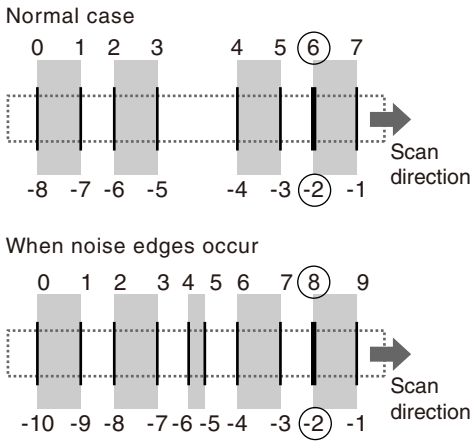
Set the position to start scanning edges within the range of 0.000 to 359.999 (default: 0.000) when [Ring] is selected for the inspection region.

Point Even if the value of Starting Angle is changed, the reference position for the detected angle is fixed at the 3 o'clock position.

Specified Edge/Specified Edge 1/Specified Edge 2

- When [1st/2nd Edges] is selected for [Select Mode]
  Set the start point of the edge width to be measured in [Specified Edge] for [Edge Detection (1st Edge)]. After that, set the end point of the edge width to be measured in [Specified Edge] for [Edge Detection (2nd Edge)].
- When [Specified Edges] is selected for [Select Mode]
  Set the start point of the edge width to be measured in [Specified Edge 1]. After that, select [Specified Edge 2] and then set the end point of the edge width to be measured.

Reference Setting negative values for [Specified Edge 1] and [Specified Edge 2] enables you to set numbers in the opposite direction from the direction of edge detection. This technique is useful when the number of edges to be detected changes.
Example: When the scan direction is set to [→] and "-2" is set for [Specified Edge 2], the second edge from the right is selected. In this case, even if edges that are noises occur midway, the specified edges do not change.



If [Specified Edge 2] is set to "6", false measurement occurs from extra edges. Using "-2" prevents false detection.

Edge Sensitivity (%)

Set the percentage threshold (0% to 100%) for identifying edges (default: 30).

Edge Filter Width

Set the width (0 to 100 pixels) of the smoothing filter applied to the differential graph for detecting edges (default: 5).

Edge Intensity Upper Limit

Set the upper limit (0.000 to 255.000) of edge intensity for detecting edges (default: 255.000).

Edge Intensity Lower Limit

Set the lower limit (0.000 to 255.000) of edge intensity for detecting edges (default: 5.000).

Options

Angled Edge Detection

Turn on this option to stabilize the detection of slanted edges in the inspection region (default: OFF). Using this option under normal conditions may affect the accuracy of the measurement.

Edge Graph Display Position

When you open the [Detection] tab in Setup Mode, an edge graph is displayed in [Image Viewer]. From the drop-down menu, select which side of the inspection region to display the edge graph.

- When [Scan Direction] is [←], [→], [Forward], [Reverse], [Clockwise], or [Counterclockwise]: [Top] or [Bottom] (default)

Reference When the inspection region is a rectangle, the position where the rotation angle is 0° is used as the reference.

- When [Scan Direction] is [↑] or [↓]: [Left] (default) or [Right]

Detailed Settings

You can set the other conditions that can be set for the Edge Width tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement result is displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Edge Width

Set the tolerance for the detected edge width.

- Unit:
  - When the inspection region is a ring or arc: Angle
  - When the inspection region is other than a ring or arc: Pixel Count
- Range: 0.000 to 99999.999

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set the display methods for the inspection and mask regions, and the detected edge. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the detected position of the detected edge.

- **ON** (default): Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detected position.
- **OFF**: Does not display the detected position.

Dimension Line (Pitch)

Select whether or not to display the dimension line (pitch).

- **ON** (default): Displays the dimension line (pitch). Set the line thickness and display color of the dimension line.
- **OFF**: Does not display the dimension line (pitch).

Reset

Restores the display options to their default settings.

Edge Pitch

#E019

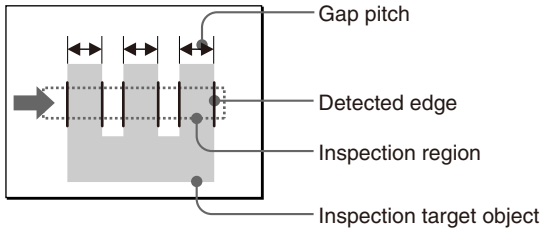
This is a tool that can scan in any direction in the set inspection region to detect edges. Edge pitch measurement measures the maximum, minimum, and average value of the distances between the detected edges. Note that edge detection is based on the amount of change, not the absolute value of intensity, and is therefore less affected by light fluctuations during image capture.

Overview of functions

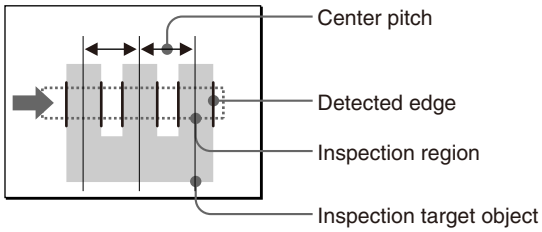
Images of the Measurement

When the inspection region is a rectangle

・Example of measuring the gap pitch

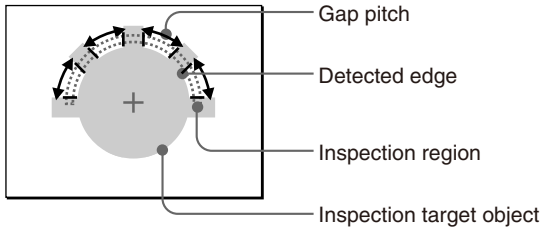


・Example of measuring the center pitch

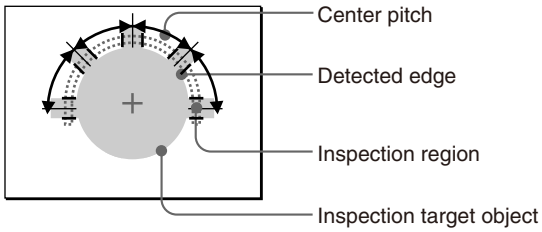


When the inspection region is a ring or an arc

・Example of measuring the gap pitch



・Example of measuring the center pitch



Reference For a technical description of edge detection, see “Appendix” - “Technical Description” - "What is an Edge?".

Measurement Results Output

The measurement results output by the Edge Pitch tool are as follows.

Point The measurement items differ depending on the shape of the inspection region. The value of an item that is not measured is always zero.

When the inspection region is not a ring or arc

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Pitch Count	Outputs the number of detected pitches.
Pitch Maximum	Outputs in pixels.

Measurement results	Description
Pitch Minimum	Outputs in pixels.
Pitch Average	Outputs in pixels.
Pitch [ ]	Outputs all detected pitches in pixels.
Position 1 (X, Y) [ ]	Outputs the position coordinates for the edge nearest the measurement start position of the edges that constitute the pitch in pixels for all pitches.
Distance 1 [ ]	Outputs all the distances from the measurement start position to the detected edge position for edge position 1 in pixels.
Intensity 1 [ ]	Outputs all edge intensities for edge position 1.
Position 2 (X, Y) [ ]	Outputs the position coordinates for the edge furthest from the measurement start position of the edges that constitute the pitch in pixels for all pitches.
Distance 2 [ ]	Outputs all the distances from the measurement start position to the detected edge position for edge position 2 in pixels.
Intensity 2 [ ]	Outputs all edge intensities for edge position 2.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

When the inspection region is a ring or arc

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Pitch Count	Outputs the number of detected pitches.
Pitch Maximum	Outputs by angle.
Pitch Minimum	Outputs by angle.
Pitch Average	Outputs by angle.
Pitch [ ]	Outputs all detected pitches by angle.
Position 1 (X, Y) [ ]	Outputs all the positions of the intersection of the edge nearest the measurement start position and the center line of the region of the edges that constitute the pitches in pixels.
Angle 1 [ ]	Outputs all angles for edge position 1.
Distance 1 [ ]	Outputs all the distances from the measurement start position to the detected edge position for edge position 1 by angle.
Intensity 1 [ ]	Outputs all edge intensities for edge position 1.
Position 2 (X, Y) [ ]	Outputs all the positions of the intersection of the edge furthest from the stmeasurement start position and the center line of the region of the edges that constitute the pitches in pixels.
Angle 2 [ ]	Outputs all angles for edge position 2.
Distance 2 [ ]	Outputs all the distances from the measurement start position to the detected edge position for edge position 2 by angle.
Intensity 2 [ ]	Outputs all edge intensities for edge position 2.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

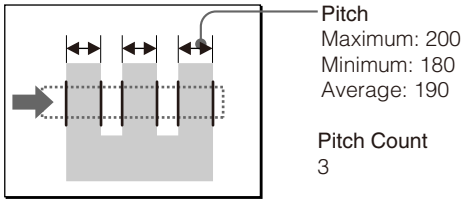
Point The upper tolerance limit is applied to the value of the maximum edge pitch, and the lower tolerance limit is applied to the value of the minimum edge pitch.

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Examples

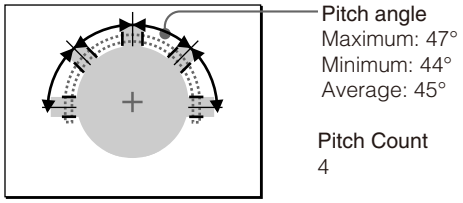
When the inspection region is a rectangle

- Detected Pitch: Gap pitch
- Scan Direction: Forward
- Edge Direction: Both



When the inspection region is a ring or an arc

- Detected Pitch: Center pitch
- Scan Direction: (Counterclockwise)
- Edge Direction: Both



Properties

When setting the Edge Pitch tool, use the [Properties] view. The [Properties] view for the Edge Pitch tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. Additionally, set the other conditions that can be set for the Edge Pitch tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set the display methods for the inspection and mask regions, and the detected edge.

Region

Specify the area on the captured image to be used for measurement.

Point Changing the shape of the region resets some of the settings under [Detection] and [Judgment].

Reference For details about how to set regions, see “Tool Common Setting Items” - “Region” tab - "Region Settings".

Detection

Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge.

Point Changing the shape of the inspection region resets some [Detection Conditions] settings.

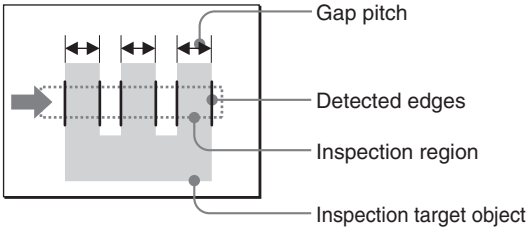
Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Mode

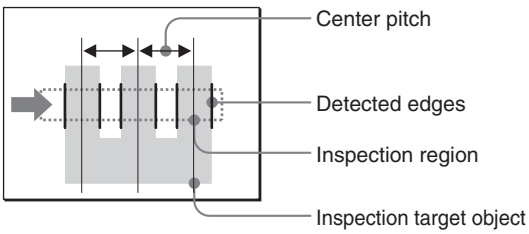
Select Mode

Select the type of edge pitch used for detection.

- **Gap Pitch** (default): Detects edges in the specified scan direction and measures the maximum, minimum, and average distance between odd and even edges.



- **Center Pitch**: Measures the maximum, minimum, and average distance between the center points of pairs of edges.



Detection Conditions

Scan Direction

Select the direction to detect edges.

- If the inspection region is a circle/oval/polygon: → (default), ←, ↑, ↓
- If the inspection region is a rectangle: **Forward** (default) or **Reverse** relative to the horizontal axis (X-axis) of the region. Note that since the scan direction depends on the rotation angle of the inspection region, this should be taken into consideration when setting the inspection region.
- When the inspection region is a ring or arc: **Clockwise** (default), **Counterclockwise**

Edge Direction

Select the direction for detecting an edge.

- **Both** (default): Detects both borders in a transition that changes from a bright area to a dark area or from a dark area to a bright area.
- **Bright to Dark**: Detects borders in a transition that changes from a bright area to a dark area.
- **Dark to Bright**: Detects borders in a transition that changes from a dark area to a bright area.

First Edge

Set the type of pitch for starting the edge pitch measurement.

- **None** (default): Start measurement from edges that change either from a bright area to a dark area or from a dark area to a bright area.
- **Bright to Dark**: Start measurement from edges that change from a bright area to a dark area.
- **Dark to Bright**: Start measurement from edges that change from a dark area to a bright area.

Starting Angle

Set the position to start scanning edges within the range of 0.000 to 359.999 (default: 0.000) when [Ring] is selected for the inspection region.

Point Even if the value of Starting Angle is changed, the reference position for the detected angle is fixed at the 3 o'clock position.

Edge Sensitivity (%)

Set the percentage threshold (0% to 100%) for identifying edges (default: 30).

Edge Filter Width

Set the width (0 to 100 pixels) of the smoothing filter applied to the differential graph for detecting edges (default: 5).

Edge Intensity Upper Limit

Set the upper limit (0.000 to 255.000) of edge intensity for detecting edges (default: 255.000).

Edge Intensity Lower Limit

Set the lower limit (0.000 to 255.000) of edge intensity for detecting edges (default: 5.000).

Reference Unwanted edges can be excluded from detection by adjusting the upper and lower edge intensity limit values while referring to the highest edge intensity in the inspection region (shown on the left of the edge graph). For details, see “Appendix” - “Technical Description” - "What is an Edge?".

Options

Maximum Pitch Count

Set the maximum pitch count (up to 1800) to be measured (default: 30).

Point The actual maximum number of pitches that can be set differs depending on the settings.

Angled Edge Detection

Turn on this option to stabilize the detection of slanted edges in the inspection region (default: OFF). Using this option under normal conditions may affect the accuracy of the measurement.

Edge Graph Display Position

When you open the [Detection] tab in Setup Mode and set the inspection region to a user-selected range, an edge graph is displayed in [Image Viewer]. From the drop-down menu, select which side of the inspection region to display the edge graph.

- When [Scan Direction] is [←], [→], [Forward], [Reverse], [Clockwise], or [Counterclockwise]: [Top] or [Bottom] (default)

Reference When the inspection region is a rectangle, the position where the rotation angle is 0° is used as the reference

- When [Scan Direction] is [↑] or [↓]: [Left] (default) or [Right]

Detailed Settings

You can set the other conditions that can be set for the Edge Pitch tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The measurement results are displayed in real-time for [Current Value], [Maximum], [Average], and [Minimum]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Pitch Count

Set the tolerance for the detected edge pitch count.
- Unit: Number of edge pitches
- Range: 0 to 9999

Pitch

Set the tolerance for the detected edge pitch width.
- Unit:
  - When the inspection region is a ring or arc: Angle
  - When the inspection region is other than a ring or arc: Pixel Count
- Range: 0.000 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set the display methods for the inspection and mask regions, and the detected edge. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the detected position of the detected edge.

- **ON** (default): Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detected position.
- **OFF**: Does not display the detected position.

Dimension Line (Pitch)

Select whether or not to display the dimension line (pitch).

- **ON** (default): Displays the dimension line (pitch). Set the line thickness and display color of the dimension line.
- **OFF**: Does not display the dimension line (pitch).

Reset

Restores the display options to their default settings.

Edge Pairs

#E020

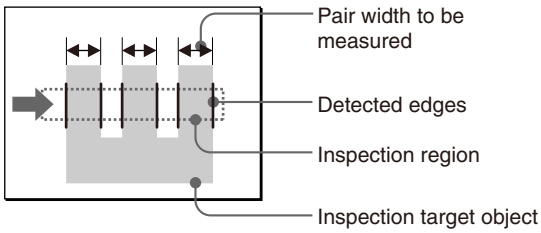
Edge pairs measurement pairs edges detected by two scans with the desired conditions to measure width and pitch. Unlike edge width measurement and edge pitch measurement, the pair detection conditions and the edge detection conditions for each scan can be set in detail, enabling more stable detection. Note that edge detection is based on the amount of change, not the absolute value of intensity, and is therefore less affected by light changes during image capture.

Overview of functions

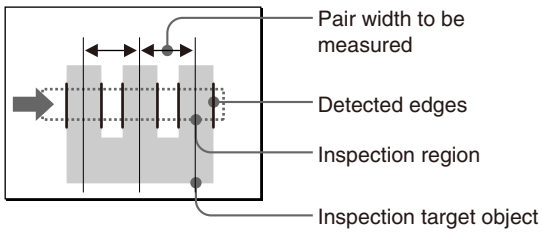
Images of the Measurement

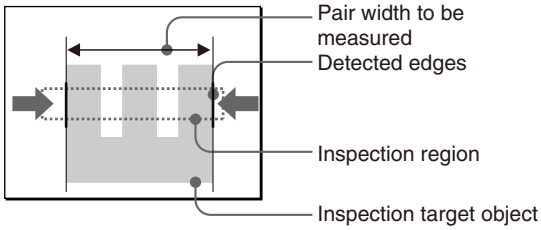
When the inspection region is a rectangle

・Example of measuring the gap pitch



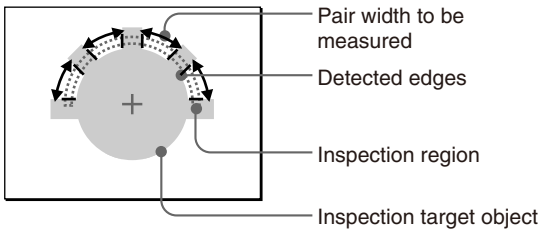
・Example of measuring the center pitch



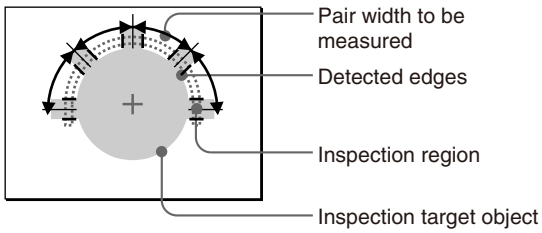


When the inspection region is a ring or an arc

・Example of measuring the gap pitch



・Example of measuring the center pitch



Reference For a technical description of edge detection, see “Appendix” - “Technical Description” - "What is an Edge?".

Measurement Results Output

The measurement results output by the Edge Pairs tool are as follows.

Point The measurement items differ depending on the shape of the inspection region. The value of an item that is not measured is always zero.

When the inspection region is not a ring or arc

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Pair Count	Outputs the number of pairs detected.
Pair Width Maximum	Outputs in pixels.
Pair Width Minimum	Outputs in pixels.
Pair Width Average	Outputs in pixels.
Pair Width [ ]	Outputs all detected pair widths in pixels.
Position 1 (X, Y) [ ]	Outputs the position coordinates for the edge nearest the measurement start position of the edges that constitute a pair in pixels for all pairs.
Distance 1 [ ]	Outputs all the distances from the measurement start position to the detected edge position for edge position 1 in pixels.
Intensity 1 [ ]	Outputs all edge intensities for edge position 1.
Position 2 (X, Y) [ ]	Outputs the position coordinates for the edge furthest from the measurement start position of the edges that constitute a pair in pixels for all pairs.
Distance 2 [ ]	Outputs the distances from the measurement start position to the detected edge position for edge position 2 in pixels.
Intensity 2 [ ]	Outputs all edge intensities for edge position 2.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

When the inspection region is a ring or arc

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Pair Count	Outputs the number of pairs detected.
Pair Width Maximum	Outputs by angle.
Pair Width Minimum	Outputs by angle.
Pair Width Average	Outputs by angle.
Pair Width [ ]	Outputs all detected pairs by angle.
Position 1 (X, Y) [ ]	Outputs all the positions of the intersection of the edge nearest the measurement start position and the center line of the region of the edges that constitute the pairs in pixels.
Angle 1 [ ]	Outputs all the angles for edge position 1.
Distance 1 [ ]	Outputs all distances from the measurement start position to the detected edge position for edge position 1 by angle.
Intensity 1 [ ]	Outputs all edge intensities for edge position 1.
Position 2 (X, Y) [ ]	Outputs all the positions of the intersection of the edge furthest the measurement start position and the center line of the region of the edges that constitute the pairs in pixels.
Angle 2 [ ]	Outputs all angles for edge position 2.

Measurement results	Description
Distance 2 [ ]	Outputs all the distances from the measurement start position to the detected edge position for edge position 2 by angle.
Intensity 2 [ ]	Outputs all edge intensities for edge position 2.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

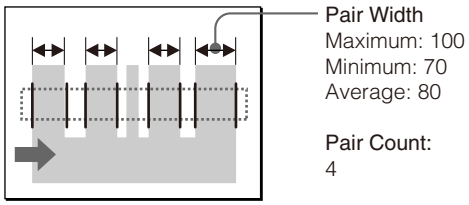
Point If [Judged Label Type] is set to [All] (default), the [Upper Limit] value is used for [Pair Width Maximum] and the [Lower Limit] value is used for the [Pair Width Minimum].

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

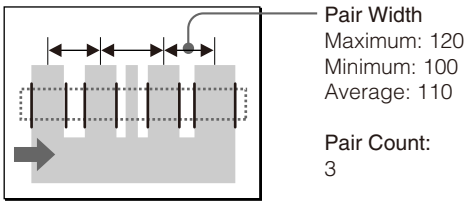
Measurement Examples

When the inspection region is a rectangle

Example 1:
- Detected Pitch: Gap Pitch
- Scan Direction (1st Scan): Forward
- Scan Direction (2nd Scan): Forward
- Edge Direction (1st Scan): Bright to Dark
- Edge Direction (2nd Scan): Dark to Bright
- Gap Pitch Upper Limit: 120.0
- Gap Pitch Lower Limit: 0050.000



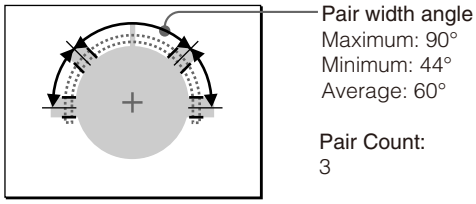
Example 2:
- Detected Pitch: Center Pitch
- Scan Direction (1st Scan): Forward
- Scan Direction (2nd Scan): Forward
- Edge Direction (1st Scan): Bright to Dark
- Edge Direction (2nd Scan): Dark to Bright
- Gap Pitch Upper Limit: 120.0
- Gap Pitch Lower Limit: 0050.000



Point The middle pin is excluded from detection because it is below the Gap Pitch Lower Limit setting.

When the inspection region is a ring or an arc

- Detected Pitch: Center Pitch
- Scan Direction (1st Scan): Clockwise
- Scan Direction (2nd Scan): Clockwise
- Edge Direction (1st Scan): Bright to Dark
- Edge Direction (2nd Scan): Dark to Bright
- Gap Pitch Upper Limit: 20.0
- Gap Pitch Lower Limit: 0005.000



Point The third pin is excluded from detection because it is below the Gap Pitch Lower Limit setting.

Properties

When setting the Edge Pairs tool, use the [Properties] view. The [Properties] view for the Edge Pairs tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. Additionally, set the other conditions that can be set for the Edge Pairs tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set the display methods for the inspection and mask regions, and the detected edge.

Region

Specify the area on the captured image to be used for measurement.

Point Changing the shape of the region resets some of the settings under [Detection] and [Judgment].

Reference For details about how to set regions, see “Tool Common Setting Items” - “Region” tab - "Region Settings".

Detection

Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. Note that [Direction] and [Sensitivity] should be set individually for [1st Scan] and [2nd Scan].

Point Changing the shape of an inspection region will reset some of the settings.

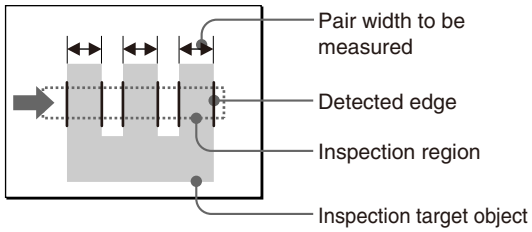
Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Mode

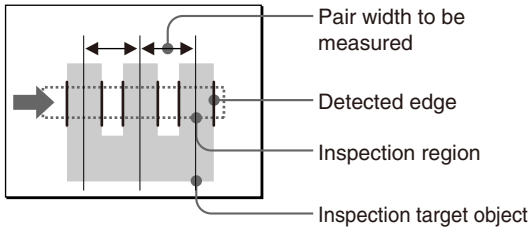
Select Mode

Select the type of pair width to be used for detection.

- **Gap Pitch** (default): Detects edges in the specified scan direction and measures the maximum, minimum, and average distance between odd and even edges.



- **Center Pitch**: Measures the maximum, minimum, and average distance between the center points of pairs of edges.



Edge Detection (1st Edge)/Edge Detection (2nd Edge)

Scan Direction

Select the direction to detect edges.

- If the inspection region is a circle/oval/polygon: → (default), ←, ↑, ↓
- If the inspection region is a rectangle: **Forward** (default) or **Reverse** relative to the horizontal axis (X-axis) of the region. Note that since the scan direction depends on the rotation angle of the inspection region, this should be taken into consideration when setting the inspection region.
- When the inspection region is a ring or arc: **Clockwise** (default), **Counterclockwise**

Edge Direction

Select the direction for detecting an edge.

- **Both**: Detects both borders in a transition that changes from a bright area to a dark area or from a dark area to a bright area.
- **Bright to Dark** (default setting for the 2nd Edge): Detects borders in a transition that changes from a bright area to a dark area.
- **Dark to Bright** (default setting for the 1st Edge): Detects borders in a transition that changes from a dark area to a bright area.

Starting Angle

Set the position to start scanning edges within the range of 0.000 to 359.999 (default: 0.000) when [Ring] is selected for the inspection region.

Point Even if the value of Starting Angle is changed, the reference position for the detected angle is fixed at the 3 o'clock position.

Skip Edges

Skips the set number of edges from the first detected edge. Set the minimum scale within the range of 0 to 3600 (default: 0).

Edge Sensitivity (%)

Set the percentage threshold (0% to 100%) for identifying edges (default: 30).

Edge Filter Width

Set the width (0 to 100 pixels) of the smoothing filter applied to the differential graph for detecting edges (default: 5).

Edge Intensity Upper Limit

Set the upper limit (0.000 to 255.000) of edge intensity for detecting edges (default: 255.000).

Edge Intensity Lower Limit

Set the lower limit (0.000 to 255.000) of edge intensity for detecting edges (default: 5.000).

Reference Unwanted edges can be excluded from detection by adjusting the upper and lower edge intensity limit values while referring to the highest edge intensity in the inspection region (shown on the left of the edge graph). For details, see “Appendix” - “Technical Description” - "What is an Edge?".

Options

Gap Pitch Upper Limit

Set the upper limit (0.000 to 99999.999) for detecting pairs (default: 99999.999). Edge combinations that exceed the gap pitch upper limit are not detected as pairs.

Gap Pitch Lower Limit

Set the lower limit (0.000 to 99999.999) for detecting pairs (default: 5.000). Edge combinations that are below the gap pitch lower limit are not detected as pairs.

Point The upper and lower limit settings are applied to the values before scaling correction, even if [Scaling] is set to ON.

Judged Label Type

Select [All] (default) to measure the maximum and minimum pair width and perform judgment with regard to all pairs. To perform judgment with regard to a particular pair, select [Specified] and then specify the edge pair number to set as judgment target. Only the pair with the label number that is set in [Judged Label] will be the target of judgment.

Maximum Pair Count

Set the maximum number of pairs (up to 3600) to be measured (default: 30).

Point Depending on the settings, [Maximum Pair Count] may not be able to be set to the maximum value.

Angled Edge Detection

Turn on this option to stabilize the detection of slanted edges in the inspection region (default: OFF). Using this option under normal conditions may affect the accuracy of the measurement.

Edge Graph Display Position

When you open the [Detection] tab in Setup Mode and set the inspection region to a user-selected range, an edge graph is displayed in [Image Viewer]. From the drop-down menu, select which side of the inspection region to display the edge graph.

- When [Scan Direction] is [←], [→], [Forward], [Reverse], [Clockwise], or [Counterclockwise]: [Top] or [Bottom] (default)

  Reference When the inspection region is a rectangle, the position where the rotation angle is 0° is used as the reference.

- When [Scan Direction] is [↑] or [↓]: [Left] (default) or [Right]

Detailed Settings

You can set the other conditions that can be set for the Edge Pairs tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value], [Maximum], [Average], or [Minimum]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Pair Count

Set the tolerance for the detected edge pairs count. The unit of tolerance is the detected “Count”.

- Unit: Count
- Range: 0 to 9999

Pair Width

Set the tolerance for the detected edge pair width. If [All] is selected for [Options] - [Judged Label Type] on the [Detection] tab, the [Maximum], [Average], and [Minimum] values are displayed instead of [Current Value].

- Unit:
  - When the inspection region is a ring or arc: Angle

– When the inspection region is other than a ring or arc: Pixel Count
- Range: 0.000 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

> **Point** The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set the display methods for the inspection and mask regions, and the detected edge. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.
- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.
- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the position of the detected edge pairs set in [Judged Label].
- **ON** (default): Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detected position.
- **OFF**: Does not display the detected position.

1st Scan Detected Position (Excluding Judged Label)

Select whether or not to display the detected position of the edges detected by the first scan which are not specified by [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detected position.
- **OFF**: Does not display the detected position.

2nd Scan Detected Position (Excluding Judged Label)

Select whether or not to display the detected position of the edges detected by the second scan which are not specified by [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detected position.
- **OFF**: Does not display the detected position.

Dimension Line (Pitch)

Select whether or not to display the dimension line (pitch).

- **ON** (default): Displays the dimension line (pitch). Set the line thickness and display color of the dimension line.
- **OFF**: Does not display the dimension line (pitch).

Reset

Restores the display options to their default settings.

Profile Position

#E021

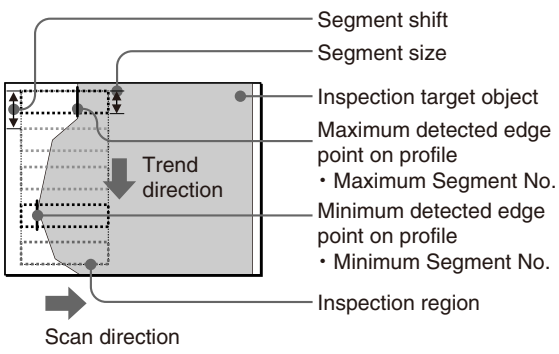
Profile position measurement scans segments for edge detection in the specified direction in the inspection region and measures the position of the edge in each segment. As multiple edge position information can be measured within a single inspection region, in addition to the overall average, maximum, and minimum, circles and lines can be detected using individual measurement results and all detected positions as point groups.

Overview of functions

Images of the Measurement

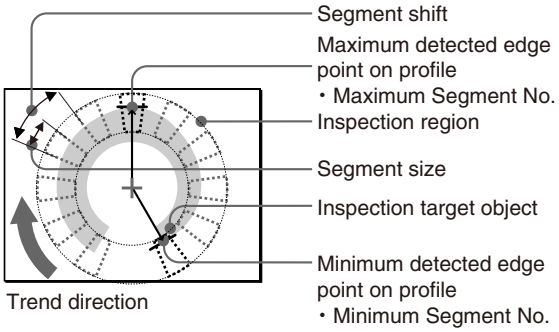
When the inspection region is a rectangle

- Trend Direction: ↓
- Scan Direction: Forward
- Edge Direction: Bright to Dark



When the inspection region is a ring or an arc

- Trend Direction: Clockwise
- Scan Direction: Center to Outer
- Edge Direction: Bright to Dark



Reference For a technical description of edge detection, see “Appendix” - “Technical Description” - "What is an Edge?".

Measurement Results Output

The measurement results output by the Profile Position tool are as follows.

Point The measurement items differ depending on the shape of the inspection region. The value of an item that is not measured is always zero.

When the inspection region is a rectangle

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Number of Segments	Outputs the set number of segments.
Number of Detected Segments	Outputs the number of segments that were actually measured.

Measurement results	Description
Number of Detected Edges [ ]	Outputs the number of edges of all segments that were measured.
Number of Detected Edges Maximum	Outputs the number of edges in the segment with the maximum edge position.
Number of Detected Edges Minimum	Outputs the number of edges in the segment with the minimum edge position.
Position X [ ]	Outputs the X-coordinate of all the measured segments in pixels. (Only when the inspection region is a rectangle and the trend direction is ↓)
Position X Average	Outputs the average X-coordinate of all measured segments in pixels.
Position Y [ ]	Outputs the Y-coordinate of all the measured segments in pixels. (Only when the inspection region is a rectangle and the trend direction is →)
Position Y Average	Outputs the average Y-coordinate of all measured segments in pixels.
Angle [ ]	Outputs the angle of the rectangle region.
Angle Maximum	Outputs the maximum rotation angle of the rectangle region.
Angle Minimum	Outputs the minimum rotation angle of the rectangle region.
Distance [ ]	Outputs the distance from the measurement start position for all measured segments in pixels.
Distance Maximum	Outputs the distance from the measurement start position in the segment with the maximum edge position in pixels.
Distance Minimum	Outputs the distance from the measurement start position in the segment with the minimum edge position in pixels.
Distance Average	Outputs the average distance of all measured segments in pixels.
Intensity [ ]	Outputs the edge intensity of all segments that were measured.
Intensity Maximum	Outputs the edge intensity in the segment with the maximum edge position.
Intensity Minimum	Outputs the edge intensity in the segment with the minimum edge position.
Detected Circle Center X	Outputs the X-coordinate for the center of the detected circle in pixels. (When Best Fit Circle/Line is [Circle])
Detected Circle Center Y	Outputs the Y-coordinate for the center of the detected circle in pixels. (When Best Fit Circle/Line is [Circle])
Detected Circle Radius	Outputs the radius of the detected circle. (When Best Fit Circle/Line is [Circle])
Detected Circle Diameter	Outputs the diameter of the detected circle in pixels. (When Best Fit Circle/Line is [Circle])
Detected Circle Count	Outputs the count of the detected circle. (When Best Fit Circle/Line is [Circle])
Detected Line Center X	Outputs the X-coordinate of the midpoint between detected line XY1 and XY2 in pixels. (When Best Fit Circle/Line is [Line])
Detected Line Center Y	Outputs the Y-coordinate of the midpoint between detected line XY1 and XY2 in pixels. (When Best Fit Circle/Line is [Line])
Detected Line Angle (+/-180°)	Outputs the angle of detected line XY2 in reference to detected line XY1. (-180.000° to 180.000°) (When Best Fit Circle/Line is [Line])
Detected Line X	Outputs the X-coordinate of the intersection between the detected line and the perpendicular line drawn down from the origin to the line in pixels. (When Best Fit Circle/Line is [Line])

Measurement results	Description
Detected Line Y	Outputs the Y-coordinate of the intersection between the detected line and the perpendicular line drawn down from the origin to the line in pixels. (When Best Fit Circle/Line is [Line])
Detected Line Angle	Outputs the angle of the detected line from the horizontal line (Turning clockwise is positive). (-180.000° to 180.000°) (When Best Fit Circle/Line is [Line])
Detected Line Count	Outputs the number of detected lines (When Best Fit Circle/Line is [Line]).
Detected Line X1	Outputs the X-coordinate of the intersection between the detected line and the top of the inspection region (or left side when the trend direction is →) in pixels. (When Best Fit Circle/Line is [Line])
Detected Line Y1	Outputs the Y-coordinate of the intersection between the detected line and the top of the inspection region (or left side when the trend direction is →) in pixels. (When Best Fit Circle/Line is [Line])
Detected Line X2	Outputs the X-coordinate of the intersection between the detected line and the bottom of the inspection region (or right side when the trend direction is →) in pixels. (When Best Fit Circle/Line is [Line])
Detected Line Y2	Outputs the Y-coordinate of the intersection between the detected line and the bottom of the inspection region (or right side when the trend direction is →) in pixels. (When Best Fit Circle/Line is [Line])
ρ of Detected Line	Outputs the ρ of the detected line (When Best Fit Circle/Line is [Line]).
θ of Detected Line	Outputs the θ of the detected line (When Best Fit Circle/Line is [Line]).
Maximum Segment No.	Outputs the segment number of the segment with the maximum edge position.
Minimum Segment No.	Outputs the segment number of the segment with the minimum edge position.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

When the inspection region is a ring or arc

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Number of Segments	Outputs the set number of segments.
Number of Detected Segments	Outputs the number of segments that were actually measured.
Number of Detected Edges [ ]	Outputs the number of edges of all segments that were measured.
Number of Detected Edges Maximum	Outputs the number of edges in the segment with the maximum edge position.
Number of Detected Edges Minimum	Outputs the number of edges in the segment with the minimum edge position.

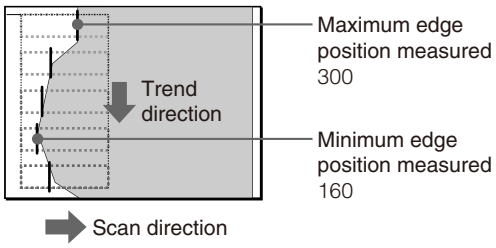
Measurement results	Description
Position X [ ]	Outputs the X-coordinate of all the measured segments in pixels.
Position X Average	Outputs the average X-coordinate of all measured segments in pixels.
Position Y [ ]	Outputs the Y-coordinate of all the measured segments in pixels.
Position Y Average	Outputs the average Y-coordinate of all measured segments in pixels.
Angle [ ]	Outputs the angle of segments that were measured.
Angle Maximum	Outputs the angle of the maximum radius segment.
Angle Minimum	Outputs the angle of the minimum radius segment.
Distance [ ]	Outputs the distance from the measurement start position for all measured segments in pixels.
Distance Maximum	Outputs the distance of the maximum radius segment from the start of the measurement position in pixels.
Distance Minimum	Outputs the distance of the minimum radius segment from the start of the measurement position in pixels.
Distance Average	Outputs the average distance of all measured segments in pixels.
Radius [ ]	Outputs the radius of all the measured segments in pixels.
Radius Maximum	Outputs the radius of the maximum radius segment in pixels.
Radius Minimum	Outputs the radius of the minimum radius segment in pixels.
Radius Average	Outputs the average radius of all measured segments in pixels.
Intensity [ ]	Outputs the edge intensity of all segments that were measured.
Intensity Maximum	Outputs the edge intensity of the maximum radius segment.
Intensity Minimum	Outputs the edge intensity of the minimum radius segment.
Detected Circle Center X	Outputs the X-coordinate for the center of the detected circle in pixels. (When Best Fit Circle/Line is [Circle])
Detected Circle Center Y	Outputs the Y-coordinate for the center of the detected circle in pixels. (When Best Fit Circle/Line is [Circle])
Detected Circle Radius	Outputs the radius of the detected circle. (When Best Fit Circle/Line is [Circle])
Detected Circle Diameter	Outputs the diameter of the detected circle in pixels. (When Best Fit Circle/Line is [Circle])
Detected Circle Count	Outputs the count of the detected circle. (When Best Fit Circle/Line is [Circle])
Maximum Segment No.	Outputs the segment number of the segment with the maximum edge position.
Minimum Segment No.	Outputs the segment number of the segment with the minimum edge position.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Examples

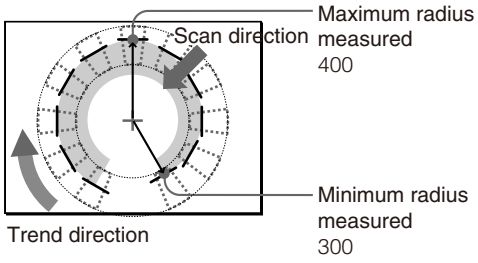
When the inspection region is a rectangle

- Trend Direction: ↓
- Scan Direction: Forward
- Edge Direction: Both



When the inspection region is a ring or an arc

- Trend Direction: Clockwise
- Scan Direction: Outer to Center
- Edge Direction: Both



Properties

When setting the Profile Position tool, use the [Properties] view. The [Properties] view for the Profile Position tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. Additionally, set the other conditions that can be set for the Profile Position tool as necessary.
Judgment	Sets the tolerances (upper and lower limits) for the measured values.
Display	Set the display methods for the inspection and mask regions, and the edge waveforms.

Region

Specify the area on the captured image to be used for measurement.

Point Changing the shape of the region resets some of the settings under [Detection] and [Judgment].

Reference For details about how to set regions, see “Tool Common Setting Items” - “Region” tab - "Region Settings".

Detection

Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. You can also set the other conditions that can be set for the Profile Position tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Trend Direction

Displays the segment’s direction of movement.

- When the inspection region is a rectangle: ↓ (top to bottom) and is linked to the direction of rotation of the region.
- When the inspection region is a ring or arc: **Clockwise**.

Scan Direction

Select the direction to detect edges.

- When the inspection region is a rectangle: **Forward** (from left to right) (default), **Reverse** (from right to left)
- When the inspection region is a ring or arc: **Center to Outer** (default), **Outer to Center**

Edge Direction

Select the direction for detecting an edge.

- **Both** (default): Detects both borders in a transition that changes from a bright area to a dark area or from a dark area to a bright area.
- **Bright to Dark**: Detects borders in a transition that changes from a bright area to a dark area.
- **Dark to Bright**: Detects borders in a transition that changes from a dark area to a bright area.

Specified Edge

Set the edge number that is to be the target of measurement within the segment. The setting range is -3600 to 3599 (default: 0). Edge numbers are set to be numbered in the order of the direction of detection if the value is greater than or equal to 0, and in the reverse order of the direction of detection if the value is negative. If the set edge number is not detected, the measurement result in that segment is zero.

Edge Sensitivity (%)

Set the percentage threshold (0% to 100%) for identifying edges (default: 30).

Edge Filter Width

Set the width (0 to 100 pixels) of the smoothing filter applied to the differential graph for detecting edges (default: 5).

Edge Intensity Upper Limit

Set the upper limit (0.000 to 255.000) of edge intensity for detecting edges (default: 255.000).

Edge Intensity Lower Limit

Set the lower limit (0.000 to 255.000) of edge intensity for detecting edges (default: 5.000).

Reference Unwanted edges can be excluded from detection by adjusting the upper and lower edge intensity limit values while referring to the highest edge intensity in the segment (shown on the left of the edge graph). For details, see “Appendix” - “Technical Description” - "What is an Edge?".

Options

Segment Size

Set the size of the segment in the inspection region.

- When the inspection region is a rectangle: Set a value between 1 and 9999 pixels (default: 10). If a value is set that is greater than the inspection region width in the [Trend Direction], a measurement error will occur.
- When the inspection region is a ring or arc: Set a value between 0.01 and 359.99° (default: 10.00). If a value is set that is greater than the angle of the arc region, a measurement error will occur.

Segment Shift

Set the amount of one movement along the trend direction of the segment.

- When the inspection region is a rectangle: Set a value between 0.01 and 9999.99 pixels (default: 5.00).
- When the inspection region is a ring or arc: Set a value between 0.01 and 359.99° (default: 5.00).

Starting Offset/Starting Angle

Set the offset amount (angle) of the detection start segment from the inspection region. If a measurement error occurs due to no edge points being near the border of the inspection region, you can move the start position to a better location without changing the inspection region.

- When the inspection region is a rectangle: Set a value between 0 and 9999 pixels (default: 0).
- When the inspection region is a ring or arc: Set a value between 0.00 and 359.99° (default: 0.00).

Number of Segments

Displays the number of segments in the inspection region.

Judged Label Type

Select the segment to be used for judgment from [Maximum] (default), [Minimum], and [Specified]. If you select [Specified], set the segment to be used for judgment by setting the label number in [Judged Label] (0 to 29999, default: 0).

Point The number of segments set for the current inspection region is refreshed automatically according to the change in the segment size and shift amount and displayed as Number of Segments. The maximum number of segments is 30,000, but the actual number of segments that can be set may be less than the maximum number, depending on other settings.

Reference
- The [Image Viewer] displays the position and edge graph, edge intensity value, and measurement result for the segment specified in the judged label. Selecting the segment by specifying the number is useful for checking the detection status of specific segments.
- When the current image is selected as the display image, execute simulation once to refresh the result display.

Angled Edge Detection

Turn on this option to stabilize the detection of slanted edges in the inspection region (default: OFF). Using this option under normal conditions may affect the accuracy of the measurement.

Maximum Number of Segments

Set the maximum number of segments that can be detected (1 to 30000, default: 100). Depending on the state of the resource memory, it may not be possible to set up to the maximum number for the setting.

Edge Graph Display Position

When you open the [Detection] tab in Setup Mode and set the inspection region to a user-selected range, an edge graph is displayed in [Image Viewer]. From the drop-down menu, select which side (Top or Bottom) of the inspection region to display the edge graph (default: Bottom).

Reference When the inspection region is a rectangle, the position where the rotation angle is 0° is used as the reference.

Best Fit Circle/Line

Best Fit Circle/Line

Detects a circle or a line from the detected edge information.
- **Off** (default): Does not perform detection processing.
- **Circle**: Detects a circle using the least square method with the detected edge information as the point group.
- **Line:** Detects a line using the least square method with the detected edge information as the point group (rectangle regions only).

Deformation Correction

Reduces the effect of interference when detecting circles or lines (default: OFF). When [Best Fit Circle/Line] is enabled, noise-like information in the detected edge information may greatly affect and distort the detection result. Turning on [Deformation Correction] may reduce the effect of non-contiguous edge information by excluding it from calculation.

Point If too few edge points are detected, turning the correction [ON] in [Best Fit Circle/Line] may increase the occurrence of errors in circle or line detection.

Abnormal Gap Size

Set the allowable range of deviation (distance) between adjacent segments for the removal of abnormal detected edge points (when [Best Fit Circle/Line] and [Deformation Correction] are enabled).

- **Unit**: Number of pixels
- **Range**: 0.0 to 999.9 (default: 5.0)

Abnormal Point Ratio Upper Limit

Set the upper limit for the proportion of the number of detected points in the segment group (cluster of segments where edges are detected continually without being divided by such as the mask region and edge undetected) deemed as abnormal edge points.

- **Unit**: %
- **Range**: 0 to 100 (default: 25)

Detailed Settings

You can set the other conditions that can be set for the Profile Position tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Number of Detected Segments

Set the tolerance for the number of detected segments.

- Unit: Number of segments
- Range: 0 to 99999

Distance (Maximum)

Set the tolerance for the maximum detected distance (when the inspection region is [Rectangle]).

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance (Minimum)

Set the tolerance for the minimum detected distance (when the inspection region is [Rectangle]).

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance

Set the tolerance for the detected distance in the segment to be used for judgment (when the inspection region is [Rectangle]).

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Detected Line Angle (+/-180°)

Set the tolerance for the detected line angle (+/-180°).

- Unit: Angle
- Range: -180.000 to 180.000

Detected Line Angle

Set the tolerance for the detected line angle.

- Unit: Angle
- Range: -90.000 to 90.000

Detected Line Count

Set the tolerance for the detected line count.

- Unit: Count
- Range: 0 to 1

Radius (Maximum)

Set the tolerance for the maximum detected radius (when the inspection region is [Ring] or [Arc]).

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Radius (Minimum)

Set the tolerance for the minimum detected radius (when the inspection region is [Ring] or [Arc]).

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Radius

Set the tolerance for the detected radius in the segment to be used for judgment (when the inspection region is [Ring] or [Arc]).

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Detected Circle Center X

Set the tolerance for center X of the detected circle.

- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Detected Circle Center Y

Set the tolerance for center Y of the detected circle.

- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Detected Circle Radius

Set the tolerance for the radius of the detected circle.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Detected Circle Diameter

Set the tolerance for the diameter of the detected circle.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Detected Circle Count

Set the tolerance for the number of detected circles.

- Unit: Count
- Range: 0 to 1

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set the display methods for the inspection and mask regions. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.

- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Judged Label

Select whether or not to display the detected position of the detected trend edge set in [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detected position.
- **OFF**: Does not display the detected position.

Maximum Label/Minimum Label

Select whether or not to display the detected position of the trend edge having the maximum/minimum label of the detected trend edges other than the one set in [Judged Label].

- **ON**: Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detected position.
- **OFF** (default): Does not display the detected position.

Display Detected Circle/Line

Set the display color and thickness of the line or circle determined from the detected segment points.

Display Profile

Select whether or not to display the line (profile) connecting the detection points and the detected edge points in the segments.

- **ON** (default): Displays the profile. Set the display color and thickness for the line that represents the profile.
- **OFF**: Does not display the profile.

Display Segments

Select whether or not to display the segment frame.

- **ON** (default): Displays the segment frame. Set the display color and thickness for the segment frame.
- **OFF**: Does not display the segment frame.

Point If the segment size is larger than the segment shift amount, it is not displayed.

Reset

Restores the display options to their default settings.

Profile Width

#E022

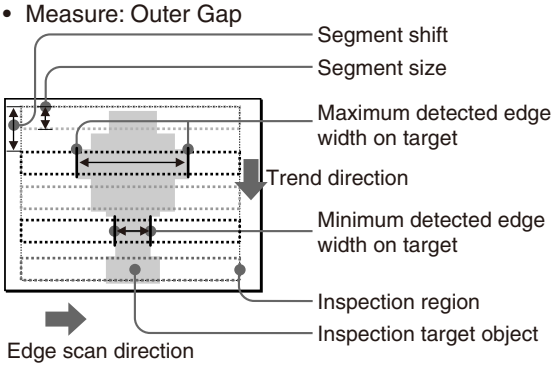
Profile width measurement scans segments for edge detection in the specified direction in the inspection region and measures the width between edges in each segment. As multiple width information can be measured within a single inspection region, the average, maximum, minimum, or individual measurement results can be obtained.

Overview of functions

Images of the Measurement

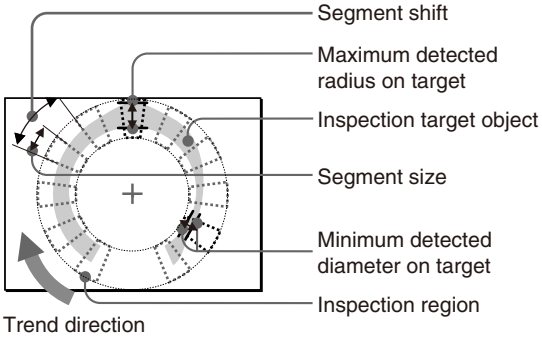
When the inspection region is a rectangle

- Trend Direction: ↓
- Scan Direction: Forward
- Measure: Outer Gap



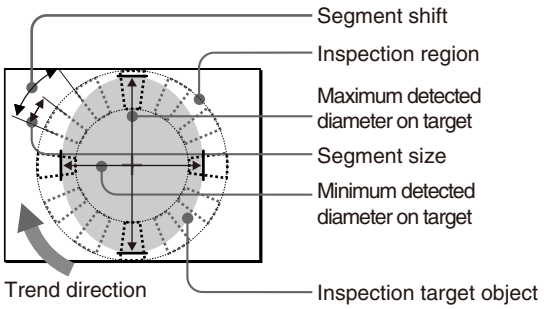
When the inspection region is a ring or an arc (1)

- Trend Direction: Clockwise
- Measure: Outer Gap



When the inspection region is a ring or an arc (2)

- Trend Direction: Clockwise
- Measure: Outer Diameter



Reference For a technical description of edge detection, see “Appendix” - “Technical Description” - "What is an Edge?".

Measurement Results Output

The measurement results output by the Profile Width tool are as follows.

Point The measurement items differ depending on the shape of the inspection region. The value of an item that is not measured is always zero.

When the inspection region is a rectangle

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Number of Segments	Outputs the set number of segments.
Number of Detected Segments	Outputs the number of segments that were actually measured.
Pair Count [ ]	Outputs (1) if a pair is detected and (0) if a pair is not detected for all measured segments.
Pair Count (Maximum)	Outputs (1) if a pair is detected and (0) if a pair is not detected for the segment with the maximum edge width.
Pair Count (Minimum)	Outputs (1) if a pair is detected and (0) if a pair is not detected for the segment with the minimum edge width.
Edge Width [ ]	Outputs the width of edges in all segments that were measured.
Edge Width (Maximum)	Outputs the width of edges in the segment with the maximum edge width.
Edge Width (Minimum)	Outputs the width of edges in the segment with the minimum edge width.
Edge Width (Average)	Outputs the average edge width of all segments that were measured.
Peak-to-Peak Width (Maximum)	Displays the measured peak-to-peak width (maximum).
Peak-to-Peak Width (Minimum)	Displays the measured peak-to-peak width (minimum).
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

When the inspection region is a ring or arc

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Number of Segments	Outputs the set number of segments.
Number of Detected Segments	Outputs the number of segments that were actually measured.
Pair Count [ ]	Outputs (1) if a pair is detected and (0) if a pair is not detected for all measured segments.
Pair Count (Maximum)	Outputs (1) if a pair is detected and (0) if a pair is not detected for the segment with the maximum edge width.
Pair Count (Minimum)	Outputs (1) if a pair is detected and (0) if a pair is not detected for the segment with the minimum edge width.
Edge Width [ ]	Outputs the width of edges in all segments that were measured.
Edge Width (Maximum)	Outputs the width of edges in the segment with the maximum edge width.
Edge Width (Minimum)	Outputs the width of edges in the segment with the minimum edge width.

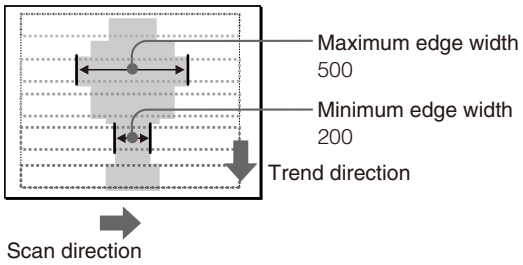
Measurement results	Description
Edge Width (Average)	Outputs the average edge width of all segments that were measured.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Examples

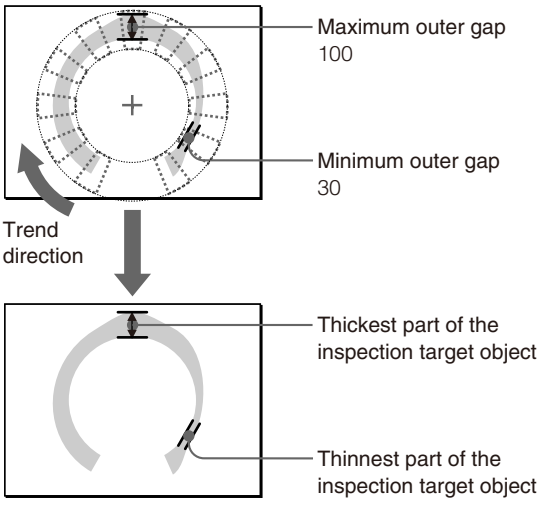
When the inspection region is a rectangle

- Measure: Outer Gap
- Trend Direction: ↓
- Scan Direction: Forward
- Edge Direction: Both



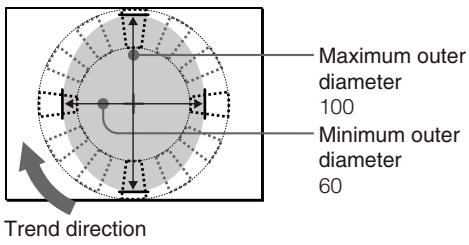
When the inspection region is a ring or an arc (1)

- Measure: Outer Gap
- Trend Direction: Clockwise
- Scan Direction: Center to Outer
- Edge Direction: Both



When the inspection region is a ring or an arc (2)

- Measure: Outer Diameter
- Trend Direction: Clockwise
- Scan Direction: Center to Outer
- Edge Direction: Both



Properties

When setting the Profile Width tool, use the [Properties] view. The [Properties] view for the Profile Width tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. Additionally, set the other conditions that can be set for the Profile Width tool as necessary.
Judgment	Sets the tolerances (upper and lower limits) for the measured values.
Display	Set the display methods for the inspection and mask regions.

Region

Specify the area on the captured image to be used for measurement.

Point Changing the shape of the region resets some of the settings under [Detection] and [Judgment].

Reference For details about how to set regions, see “Tool Common Setting Items” - “Region” tab - "Region Settings".

Detection

Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge. You can also set the other conditions that can be set for the Profile Width tool as necessary.

Point Changing the shape of the inspection region resets some [Edge Detection] settings.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

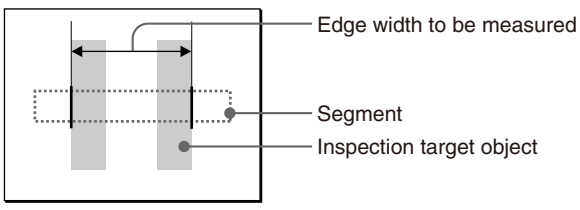
Mode

Select Mode

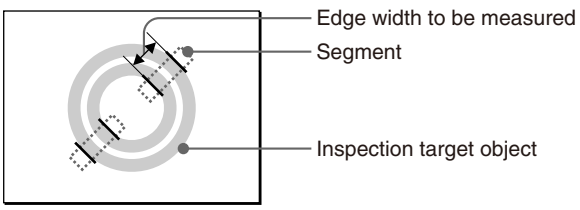
Select the type of edge width to be measured.

- **Outer Gap** (default): Measures the distance between the outermost edges in the inspection region.

When the inspection region is a rectangle:

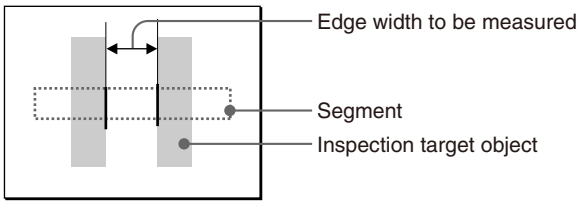


When the inspection region is a ring or an arc:

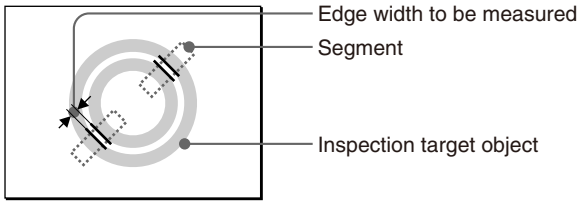


- **Inner Gap**: Measures the distance between the innermost edges in the inspection region.

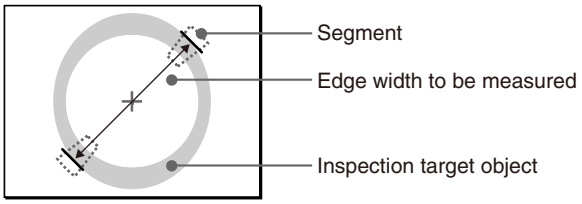
When the inspection region is a rectangle:



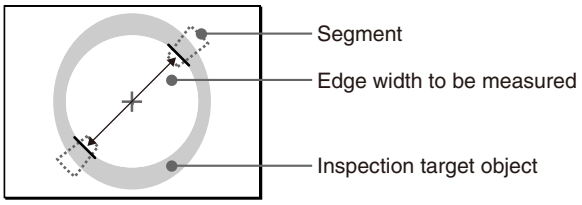
When the inspection region is a ring or an arc:



- **Outer Diameter** (Ring region only): Measures the outer diameter of the edges detected by two opposing segments in a ring inspection region.

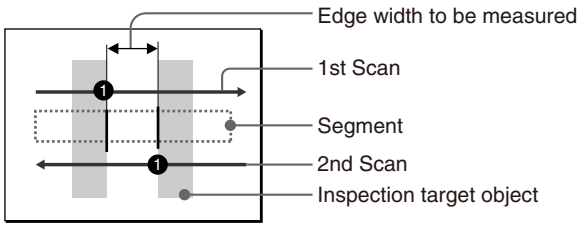


- **Inner Diameter** (Ring region only): Measures the inner diameter of the edges detected by two opposing segments in a ring inspection region.

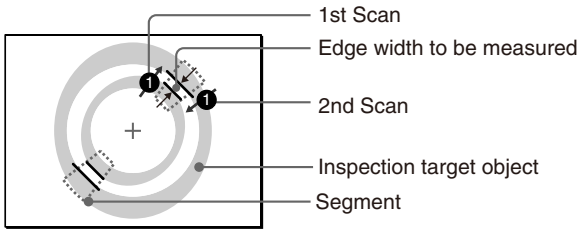


- **1st/2nd Edges**: Measures the distance between the edges specified in the 1st and 2nd scan respectively.

When the inspection region is a rectangle:



When the inspection region is a ring or an arc:



Edge Detection

Point When [Select Mode] is set to [1st/2nd Edges], edge detection settings are configured for the first and second edges respectively.

Trend Direction

Displays the segment's direction of movement.

- When the inspection region is a rectangle: ↓ (top to bottom) and is linked to the direction of rotation of the region.
- When the inspection region is a ring or arc: **Clockwise**.

Scan Direction

Select the direction to detect edges.

- When the inspection region is a rectangle: **Forward** (from left to right) (default), **Reverse** (from right to left)

- When the inspection region is a ring or arc: **Center to Outer** (default), **Outer to Center**

Edge Direction

Select the direction for detecting an edge.

- **Both** (default): Detects both borders in a transition that changes from a bright area to a dark area or from a dark area to a bright area.
- **Bright to Dark**: Detects borders in a transition that changes from a bright area to a dark area.
- **Dark to Bright**: Detects borders in a transition that changes from a dark area to a bright area.

Specified Edge

When [Select Mode] is set to [1st/2nd Edges], set the edge number that is to be the target of measurement within the segment. The setting range is -3600 to 3599 (default: 0). Edge numbers are set to be numbered in the order of the direction of detection if the value is greater than or equal to 0, and in the reverse order of the direction of detection if the value is negative. If the specified edge number is not detected, the measurement result in that segment is zero.

Edge Sensitivity (%)

Set the percentage threshold (0% to 100%) for identifying edges (default: 30).

Edge Filter Width

Set the width (0 to 100 pixels) of the smoothing filter applied to the differential graph for detecting edges (default: 5).

Edge Intensity Upper Limit

Set the upper limit (0.000 to 255.000) of edge intensity for detecting edges (default: 255.000).

Edge Intensity Lower Limit

Set the lower limit (0.000 to 255.000) of edge intensity for detecting edges (default: 5.000).

Reference Unwanted edges can be excluded from detection by adjusting the upper and lower edge intensity limit values while referring to the highest edge intensity in the inspection region (shown on the left of the edge graph). For details, see “Appendix” - “Technical Description” - "What is an Edge?".

Options

Edge Width Upper Limit

Set the upper limit of the edge width (0 to 99999.999) for detecting pairs (default: 99999.999).

Edge Width Lower Limit

Set the lower limit of the edge width (0 to 99999.999) for detecting pairs (default: 1.000).

Point The upper and lower limit settings are applied to the values before scaling correction, even if [Scaling] is set to ON.

Segment Size

Set the size of the segment in the inspection region.

- When the inspection region is a rectangle: Set a value between 1 and 9999 pixels (default: 10). If a value is set that is greater than the inspection region width in the [Trend Direction], a measurement error will occur.
- When the inspection region is a ring or arc: Set a value between 0.01 and 359.99° (default: 10.00). If a value is set that is greater than the angle of the arc region, a measurement error will occur.

Segment Shift

Set the amount of one movement along the trend direction of the segment.

- When the inspection region is a rectangle: Set a value between 0.01 and 9999.99 pixels (default: 5.00).
- When the inspection region is a ring or arc: Set a value between 0.01 and 359.99° (default: 5.00).

Starting Offset/Starting Angle

Set the offset amount (angle) of the detection start segment from the inspection region. If a measurement error occurs due to no edge points being near the border of the inspection region, you can move the start position to a better location without changing the inspection region.

- When the inspection region is a rectangle: Set a value between 0 and 9999 pixels (default: 0).
- When the inspection region is a ring or arc: Set a value between 0.00 and 359.99° (default: 0.00).

Number of Segments

Displays the number of segments in the inspection region.

Judged Label Type

Select the segment to be used for judgment from [Maximum] (default), [Minimum], and [Specified]. If you select [Specified], set the segment to be used for judgment by setting the label number in [Judged Label] (0 to 29999, default: 0).

Point The number of segments set for the current inspection region is refreshed automatically according to the change in the segment size and shift amount and displayed as Number of Segments. The maximum number of segments is 30,000, but the actual number of segments that can be set may be less than the maximum number, depending on other settings.

Reference

- The [Image Viewer] displays the position and edge graph, edge intensity value, and measurement result for the segment specified in the judged label. Selecting the segment by specifying the number is useful for checking the detection status of specific segments.
- When the current image is selected as the display image, execute simulation once to refresh the result display.

Angled Edge Detection

Turn on this optionto stabilize the detection of slanted edges in the inspection region (default: OFF).
Using this option under normal conditions may affect the accuracy of the measurement.

Maximum Number of Segments

Set the maximum number of segments that can be detected (1 to 30000, default: 100). Depending on the state of the resource memory, it may not be possible to set up to the maximum number for the setting.

Edge Graph Display Position

When you open the [Detection] tab in Setup Mode and set the inspection region to a user-selected range, an edge graph is displayed in [Image Viewer]. From the drop-down menu, select which side (Top or Bottom) of the inspection region to display the edge graph (default: Bottom).

Reference When the inspection region is a rectangle, the position where the rotation angle is 0° is used as the reference.

Detailed Settings

You can set the other conditions that can be set for the Profile Width tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Number of Detected Segments

Set the tolerance for the number of detected segments.
- Unit: Number of segments
- Range: 0 to 99999

Edge Width (Maximum)

Set the tolerance for the maximum value of the detected edge widths.
- Unit: Pixel Count
- Range: 0.000 to 99999.999

Edge Width (Minimum)

Set the tolerance for the minimum value of the detected edge widths.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Edge Width

Set the tolerance for the detected edge width in the segment to be used for judgment.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Peak-to-Peak Width (Maximum)

Set the tolerance for the maximum value of the detected peak intervals. This condition is displayed when [Region Settings] - [Shape] - [Rectangle] is selected on the [Region] tab.

- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Peak-to-Peak Width (Minimum)

Set the tolerance for the minimum value of the detected peak intervals. This condition is displayed when [Region Settings] - [Shape] - [Rectangle] is selected on the [Region] tab.

- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set the display methods for the inspection and mask regions. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Judged Label

Select whether or not to display the detected position of the detected trend edge set in [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detected position.
- **OFF**: Does not display the detected position.

Maximum Label/Minimum Label

Select whether or not to display the detected position of the maximum and minimum labels of the detected trend edges other than those set in [Judged Label].

- **ON**: Displays the detected position. Set the shape (Cross, Circle, or Bar), size (4 to 1024), line thickness, and color of the detected position.
- **OFF** (default): Does not display the detected position.

Peak-to-Peak Width (Maximum)

Select whether or not to display the maximum peak-to-peak width of the detected profile widths. This condition is displayed when [Region Settings] - [Shape] - [Rectangle] is selected on the [Region] tab.

- **ON** (default): Displays the maximum peak-to-peak width. Set the thickness and color of the graphics.
- **OFF**: Does not display the maximum peak interval.

Peak-to-Peak Width (Minimum)

Select whether or not to display the minimum peak-to-peak width of the detected profile widths. This condition is displayed when [Region Settings] - [Shape] - [Rectangle] is selected on the [Region] tab.

- **ON** (default): Displays the minimum peak-to-peak width. Set the thickness and color of the graphics.
- **OFF**: Does not display the minimum peak interval.

Display Profile

Select whether or not to display the line (profile) connecting the detection points and the detected edge points in the segments.

- **ON** (default): Displays the profiles. Set the display color and thickness for the lines that represent the profiles.
- **OFF**: Does not display the profiles.

Point Display with display type "Raw" is not supported.

Display Segments

Select whether or not to display the segment frame.

- **ON** (default): Displays the segment frame. Set the display color and thickness for the segment frame.
- **OFF**: Does not display the segment frame.

Point If the segment size is larger than the segment shift amount, it is not displayed.

Reset

Restores the display options to their default settings.

Profile Defect

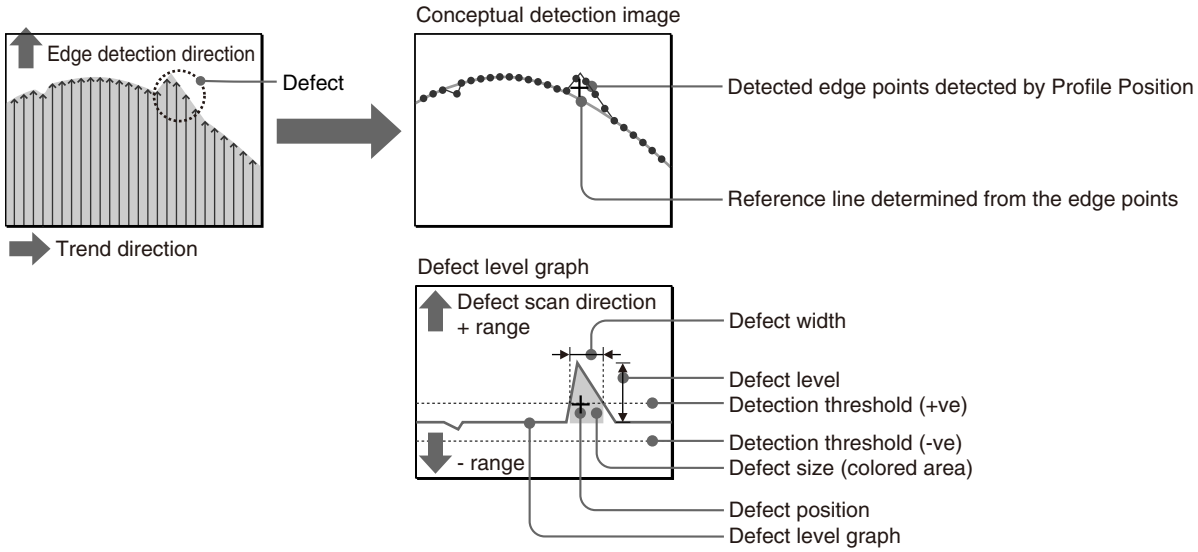
#E023

The Profile Defect tool takes an inspection target's edge points (similar to the processing of Profile Position) and calculates from them a smoothed reference line (line, circle, oval or free curve) which serves as the basic contour of the inspection target to determine if there are any individual or small groups of edge points that are outside of the normal target profile. Detected deviations from the norm that are greater than the threshold value are determined as defects and their count, position, level (height or depth), width and size (area) can all be measured.

Overview of functions

Images of the Measurement

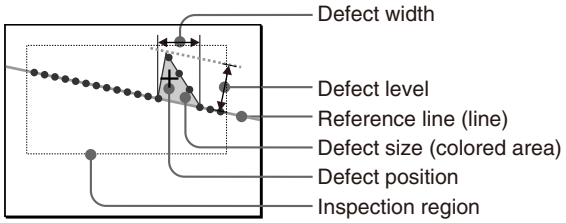
Example of an inspection region with a curved reference line



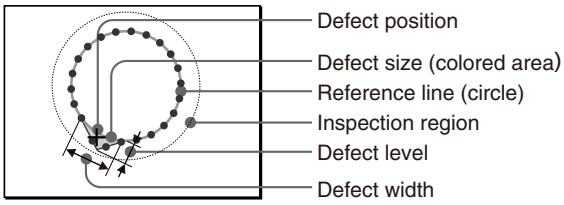
- **Defect Scan Direction**: The same direction as the edge detection direction is positive and the opposite direction is negative.
- **Defect Level**: The maximum difference in distance between the reference line and the detected edge points that make up the defect by exceeding the detection threshold.
- **Defect Width**: The number of edge points (segments) that exceed the detection threshold making up a defect.
- **Defect Size**: The sum of the differences between the reference line and all edge points of the defect (defect levels) or the differences between the detection threshold value and all edge points of the defect. (The selection is available in [Defect Size Calculation] in the [Options].)
- **Defect Position**: The center of gravity of the defect (center of gravity of the area encompassing the reference line and the edge points of the defect).

Point The measured results differ depending on the edge detection condition segment size and shift amount. For example, even if the physical size of the defect is the same, increasing the segment size or shift amount may result in a significantly different defect width and defect size. In addition, if the inspection region is a ring or an arc, such changes may greatly affect defect detection close to the border of the region.

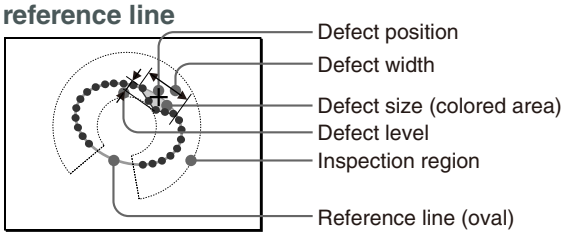
Example of a rectangle inspection region and a straight reference line



Example of a ring inspection region and a circle reference line



Example of an arc inspection region and an oval reference line



Reference For a technical description of edge detection, see “Appendix” - “Technical Description” - "What is an Edge?".

Measurement Results Output

The measurement results output by the profile defect tool are as follows.

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Number of Segments	Outputs the set number of segments.
Number of Detected Segments	Outputs the number of segments for which edge measurement was actually performed.
Defect Count	Outputs the number of defects detected in the inspection region.
Defect Count (+)	Outputs the number of defects detected in the inspection region in the forward direction of edge detection.
Defect Count (-)	Outputs the number of defects detected in the inspection region in the reverse direction of edge detection.
Total Defect Size	Outputs the total size of all defects detected in the inspection region.
Total Defect Level	Outputs the sum of the maximum positive and maximum negative defect level detected in the inspection region.
Total Defect Width	Outputs the total width (number of continuous edge points) of all detected defects in the inspection region.
Defect Size [ ]	Outputs all defect sizes (total of the differences from the [Reference Line] or detection threshold) that the defect has.
Defect Level [ ]	Outputs the defect level (maximum difference from the reference line) of all defects detected in the inspection region.
Defect Width [ ]	Outputs the number of segments that make up the part that exceeds the detection threshold (a defect) for all defects.
Defect Position X [ ]	Outputs the X-coordinate of all defect positions in pixels.

Measurement results	Description
Defect Position Y [ ]	Outputs the Y-coordinate of all defect positions in pixels.
Defect Angle [ ]	Outputs the angle of all defects in reference to the position coordinates (If [Reference Line] is [Circle]/[Oval]: Angle from the center of the reference circle or oval. For the other reference lines: Angle from the center point of the region (when the inspection region is [Ring]/[Arc]), or the angle of the rectangle region (when the inspection region is [Rectangle])).
Defect Peak Position X [ ]	Outputs the X-coordinate of the peak position of the defect (the edge point of the segment with the maximum defect level in the defect) for all defects in pixels.
Defect Peak Position Y [ ]	Outputs the Y-coordinate of the peak position of the defect (the edge point of the segment with the maximum defect level in the defect) for all defects in pixels.
Reference Circle Radius	Outputs the radius of the detected circle (when [Reference Line] is [Circle]).
Reference Circle Center X	Outputs the X-coordinate of the detected circle in pixels (when [Reference Line] is [Circle]).
Reference Circle Center Y	Outputs the Y-coordinate of the detected circle in pixels (when [Reference Line] is [Circle]).
Reference Line X1	Outputs the X-coordinate of the intersection between the detected line and the top of the inspection region (or left side when the trend direction is →) in pixels.
Reference Line Y1	Outputs the Y-coordinate of the intersection between the detected line and the top of the inspection region (or left side when the trend direction is →) in pixels.
Reference Line X2	Outputs the X-coordinate of the intersection between the detected line and the bottom of the inspection region (or right side when the trend direction is →) in pixels.
Reference Line Y2	Outputs the Y-coordinate of the intersection between the detected line and the bottom of the inspection region (or right side when the trend direction is →) in pixels.
ρ of Reference Line	Outputs the ρ of the detected line (when [Reference Line] is [Line]).
θ of Reference Line	Outputs the θ of the detected line (when [Reference Line] is [Line]).
Reference Line Angle	Outputs the angle (0° to 359.999°) of detected line XY2 as seen from detected line XY1 (when [Reference Line] is [Line]).
Reference Line Center X	Outputs the X-coordinate of the midpoint between detected line XY1 and XY2 in pixels (when [Reference Line] is [Line]).
Reference Line Center Y	Outputs the Y-coordinate of the midpoint between detected line XY1 and XY2 in pixels (when [Reference Line] is [Line]).
Reference Line Angle (+/-180°)	Outputs the angle (0° to 359.999°) of detected line XY2 in reference to detected line XY1 (when [Reference Line] is [Line]).
Reference Oval Radius 1	Outputs the radius in the major axis direction of the detected oval (1/2 of the long axis) in pixels (when [Reference Line] is [Oval]).
Reference Oval Radius 2	Outputs the radius in the minor axis direction of the detected oval (1/2 of the short axis) in pixels (when [Reference Line] is [Oval]).
Reference Oval Center X	Outputs the X-coordinate of the center position of the detected oval in pixels (when [Reference Line] is [Oval]).
Reference Oval Center Y	Outputs the Y-coordinate of the center position of the detected oval in pixels (when [Reference Line] is [Oval]).
Reference Oval Rotation Angle	Outputs the angle of the detected oval (when [Reference Line] is [Oval]).
Defect Start Segment No. [ ]	Outputs the start segment number for all detected defects.

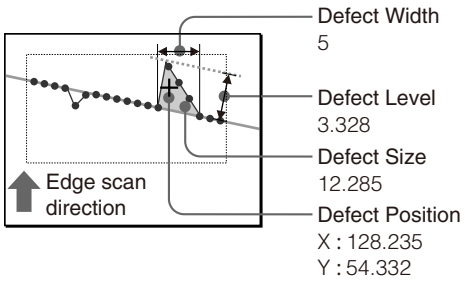
Measurement results	Description
Defect Peak Segment No. [ ]	Outputs the segment number of the segment showing the peak position of the defect (maximum defect level in the defect) for all detected defects.
Defect End Segment No. [ ]	Outputs the end segment number for all detected defects.
Difference [ ]	Outputs all the difference between the reference line and the edge position coordinate detected in each segment in pixels.
Number of Detected Edges [ ]	Outputs the number of edges in each of all segments that were measured.
Edge Position X [ ]	Outputs the X-coordinate of all edges of the measured segments in pixels.
Edge Position Y [ ]	Outputs the Y-coordinate of all edges of the measured segments in pixels.
Edge Angle [ ]	Outputs all angles of segments that were measured (or the angle of the rectangle region when the inspection region is [Rectangle]).
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Examples

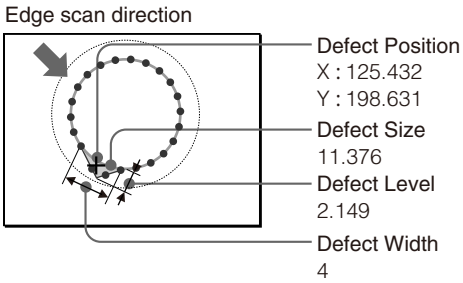
Example of a rectangle inspection region and a straight line as the reference line

- Reference Line: Line
- Edge scan direction: ↑
- Defect Scan Direction: +



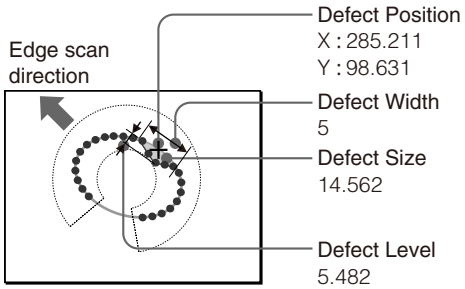
Example of a ring inspection region and a circle as the reference line

- Reference Line: Circle
- Edge scan direction: Outer to Center
- Defect Scan Direction: +/-



Example of an arc inspection region and an oval as the reference line

- Reference Line: Oval
- Edge scan direction: Center to Outer
- Defect Scan Direction: -



Properties

When setting the Profile Defect tool, use the [Properties] view. The [Properties] view for the Profile Defect tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Sets the conditions (detection conditions) for detecting the edge. Additionally, set the other conditions that can be set for the edge detection conditions as necessary.
Defect Detection	Sets the conditions (defect detection conditions) for detecting defects.
Judgment	Sets the tolerances (upper and lower limits) for the measured values.
Display	Sets the display methods for the inspection and mask regions, and the detected defects.

Region

Specify the area on the captured image to be used for measurement.

Point Changing the shape of the region resets some of the settings under the [Detection] and [Defect Detection] tabs.

Reference For details about how to set regions, see “Tool Common Setting Items” - “Region” tab - "Region Settings".

Detection

You can set the conditions (detection conditions) for detecting edges and the other conditions that can be set for the edge detection conditions as necessary.

Point Changing the shape of the inspection region resets some of the [Detection] and [Defect Detection] settings.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Set the scan direction and edge direction for edge detection, and the detailed conditions and other settings for detecting as an edge.

Trend Direction

Displays the segment’s direction of movement.

- When the inspection region is a rectangle: ↓ (top to bottom) only and is linked to the direction of rotation of the region.

- When the inspection region is a ring or arc: **Clockwise** only.

Scan Direction

Select the direction to detect edges.

- When the inspection region is a rectangle: **Forward** (from left to right) (default), **Reverse** (from right to left)
- When the inspection region is a ring or arc: **Center to Outer** (default), **Outer to Center**

Edge Direction

Select the direction for detecting an edge.

- **Both** (default): Detects both borders in a transition that changes from a bright area to a dark area or from a dark area to a bright area.
- **Bright to Dark**: Detects borders in a transition that changes from a bright area to a dark area.
- **Dark to Bright**: Detects borders in a transition that changes from a dark area to a bright area.

Specified Edge

Set the edge number that is to be the target of measurement within the segment. The setting range is -3600 to 3599 (default: 0).

- Setting the value to 0 or above sets edge numbers in the order of the direction of detection, and in the reverse order of the direction of detection if the value is negative.
- If the specified edge number is not detected, the measurement result in that segment is zero. However, if the [Defect Detection] tab - [Options] - [Handling of Undetected Point] is set to an option other than [Ignore], the measurement results will be output according to that setting.

Edge Sensitivity (%)

Set the percentage threshold (0% to 100%) for identifying edges (default: 30).

Edge Filter Width

Set the width (0 to 100 pixels) of the smoothing filter applied to the differential graph for detecting edges (default: 5).

Edge Intensity Upper Limit

Set the upper limit (0.000 to 255.000) of edge intensity for detecting edges (default: 255.000).

Edge Intensity Lower Limit

Set the lower limit (0.000 to 255.000) of edge intensity for detecting edges (default: 5.000).

Reference Unwanted edges can be excluded from detection by adjusting the upper and lower edge intensity limit values while referring to the highest edge intensity in the segment (shown on the left of the edge graph). For details, see “Appendix” - “Technical Description” - "What is an Edge?".

Options

Segment Size

Set the size of the segment in the inspection region.

- When the inspection region is a rectangle: Set a value between 1 and 9999 pixels (default: 5). If a value is set that is greater than the inspection region width in the trend direction, a measurement error will occur.
- When the inspection region is a ring or arc: Set a value between 0.01 and 359.99° (default: 5.00). If a value is set that is greater than the angle of the arc region, a measurement error will occur.

Segment Shift

Set the amount of one movement along the trend direction of the segment.

- When the inspection region is a rectangle: Set a value between 0.01 and 9999.99 pixels (default: 3.00).
- When the inspection region is a ring or arc: Set a value between 0.01 and 359.99° (default: 3.00).

Starting Offset/Starting Angle

Set the offset amount (angle) of the detection start segment from the inspection region. If a measurement error occurs due to no edge points being near the border of the inspection region, you can move the start position to a better location without changing the inspection region.

- When the inspection region is a rectangle: Set a value between 0 and 9999 pixels (default: 0).
- When the inspection region is a ring or arc: Set a value between 0.00 and 359.99° (default: 0.00).

Number of Segments

Displays the number of segments in the inspection region.

Edge Graph Segment No.

Set the segment whose position, edge graph, edge intensity value, and measurement result are to be displayed on the screen. The setting range is 0 to 29999 (default: 0).

Point The number of segments set for the current inspection region is refreshed automatically according to the change in the segment size and shift amount and displayed as Number of Segments. The maximum number of segments is 30,000, but the actual number of segments that can be set may be less than the maximum number, depending on other settings.

Reference

- The [Image Viewer] displays the position, edge graph, and edge intensity value for the segment set in [Edge Graph Segment No.]. Selecting the segment by specifying the number is useful for checking the detection status of specific segments.
- When the current image is selected as the display image, execute simulation once to refresh the result display.

Angled Edge Detection

Turn on this option to stabilize the detection of slanted edges in the inspection region (default: OFF).
Using this option under normal conditions may affect the accuracy of the measurement.

Maximum Number of Segments

Set the maximum number of segments that can be detected with the tool currently being configured (1 to 30000, default: 200).

Point Depending on the state of the resource memory, it may not be possible to set up to the maximum number for the setting.

Edge Graph Display Position

When you open the [Detection] tab in Setup Mode and set the inspection region to a user-selected range, an edge graph is displayed in [Image Viewer]. From the drop-down menu, select which side of the inspection region to display the edge graph.

- When the inspection region is a rectangle: [Top] or [Bottom] (default)

  Reference The position where the rotation angle is 0° is used as the reference.

- When the inspection region is a ring or arc: [Left] (default) or [Right]

Detailed Settings

You can set the other conditions that can be set for the Profile Defect tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Defect Detection

Set the conditions (defect detection conditions) for detecting defects.

Defect Detection Conditions

Set the reference line and the direction of defect detection for detecting defects.

Reference Line

Select the shape of the reference model line.

- **Circle** (default setting when the inspection region is a ring or arc)
- **Line** (default setting when the inspection region is a rectangle)
- **Oval** (When the inspection region is a ring or arc)
- **Free Curve**

Point The displayed settings differ depending on the shape of the set inspection region.

Smoothing Range (%)

Set the degree of smoothness of the curve as a percentage of all segments (1 to 100) when [Free Curve] is selected for [Reference Line] (default: 15). Increase the smoothing range value to make a smoothly curving reference line upon the shape of the target, or reduce it for a finer sharp change.

Defect Scan Direction

Select the direction to detect defects.

- **+**: Only irregularities in the + direction are detected as defects.

- **-**: Only irregularities in the - direction are detected as defects.
- **+/-** (default): Detects irregularities in both +/- directions as defects.
- **+/- (Individual)**: Detects irregularities in both +/- directions as defects. This option differs from [+/-] in that the level of detection as a defect can be set separately for the + and - directions.

Point A detection direction guide is displayed, which is linked to the selection for [Defect Scan Direction] and the shape of the set inspection region. The + sign indicates the direction is the same as the edge detection direction while the - sign indicates the direction is opposite to the edge detection direction.

Defect Conditions

Set the defect level, number of defect segments, and size of defects to be detected.

Detection Threshold

Set the threshold value for the defect level to a value between 0.00 and 9999.99 for detecting defects (default: 3.00). If [Defect Scan Direction] is set to [+/- (Individual)], set the tolerance for the + range and the - range respectively.

Defect Level Filter

Set the tolerances for the defect level to detect as defects. If [Defect Scan Direction] is set to [+/- (Individual)], set the tolerances for the + range and the - range respectively.

- **Upper Limit**: Set the upper limit (0.00 to 9999.99) for the defect level to detect as defects (default: 9999.99).
- **Lower Limit**: Set the lower limit (0.00 to 9999.99) for the defect level to detect as defects (default: 0.00).

Defect Width Filter

Set the tolerances for the number of defect segments to detect as defects. If [Defect Scan Direction] is set to [+/- (Individual)], set the tolerances for the + range and the - range respectively.

- **Upper Limit**: Set the upper limit (0 to 99999) for the number of defect segments to detect as defects (default: 99999).
- **Lower Limit**: Set the lower limit (0 to 99999) for the number of defect segments to detect as defects (default: 0).

Defect Size Filter

Set the tolerances for the defect size to detect as defects. If [Defect Scan Direction] is set to [+/- (Individual)], set the tolerances for the + range and the - range respectively.

- **Upper Limit**: Set the upper limit (0.00 to 9999999.99) for the defect size to detect as defects (default: 9999999.99).
- **Lower Limit**: Set the lower limit (0.00 to 9999999.99) for the defect size to detect as defects (default: 0.00).

Detection Count

Set the maximum number of defects to be detected by the Profile Defect measurement in the range of 1 to 30000 (default: 30). For example, setting [3] will detect a maximum of three defects.

Options

Detection Order

Select the condition by which the defect is given a defect number from the following 12 options:

- **Segment: Ascending**: Sorts defects based on the one bearing the smallest segment number to the one with the largest.
- **Segment: Descending**: Sorts defects based on the one bearing the largest segment number to the one with the smallest.
- **X: Ascending**: Sorts defects based on the one having the smallest X coordinate to the one with the largest.
- **X: Descending**: Sorts defects based on the one having the largest X coordinate to the one with the smallest.
- **Y: Ascending**: Sorts defects based on the one having the smallest Y coordinate to the one with the largest.
- **Y: Descending**: Sorts defects based on the one having the largest Y coordinate to the one with the smallest.
- **Defect Level: Ascending**: Sorts defects based on the one having the smallest defect level to the one with the largest.
- **Defect Level: Descending**: Sorts defects based on the one having the largest defect level to the one with the smallest.
- **Defect Width: Ascending**: Sorts defects based on the one having the smallest number of defect segments to the one with the largest.
- **Defect Width: Descending**: Sorts defects based on the one having the largest number of defect segments to the one with the smallest.
- **Defect Size: Ascending**: Sorts defects based on the one having the smallest defect size to the one with the largest.
- **Defect Size: Descending** (default): Sorts defects based on the one having the largest defect size to the one with the smallest.

Judged Label Type

Set the defect to be judged.

- **All**: Uses all the minimum and maximum values measured from all defects for the judgment.
- **Specified** (default): To judge only a particular defect, set the number of the defect (0 to 29999) (default: 0). The defect of the number that is set in [Judged Label] will be the target of judgment.

Reference

- The [Image Viewer] displays the defect level graph, position and defect level of the defect segment specified as the judged label. Selecting defects with [Specified] is useful for checking the detection status of specific defects.
- When the current image is selected as the display image, execute simulation once to refresh the result display.
- If [All] is selected for [Judged Label Type], the edge points of all defects are displayed in green.

Handling of Undetected Point

Set the handling of defect levels for points where edges could not be detected.

- **Ignore** (default): Undetected points are treated as having a defect level of 0.

- **Maximize**: The defect level of undetected points are treated as having the maximum value in the edge scan direction.
- **Minimize**: The defect level of undetected points are treated as having the minimum value in the edge scan direction.
- **Interpolate**: The defect level of an undetected point is interpolated from the surrounding points.

Point Selecting [Interpolate] increases the measurement time.

Defect Size Calculation

Select a defect size calculation method.

- **Total Difference from Reference Line** (default): The total of the differences from the reference line is used as the defect size.
- **Total Difference from Threshold**: The total of the differences from the [Detection Threshold] value set in [Defect Conditions] is used as the defect size.

Selection Settings

Selection Method

To increase (for a more precise reference line) or decrease (for faster reference line detection) the number of detection points used to create the reference line, select [Manual] and then specify the selection rate.

- **Auto** (default): Automatically sets the selection rate.
- **Manual**: Set the desired selection rate.

Edge Selection (%)

Set the detection selection rate for creating the reference line.

- **Auto**: Displays the selection rate in the case where [Auto] is selected for [Selection Method].
- **Manual**: Set the selection rate between 0.00 and 99.99% (default: 50.00%) when [Manual] is selected for [Selection Method].

Defect Level Graph Display Position

When you open the [Defect Detection] tab in Setup Mode, a defect level graph is displayed in [Image Viewer]. From the drop-down menu, select which side of the inspection region to display the defect level graph.

- When [Inspection Region] is [Rectangle]: [Left] (default) or [Right]

  Reference The position where the rotation angle is 0° is used as the reference.

- When [Inspection Region] is [Ring] or [Arc]: [Top] or [Bottom] (default)

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point

- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Number of Detected Segments

Set the tolerances for the number of detected segments.

- Unit: Number of segments
- Range: 0 to 99999

Defect Count

Set the tolerances for the number of defects detected.

- Unit: Defect Count
- Range: 0 to 99999

Defect Count (+)/Defect Count (-)

Set the tolerances for the number of defects detected on the + and - ranges.

- Unit: Defect Count
- Range: 0 to 99999

Total Defect Size

Set the tolerances for the total defect size for all defects.

- Unit: Pixel Count
- Range: 0.000 to 9999999.999

Defect Size

Set the tolerances for the defect size of the defect specified for [Judged Label]. If [All] is selected for [Judged Label Type], the [Maximum] and [Minimum] values are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0.000 to 9999999.999

Defect Position X/Defect Position Y

Set the tolerance for the center of gravity of the defect specified for [Judged Label]. If [All] is selected for [Judged Label Type], the [Maximum] and [Minimum] values are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set so as to not judge if judgment targets are invalid data (default: ON). If set to ON, the tool will no longer result in an execution error arising from the occurrence of a judgment error that is due to the judging of invalid data.

Display

Set the display methods for the inspection and mask regions, and the detected defects. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Defect Position

Select whether or not to display the detected position of the detected defect set in [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Circle, Plus/Minus), size (4 to 1024), line thickness, and color of the detected position.
- **OFF**: Does not display the detected position.

Detected Defect Position (Excluding Judged Label)

Select whether or not to display the detected position of the detected defect other than the one set in [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Circle, Plus/Minus), size (4 to 1024), line thickness, and color of the detected position.
- **OFF**: Does not display the detected position.

Detected Edge Position

Select whether or not to display the position of the detected edge of the detected defect specified in [Judged Label].

- **ON**: Displays the position of the detected edge. Set the thickness and display color for the line segment that represents the edge position.
- **OFF** (default): Does not display the position of the detected edge of the detected defect.

Detected Edge Position (+ Range Maximum)

Select whether or not to display the detected edge position of the maximum defect level on the + range.

- **ON**: Displays the position of the detected edge. Set the thickness and display color for the line segment that represents the edge position.
- **OFF** (default): Does not display the detected edge position.

Detected Edge Position (- Range Maximum)

Select whether or not to display the detected edge position of the maximum defect level on the - side.

- **ON**: Displays the position of the detected edge. Set the thickness and display color for the line segment that represents the edge position.
- **OFF** (default): Does not display the detected edge position.

Display Profile

Select whether or not to display the line (profile) connecting the detection points and the detected edge points in the segments.

- **ON** (default): Displays the profile. Set the display color and thickness for the line that represents the profile.
- **OFF**: Does not display the profile.

Display Segments

Select whether or not to display the segment frame.

- **ON** (default): Displays the segment frame. Set the display color and thickness for the segment frame.
- **OFF**: Does not display the segment frame.

Point If the segment size is larger than the segment shift amount, it is not displayed.

Reference Line Display

Set the display color and the thickness for the reference line.

Reset

Restores the display options to their default settings.

Defect

#E024

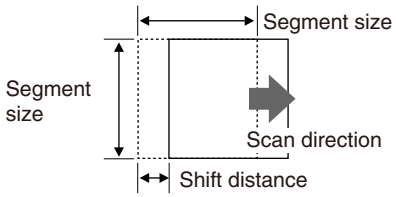
This tool moves a small detection region (segment) in the set inspection region, calculates the average intensity, and detects places where there is a difference in intensity above the threshold value as defects. This is useful for detecting whether or not there are scratches or dirt on an object. It is also possible to group segments with intensity differences above a threshold value, measure the number of groups and their respective positions (defect grouping function) and, in combination with the "Subtraction Filter" tool, extract chips and stains on the workpiece.

Reference Defect detection is based on the amount of change, not the absolute value of intensity, and is therefore less affected by light fluctuations during image capture.

Overview of functions

Image of the Measurement

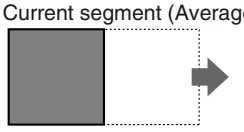
The Defect tool moves the measurement segment by the set shift distance in the specified detection direction within the inspection region, measuring the average intensity within the segment.



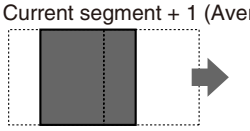
Difference between defect level and defect area

The difference between the maximum and minimum intensity in a total of four segments to be compared in the detection direction, including the current segment, is the “defect level” of the current segment. In the following example, the defect level is 120 (maximum intensity at current segment + 3 position) - 80 (minimum intensity at current segment + 1 position) = 40 (defect level).

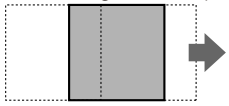
❶ Current segment (Average intensity: 95)



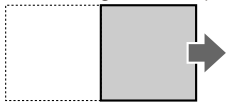
❷ Current segment + 1 (Average intensity: 80)



❸ Current segment + 2 (Average intensity: 100)

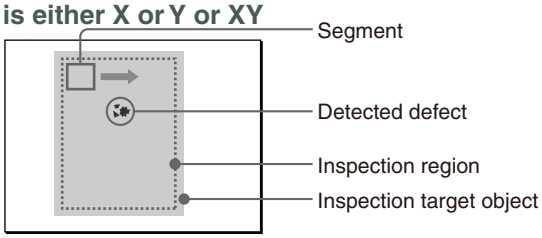


❹ Current segment + 3 (Average intensity: 120)

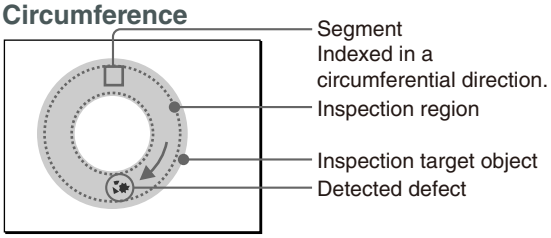


If the “defect level” exceeds the set threshold, the current segment is judged to have a defect and this is added to the “defect area” measurement (the “defect area” measurement is the number of segments judged to have a defect).

Example when the Scan Direction is either X or Y or XY



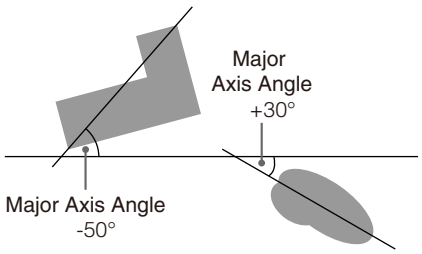
Example when the Scan Direction is Circumference

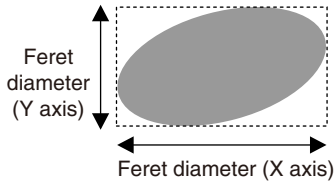
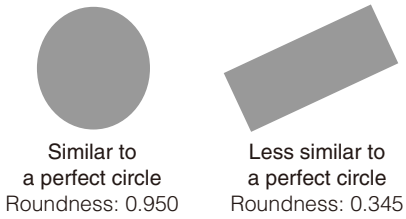
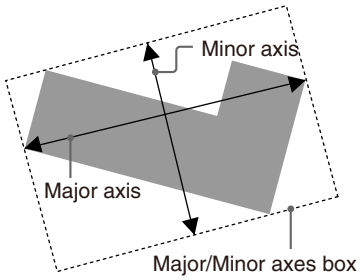


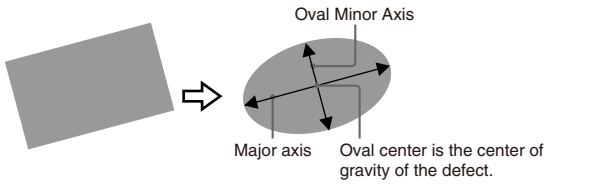
Measurement Results Output

The measurement results output by the Defect tool are as follows.

Point The measurement items differ depending on the "Grouping" settings. The value of an item that is not measured is always zero.

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Detected Defect Level	Outputs the intensity difference in the segment with the largest defect level.
Total Defect Area	Outputs the total number of segments that exceeded the defect level threshold in the inspection region.
Groups	Outputs the number of groups detected by the defect grouping function (when [Grouping] is set to ON).
Defect Area [ ]	Outputs for all groups the number of segments that exceeded the defect level threshold, which make up the group (when [Grouping] is set to ON).
Area [ ]	Outputs all defect areas in pixels (when [Grouping] is set to ON).
Center of Gravity (X, Y) [ ]	Outputs the position coordinate of all groups in pixels. The general location of a defect can be measured. This value is referenced when the Defect tool is specified as the adjustment source during [Image Position Adjustment] (when [Grouping] is set to ON).
Major Axis Angle [ ]	Outputs the angle with regards to the horizontal (X) axis of all the detected defects (when [Grouping] is set to ON). 

Measurement results	Description
Feret Diameter (X, Y) [ ]	Outputs all the length (Feret diameter) of the sides that are parallel to the horizontal axis (X axis) and vertical axis (Y axis) of the rectangle that is circumscribed around the defect in pixels (when [Grouping] is set to ON). 
Perimeter [ ]	Outputs all defect outline lengths (perimeter) in pixels (when [Grouping] is set to ON).
Roundness [ ]	Outputs how resemblant, represented by a numerical value from 0.000 to 1.000, to a true circle all the defects detected in the inspection region are (when [Grouping] is set to ON). If a defect is a perfect circle, 1.000 is output. The value will approach 0.000 as the similarity to a perfect circle decreases. 
Bounding Rectangle (Upper Left, Lower Left, Upper Right, Lower Right) (X, Y) [ ]	Outputs the coordinates for the bounding box for all detected defects in pixels (when [Grouping] is set to ON).
Major Axis Bounding Rectangle (Upper Left, Lower Left, Upper Right, Lower Right) (X, Y) [ ]	Outputs the vertex positions of the major axis bounding box for all detected defects in pixels (when [Grouping] is set to ON). The positional relationship (top/bottom/left/right) is based on the orientation of the major axis angle.
Major Axis [ ]	Outputs all long sides of major axis bounding boxes in pixels (when [Grouping] is set to ON).
Minor Axis [ ]	Outputs all short sides of major axis bounding boxes in pixels (when [Grouping] is set to ON).
Axes Ratio [ ]	Outputs all axes ratios of major axis bounding boxes (when [Grouping] is set to ON). The axes ratio is a value of the "Major axis/Minor axis," and a larger value represents a long and thinner shape. 
Oval Major Axis [ ]	Outputs the major axis of an equivalent distributed oval in pixels (when [Grouping] is set to ON).
Oval Minor Axis [ ]	Outputs the minor axis of an equivalent distributed oval in pixels (when [Grouping] is set to ON).

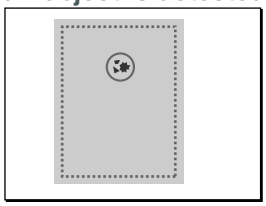
Measurement results	Description
Aspect Ratio [ ]	Outputs all ratios of the major and minor axes of an equivalent distributed oval (when [Grouping] is set to ON). A larger value represents a thinner shape.  The equivalent oval detected from a blob is an approximate oval obtained from the shape of the blob.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Point The tolerance judgment target for the defect area and center of gravity is specified in [Judged Label] (default: Label 0).

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Examples

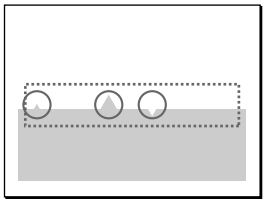
When a defect on the surface of an object is detected



Total Defect Area
20

- Scan Direction: XY

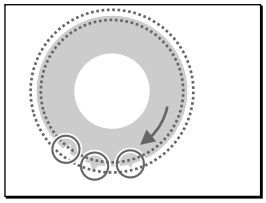
When a crack or burr on the surface of an object is detected



Total Defect Area
55

- Scan Direction: X

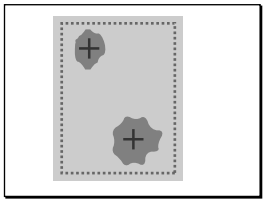
When a crack or burr on the surface of a circular object is detected



Total Defect Area
35

- Scan Direction: Circumference

When the position of a defect on the surface of an object is detected



Result of the first defect
Defect area:70
Center of Gravity:
X100,Y100
Result of the second defect
Defect area:100
Center of Gravity:
X200,Y400

- Scan Direction: XY
- Defect Grouping Function: ON
- Detection count: 2
- Detection order: X>Y: Ascending

Properties

When setting the Defect tool, use the [Properties] view. The [Properties] view for the Defect tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.

Properties	Settings
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	If you are using a color camera, set whether the color information from the image sensor is processed directly in [Fine Color] or converted to a grayscale image using the desired extraction method. Additionally, set the filter processing to apply to the image.
Detection	Set the scan direction and segment size for defect detection, and the detailed conditions and other settings for detecting as a defect. Additionally, set the other conditions that can be set for the Defect tool as necessary.
Judgment	Sets the tolerances (upper and lower limits) for the measured values.
Display	Sets the display methods for the inspection and mask regions, and the detected defects.

Region

Specify the area on the captured image to be used for measurement.

Point Changing the shape of the region resets some of the settings under [Detection] and [Judgment].

Reference For details about how to set regions, see “Tool Common Setting Items” - “Region” tab - "Region Settings".

Detection

Set the scan direction and segment size for defect detection, and the detailed conditions and other settings for detecting as a defect. You can also set the other conditions that can be set for the Defect tool as necessary.
→Detection Conditions
→Grouping
→Filter Settings
→Detailed Settings

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Scan Direction

Select the defect detection direction.

- **X**: Detects intensity differences in the X direction.
- **Y**: Detects intensity differences in the Y direction.
- **XY** (default): Detects intensity differences in the X and Y directions.
- **Circumference**: Detects intensity differences in a circumferential direction.
- **Radius**: Detects intensity differences in a radial direction (from the outside inward).

Point
- [Circumference] and [Radius] can only be set if the inspection region uses a ring or arc.
- If the inspection region is a ring and [Circumference] or [Radius] is selected as [Scan Direction], [Grouping] is disabled.
- When a rectangle region is used, the XY direction moves according to the rotation of the region.
- If you select [Circumference] or [Radius], the [Grouping] filter function is not available.

Set by Direction

Turn on this option if you want to configure the segment settings by detection direction.

- **OFF** (default): Do not configure the segment settings individually by detection direction.
- **ON**: Configure the segment settings individually by detection direction.

It will become possible to for [X] and [Y] (or [Circumference] and [Radius] if the inspection region is a ring or an arc) independently the [Segment Size], [Segment Shift] and other settings.

High Speed Mode

Turn on this option if you want to speed up measurement.

- **ON** (default): Performs high speed measurement.
- **OFF**: Does not perform high speed measurement.

If [High Speed Mode] is turned on, [Segment Size] and [Segment Shift] can only be set in multiples of 4 (if referenced, they are rounded to multiples of 4).

Defect Level

Set the average intensity difference for identifying as a defect in the range of 0 to 254 (default: 10). Defects that are below the intensity difference set here will not be detected as defects.

Segment Size

Set the size of the segment that moves in the inspection region in the X (horizontal) and Y (vertical) directions, respectively, from 1 to 256 (pixels) (default: 16).

Point
- If the segment size is larger than the inspection region, no measurement is performed and the total defect area will be “99999999.”
- If [Circumference] or [Radius] is selected for [Scan Direction], the setting changes to [Radius] and [Circumference].
- To set individual sizes for X/Y and radius/circumference, set [Set by Direction] to ON.

Comparison Interval Setting

In defect measurement, the difference in intensity between adjacent segments is usually detected as the defect area, which can make it difficult to detect gentle changes such as overall color irregularities. In such cases, the defect area can be increased by changing the [Segment Shift] and [Compare Segments] settings in such a way that the intensity differences with places further away are detected. If you want to increase the defect area for gentle intensity changes, select [Manual] and then configure the detailed settings.

- **Auto** (default): [Segment Shift] and [Compare Segments] are adjusted automatically.
- **Manual**: Manually specify values for [Segment Shift] and [Compare Segments].

Segment Shift

Set the amount by which the segment is to be moved when calculating the average intensity of a segment in the range of 1 to 2432 (pixels). When [Comparison Interval Setting] is set to [Auto], it is automatically set to 1/4 of the segment size. Note that if [High Speed Mode] is set to ON, this setting can only be set to a multiple of 4.

Point If the value of [Segment Shift] is greater than the segment size, there will be places in the inspection region that are not reflected in the average intensity. If you want to detect defects smaller than the segment size, select [Auto] for [Comparison Interval Setting] or set the segment shift to a value lower than the segment size.

Compare Segments

Set the interval between segments at which intensity differences are compared from 1 to 2432 (segments) (default: 1). When [Comparison Interval Setting] is set to [Auto], this setting is always set to [1].

Point Increasing the value of [Compare Segments] may result in a single defect being detected more than once. If the number of groups is measured using [Grouping], set the value for [Compare Segments] to a smaller value.

Enable Gain Setting

Turn on this option to set the gain to the intensity difference for detecting defects. If you want to detect defects with a small difference in intensity, set the [Gain] value to a large number.

Point The gain cannot be configured with the following settings:
- When [Fine Color] is selected for [Extraction Method] under [Color Extraction].
- When the region size exceeds 2544 pixels in width or 2544 pixels in height.

Ignore Intensity

Detects only changes in hue and saturation as defects, and excludes any brightness information.
- **OFF** (default): Changes in brightness are also reflected in the defect level.
- **ON**: Only changes in hue and saturation are reflected in the defect level (this setting cannot be selected for camera images for which MultiSpectrum Mode is enabled).

Grouping

Grouping

When this option is turned on, adjacent defects are grouped together so that the center of gravity and defect area of each group can be detected.
- **ON**: Groups defects.
- **OFF** (default): Does not group defects.

Point
- If the inspection region is a ring and [Circumference] or [Radius] is selected for [Scan Direction], [Grouping] is always set to OFF.
- When this option is turned off, all grouping-related functions are not available.
- Changing the setting from ON to OFF will reset some of the previous settings related to [Grouping] and [Judgment Conditions].

Detection Count

Set the maximum number of groups to be detected in the range of 1 to 99 (default: 10). This option cannot be set if [Grouping] is set to OFF.

Fill Holes

Select whether or not to measure the interior portion of a group to include it as part of the detected defect.

- **OFF** (default): Does not fill the inside of a group as a detected defect.
- **ON**: Fills the inside of a group as a detected defect.

Fill holes: OFF

Fill holes: ON

Active Border

Set whether to detect groups located on the frame of the inspection region.

- **OFF** (default): Detects groups that are on top of the frame lines of the inspection region as well.
- **ON**: Excludes groups located on the frame of the inspection region from detection.

Point [Active Border] can only be set if the inspection region is a rectangle or arc ([Scan Direction] is set to [Circumference] or [Radius]) and no mask or image region has been set. If any other inspection region is selected, [Active Border] is always set to OFF.

Judged Label

Set the label (0 to 98) to be judged (default: 0).

Detection Order

Set the condition by which groups are labelled. Note that this option cannot be set if [Grouping] is set to OFF. If the inspection region is an arc and [Scan Direction] is not set to [Circumference] or [Radius], select the condition for labeling groups from the following 8 methods (default: [Defect Area: Descending]):

- **Y>X: Ascending**: Sorts groups by their Y coordinate in ascending order. If the Y range is the same, sorts the groups by their X coordinate in ascending order.
- **X>Y: Ascending**: Sorts groups by their X coordinate in ascending order. If the X range is the same, sorts the groups by their Y coordinate in ascending order.
- **X: Ascending**: Sorts groups based on the one having the smallest X coordinate to the one with the largest.
- **X: Descending**: Sorts groups based on the one having the largest X coordinate to the one with the smallest.
- **Y: Ascending**: Sorts groups based on the one having the smallest Y coordinate to the one with the largest.
- **Y: Descending**: Sorts groups based on the one having the largest Y coordinate to the one with the smallest.
- **Defect Area: Ascending**: Sorts groups based on the one having the smallest defect area to the one with the largest.
- **Defect Area: Descending**: Sorts groups based on the one having the largest defect area to the one with the smallest.

If the inspection region is an arc and [Scan Direction] is set to [Circumference] or [Radius], select the condition for labeling groups from the following 6 methods (default: [Defect Area: Descending]):

- **Clockwise**: Sorts groups in a clockwise direction based on the inspection region.
- **Counterclockwise**: Sorts groups in a counterclockwise direction based on the inspection region.
- **Outer to Center**: Sorts groups in order of distance from the center of the inspection region.
- **Center to Outer**: Sorts groups in order of proximity from the center of the inspection region.
- **Defect Area: Ascending**: Sorts groups based on the one having the smallest defect area to the one with the largest.
- **Defect Area: Descending**: Sorts groups based on the one having the largest defect area to the one with the smallest.

Point When the rectangle region is used, the XY direction moves according to the rotation direction of the region.

Filter Settings

Enable or disable and set upper and lower limits for each filter item for detecting as a group.

Point
- When each item of the filter settings is set to ON, the processing time required for each filtering process is added (default: OFF).
- If the inspection region is an arc and [Scan Direction] is set to [Circumference] or [Radius], the [Grouping] filter function is not available.

Reference For details of the settings for each item, see "Measurement Results Output" for the Blob tool.

Defect Area

Set the upper limit (1 to 99999999, default: 99999999) and lower limit (1 to 99999999, default: 1) for the defect area to be detected as a group. Groups with a greater defect area than the set upper limit or a smaller defect area than the set lower limit are not detected as a group. Additionally, this option cannot be set if [Grouping] is set to OFF.

Roundness

Enable or disable the roundness filter. If enabled, groups with a roundness (close to a perfect circle) greater than the upper limit (0.000 to 1.000, default: 1.000) or smaller than the lower limit (0.000 to 1.000, default: 0.000) are not detected.

Major Axis

Enable or disable the major axis filter. If enabled, groups with a major axis greater than the upper limit (0.000 to 99999.999, default: 99999.999) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected.

Axes Ratio

Enable or disable the axes ratio filter. If enabled, groups with an axes ratio (elongated shape) greater than the upper limit (0.000 to 99999.999, default: 99999.999) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected.

Equivalent Oval Major Axis

Enable or disable the equivalent oval major axis filter. If enabled, groups with an equivalent oval major axis greater than the upper limit (0.000 to 99999.999, default: 99999.999) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected.

Equivalent Oval Aspect Ratio

Enable or disable the equivalent oval aspect ratio filter. If enabled, groups with an equivalent oval aspect ratio (elongated equivalent oval) greater than the upper limit (0.000 to 99999.999, default: 99999.999) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected.

Detailed Settings

You can set the other conditions that can be set for the Defect tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Total Defect Area

Set the tolerance for the total defect area in the inspection region.
- Unit: Number of segments
- Range: 0 to 99999999

Groups

Set the tolerance for the number of defect groups.
- Unit: Number of Groups
- Range: 0 to 99

Point If [Grouping] is set to OFF, this measurement value is not available.

Defect Area

Set the tolerance for the defect area of the group specified for [Judged Label].

- Unit: Number of segments
- Range: 0 to 99999999

Point If [Grouping] is set to OFF, this measurement value is not available.

Center of Gravity X/Y

Set the tolerance for the center of gravity position of the group specified for [Judged Label].

- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Point If [Grouping] is set to OFF, this measurement value is not available.

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set so as to not judge if judgment targets are invalid data (default: ON). If set to ON, the tool will no longer result in an execution error arising from the occurrence of a judgment error that is due to the judging of invalid data.

Display

Set the display methods for the inspection and mask regions, and the detected defects. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the detected position of the defect specified for [Judged Label].

- **ON** (default): Displays the detected position. Configure the shape (cross or circle), size (4 to 1024), line thickness, and color of the detected position (center of the defect).
- **OFF**: Does not display the detected position.

Detected Position (Excluding Judged Label)

Select whether or not to display the detected position of the defects other than the one specified for [Judged Label].

- **ON** (default): Displays the detected position. Configure the shape (cross or circle), size (4 to 1024), line thickness, and color of the detected position (center of the defect) other than the one specified by [Judged Label].
- **OFF**: Does not display the detected position.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The detected position setting is applied for the display color.

Display Label Number

Display Defect Area

Display Center of Gravity X

Display Center of Gravity Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all results.

Reset

Restores the display options to their default settings.

Blob

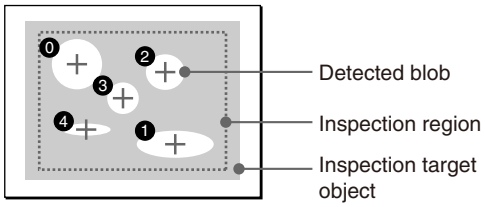
#E025

A set of pixels with the same intensity (255 or 0) in a binary (black and white) image is called a “blob.” The Blob tool can measure the number of blobs and features such as the area and center of gravity position of the blobs.

Overview of functions

Image of the Measurement

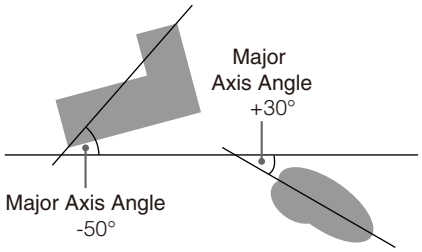
Blobs are measured and managed by label numbering in order from the blob with the largest area.

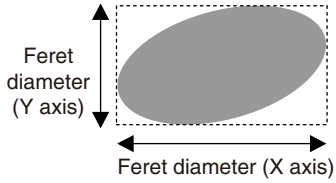
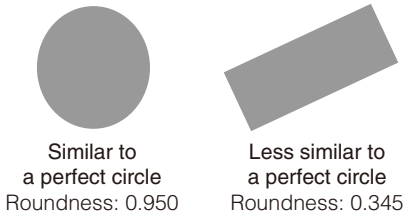
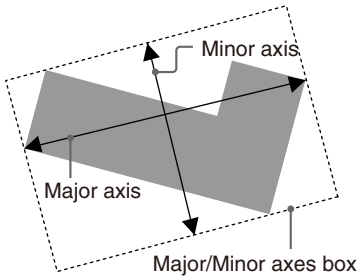


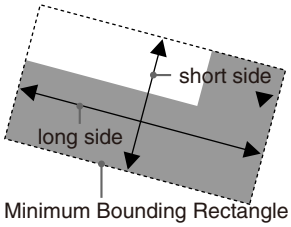
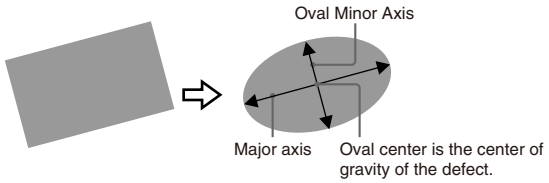
Measurement Results Output

The measurement results output by the Blob tool are as follows.

Point The measurement items differ depending on the shape of the inspection region. The value of an item that is not measured is always zero.

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Total Area	Outputs the total value of the area of the detected blobs.
Label Count	Outputs the number of detected blobs.
Center of Gravity (X, Y) [ ]	Outputs the center of gravity position for all detected blobs in pixels.
Major Axis Angle [ ]	Outputs all the angle with regards to the horizontal (X) axis of the detected blobs. 
Area [ ]	Outputs all blob areas in pixels.

Measurement results	Description
Feret Diameter (X, Y) [ ]	Outputs all the length (Feret diameter) of the sides that are parallel to the horizontal axis (X axis) and vertical axis (Y axis) of the rectangle that is circumscribed around the blob in pixels. 
Perimeter [ ]	Outputs the length (perimeter) of all blob contours in pixels.
Roundness [ ]	Outputs how resemblant, represented by a numerical value from 0.000 to 1.000, to a perfect circle all the blobs detected in the inspection region are. If a blob is a perfect circle, 1.000 is output. The value will approach 0.000 as the similarity to a perfect circle decreases. 
Bounding Rectangle (Upper Left, Lower Left, Upper Right, Lower Right) (X, Y) [ ]	Outputs the bounding box position for all detected blobs in pixels.
Major Axis Bounding Rectangle (Upper Left, Lower Left, Upper Right, Lower Right) (X, Y) [ ]	Outputs the vertex positions of the major axis bounding box for all detected blobs in pixels. The positional relationship (top/bottom/left/right) is based on the orientation of the major axis angle.
Major Axis [ ]	Outputs all long sides of major axis bounding boxes in pixels (when [Major Axis Bounding Rectangle (Major Axis/Minor Axis Length, Axes Ratio)] under [Additional Data] is set to ON).
Minor Axis [ ]	Outputs all short sides of major axis bounding boxes in pixels (when [Major Axis Bounding Rectangle (Major Axis/Minor Axis Length, Axes Ratio)] under [Additional Data] is set to ON).
Axes Ratio [ ]	Outputs all axes ratios of major axis bounding boxes (when [Major Axis Bounding Rectangle (Major Axis/Minor Axis Length, Axes Ratio)] under [Additional Data] is set to ON). The axes ratio is a value of the "Major axis/Minor axis," and a larger value represents a long and thinner shape. 

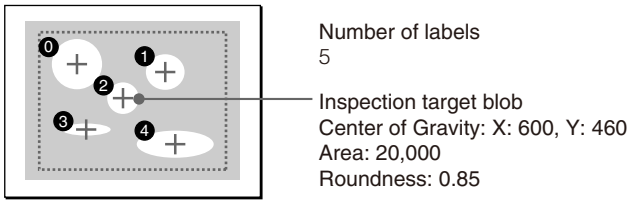
Measurement results	Description
Minimum Bounding Rectangle (Upper Left, Lower Left, Upper Right, Lower Right) (X, Y) [ ]	Outputs the angle of the bounding rectangle with the least area, the vertex positions, center position, and the length of the long and short sides of the bounding box for all the detected blobs in pixels. 
Equivalent Oval Major Axis [ ]	Outputs the length of the major axis all the equivalent distributed ovals in pixels (when [Equivalent Oval] under [Additional Data] is set to ON).
Equivalent Oval Minor Axis [ ]	Outputs the length of the minor axis of all the equivalent distributed ovals in pixels (when [Equivalent Oval] under [Additional Data] is set to ON).
Equivalent Oval Aspect Ratio [ ]	Outputs all ratios of the major and minor axes of an equivalent distributed oval (when [Equivalent Oval] under [Additional Data] is set to ON). A larger value represents a long and thinner shape.  The equivalent oval detected from a blob is an approximate oval obtained from the shape of the blob.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits) or the specified blob does not exist, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Point The tolerance judgment target for measurements other than the number of blobs is set in [Judged Label] (default: 0). If [All] is set in [Judged Label Type], the maximum and minimum of each item are the ones that are subject to tolerance judgment.

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

- Detection Order: Y>X: Ascending
- Selected label: 2



Properties

When setting the Blob tool, use the [Properties] view. The [Properties] view for the Blob tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Set the conditions to detect blobs during measurement. Additionally, set the other conditions that can be set for the Blob tool as necessary.
Judgment	Sets the tolerances (upper and lower limits) for the measured values.
Display	Sets the display methods for the inspection and mask regions, and the detected blobs.

Region

Specify the area on the captured image to be used for measurement.

Point Changing the shape of the region resets some settings under [Detection].

Reference For details about how to set regions, see “Tool Common Setting Items” - "Region" tab - "Region Settings".

Detection

Set the conditions to detect blobs during measurement. You can also set the other conditions that can be set for the Blob tool as necessary.
→Detection Conditions
→Options
→Filter Settings
→Detailed Settings

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Detection Color

Set which color area of the binarized (black and white processed) image is to be detected.

- **Black**: Measures black blobs.
- **White** (default): Measures white blobs.

Point If the binary filter is not set, the lowest bit of the luminance value is used to assess. 1: white, 0: black.

Detection Count

Set the maximum number of blobs to be detected during blob measurement in the range of 1 to 30000. For example, setting [3] will detect a maximum of three blobs (default: 30).

Fill Holes

Specify whether to fill the holes inside the blobs with the detection color. If there are parts inside the blob with a color different to the detection color, the area, center of gravity, major axis angle, and roundness measurements could be affected. In order to prevent this, the inside of blobs can be filled with the detection color.

- **OFF**: Does not fill the inside of the blob with the detection color.
- **ON** (default): Fills the inside of blobs with the detection color.

Fill holes: OFF

Fill holes: ON

Point The result of fill holes is not reflected on the processing screen.

Active Border

Set whether to detect blobs located on the frame of the inspection region.

- **OFF** (default): Detects blobs that are on top of the frame lines of the inspection region as well.
- **ON**: Excludes blobs located on the frame of the inspection region from detection.

Point The [Active Border] ON/OFF setting can only be specified if the inspection region is a rectangle and the mask or processed image regions are not set. If any other inspection region is selected, the [Active Border] will be processed as if set to OFF.

Angle Range

Specify the range of the major axis angle to be output.

- **180°** (default): Outputs angles in the range of -89.999° to 90.000°.
- **360°**: Outputs angles in the range of -179.999° to 180.000°.
- **None**: Always outputs in 0 (degrees) without measuring the major axis angle (increasing the processing speed).

Point

- The behavior may become unstable if [360°] is set for the angle range when measuring blobs with a symmetrical shape.
- This setting also applies to the angle range for the minimum bounding rectangle. If [Angle Range] is set to [None], the minimum bounding rectangle angle is output in the range of -89.999° to 90.000°.

Options

Additional Data

Select to enable or disable detection targets as required. For enabled items, the result data is measured and can be set in [Filter Settings].

Major Axis Bounding Rectangle (Major Axis/Minor Axis Length, Axes Ratio)

– **ON**: Enables [Major Axis], [Minor Axis] and [Axes Ratio] in the measurement results, [Judgment Conditions] and [Filter Settings] (exclusive with the minimum bounding rectangle).

– **OFF** (default): Disables [Major Axis], [Minor Axis] and [Axes Ratio] in the measurement results, [Judgment Conditions], and [Filter Settings] ([Major Axis], [Minor Axis] and [Axes Ratio] in the measurement results are always output as 0).

Minimum Bounding Rectangle

– **ON**: Enables the measurement results (exclusive with the major axis bounding rectangle).
– **OFF** (default): Disables the measurement results (measurement results are always output as 0).

Equivalent Oval

– **ON**: Enables [Equivalent Oval Major Axis], [Equivalent Oval Minor Axis] and [Equivalent Oval Aspect Ratio] in the measurement results, [Judgment Conditions], and [Filter Settings].
– **OFF** (default): Disables [Equivalent Oval Major Axis], [Equivalent Oval Minor Axis] and [Equivalent Oval Aspect Ratio] in the measurement results, [Judgment Conditions], and [Filter Settings] ([Equivalent Oval Major Axis], [Equivalent Oval Minor Axis] and [Equivalent Oval Aspect Ratio] in the measurement results are always output as 0).

Point Enabling [Major Axis Bounding Rectangle], [Minimum Bounding Rectangle], and [Equivalent Oval] increases resource memory consumption and slows down processing.

Detection Order

Select the condition by which the blob is given a number from the following 12 options:

- **Y>X: Ascending**: Sorts blobs by their Y coordinate in ascending order. For blobs in which the Y range is close, sorts the blobs by their X coordinate in ascending order.
- **X>Y: Ascending**: Sorts blobs by their X coordinate in ascending order. For blobs in which the X range is close, sorts the blobs by their Y coordinate in ascending order.
- **X: Ascending**: Sorts blobs based on the one having the smallest X coordinate to the one with the largest.
- **X: Descending**: Sorts blobs based on the one having the largest X coordinate to the one with the smallest.
- **Y: Ascending**: Sorts blobs based on the one having the smallest Y coordinate to the one with the largest.
- **Y: Descending**: Sorts blobs based on the one having the largest Y coordinate to the one with the smallest.
- **Area: Ascending**: Sorts blobs by their area from smallest area to largest.
- **Area: Descending** (default): Sorts blobs by their area from largest area to smallest.
- **Roundness: Ascending**: Sorts blobs by their roundness from smallest value to largest.
- **Roundness: Descending**: Sorts blobs by their roundness from largest value to smallest.
- **Clockwise**: Sorts blobs in a clockwise direction based on the starting angle.
- **Counterclockwise**: Sorts blobs in a counterclockwise direction based on the starting angle.

Starting Angle

Set the start angle for numbering blobs when [Clockwise] or [Counterclockwise] is selected for [Detection Order].

Point No reference is made if [Detection Order] is set to an option other than [Clockwise] or [Counterclockwise].

Judged Label Type

Set the blob to be judged.

- **All**: Uses the maximum and minimum values measured from all blobs for the Pass/Fail judgment.
- **Specified** (default): Uses the values measured from set blob numbers for judgment.

Judged Label

If you select [Specified] for [Judged Label Type], set the blob number (0 to 29999) to use in judgment (default: 0).

Filter Settings

Set the upper and lower limits for each filter item for detection as a blob.

Point

- If [Major Axis Bounding Rectangle (Major Axis/Minor Axis Length, Axes Ratio)] is disabled, [Major Axis] and [Axes Ratio] cannot be set.
- If [Equivalent Oval] is disabled, [Equivalent Oval Major Axis] and [Equivalent Oval Aspect Ratio] cannot be set.

Area

Blobs with an area larger than the set upper limit (0 to 99999999, default: 99999999) or smaller than the lower limit (0 to 99999999, default: 100) are not detected as blobs (area filter).

Roundness

Blobs with a roundness larger than the set upper limit (0.000 to 1.000, default: 1.000) (shape is close to a perfect circle) or smaller than the lower limit (0.000 to 1.000, default: 0.000) are not detected as blobs (roundness filter).

Major Axis

Blobs with a major axis length larger than the set upper limit (0.000 to 99999.999, default: 99999.999) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected as blobs (major axis filter).

Axes Ratio

Blobs with an axes ratio larger than the set upper limit (0.000 to 99999.999, default: 99999.999) (elongated shape) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected as blobs (axes ratio filter).

Equivalent Oval Major Axis

Blobs with an equivalent oval major axis length larger than the set upper limit (0.000 to 99999.999, default: 99999.999) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected as blobs (equivalent oval major axis filter).

Equivalent Oval Aspect Ratio

Blobs with an equivalent oval aspect ratio larger than the set upper limit (0.000 to 99999.999, default: 99999.999) (elongated equivalent oval) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected as blobs (equivalent oval aspect ratio filter).

Detailed Settings

You can set the other conditions that can be set for the Blob tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- With the exception of [Major Axis Angle], a value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Total Area

Set the tolerance for the total area of all detected blobs.
- Unit: Pixel Count
- Range: 0 to 99999999

Label Count

Set the tolerance for the number of blobs detected.
- Unit: Number of Blobs
- Range: 0 to 30000

Center of Gravity X/Center of Gravity Y

Set the tolerance for the position of the center of gravity of the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].
- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Major Axis Angle

Set the major axis angle tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current].
- Unit: Angle
- Range: -180.000 to 180.000

Area

Set the area tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0 to 99999999

Feret Diameter X / Feret Diameter Y

Set the Feret diameter tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Perimeter

Set the perimeter tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0 to 99999999

Roundness

Set the roundness tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Number
- Range: 0.000 to 1.000 (1.000 = perfect circle)

Major Axis

Set the major axis length tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Minor Axis

Set the minor axis length tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Axes Ratio

Set the axes ratio (major axis/minor axis) tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Number
- Range: 0.000 to 99999.999

Equivalent Oval Major Axis

Set the equivalent oval major axis length tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count

- Range: 0.000 to 99999.999

Equivalent Oval Minor Axis

Set the equivalent oval minor axis length tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Equivalent Oval Aspect Ratio

Set the equivalent oval aspect ratio tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Number
- Range: 0.000 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set so as to not judge if judgment targets are invalid data (default: ON). If set to ON, the tool will no longer result in an execution error arising from the occurrence of a judgment error that is due to the judging of invalid data.

Display

Set the display methods for the inspection and mask regions, and the detected blobs. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the detected position of the blob set for [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Circle, Cross, or Cross with Arrow), size (4 to 1024), line thickness, and color for the indicator of the center of gravity position of the blob.
- **OFF**: Does not display the detected position.

Detected Position (Excluding Judged Label)

Select whether or not to display the detected position of the blobs other than the one set for [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Circle, Cross, or Cross with Arrow), size (4 to 1024), line thickness, and color for the indicator of the center of gravity position of the blobs.
- **OFF**: Does not display the detected position.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The detected position setting is applied for the display color.

Display Label Number

Display Center of Gravity X

Display Center of Gravity Y

Display Major Axis Angle

Display Area

Display Feret Diameter X

Display Feret Diameter Y

Display Perimeter

Display Roundness

Display Major Axis

Display Minor Axis

Display Axes Ratio

Display Equivalent Oval Major Axis

Display Equivalent Oval Minor Axis

Display Equivalent Oval Aspect Ratio

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all results.

Reset

Restores the display options to their default settings.

Grayscale Blob

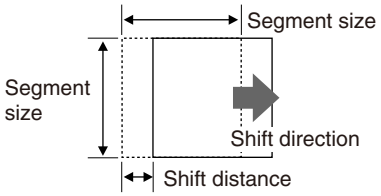
#E026

This tool moves a small detection region (segment) in the set inspection region, calculates the average intensity, and detects places where the difference in intensity from the reference intensity value is greater than or equal to the threshold value as blobs. The Grayscale Blob tool can measure the number of blobs and features such as the area and center of gravity position of the blobs.

Overview of functions

Image of the Measurement

The Grayscale Blob tool moves the measurement segment by the set shift distance in the specified detection direction within the inspection region, measuring the average intensity within each segment. The measured value is the “intensity” for each segment.



The difference between the intensity of each segment and the reference intensity value is called the “Intensity Difference” and the group of segments whose intensity difference exceeds the set threshold is detected as a blob.

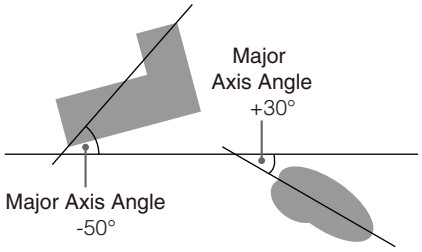
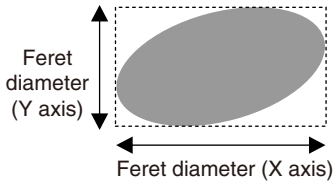
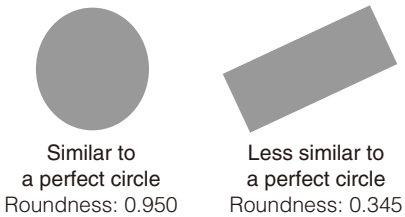
Point If a group of segments exceeding the threshold are in contact on the bright and dark sides, they are detected as a single blob. To avoid this, detection should be performed separately by setting the detection target to [Bright] or [Dark], or by setting a higher detection threshold to avoid contact.

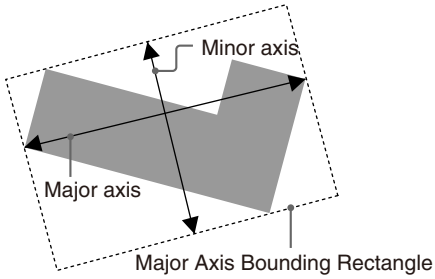
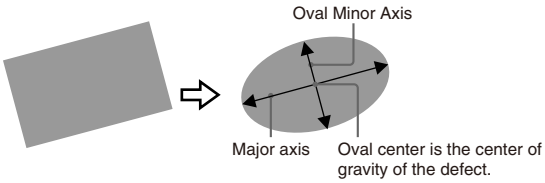
Measurement Results Output

The measurement results output by the Grayscale Blob tool are as follows.

Point The measurement items differ depending on the shape of the inspection region. The value of an item that is not measured is always zero.

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Detected Intensity Difference	Outputs the value of the detected shading level.
Reference Intensity	Outputs the intensity value that serves as a reference for the intensity difference.
Total Area	Outputs the total value of the area of the detected blobs.
Total Volume	Outputs the total value of the volume of the detected blobs.
Label Count	Outputs the number of detected blobs.

Measurement results	Description
Center of Gravity (X, Y) [ ]	Outputs the center of gravity position for all detected blobs in pixels.
Major Axis Angle [ ]	Outputs all the angle with regards to the horizontal (X) axis of the detected blobs (when [Angle Range] in [Blob Settings] is set to [180°] or [360°]). 
Area [ ]	Outputs all blob areas in pixels.
Average Intensity Difference [ ]	Outputs the average value of the detected blob's intensity differences (when [Grayscale Information (Volume/Intensity Difference)] under [Measurement Target Selection] is set to ON).
Maximum Intensity Difference [ ]	Outputs the maximum value of the detected blob's intensity differences (when [Grayscale Information (Volume/Intensity Difference)] under [Measurement Target Selection] is set to ON).
Volume [ ]	Outputs the integral value (sum) of all the detected blob's shading level (when [Grayscale Information (Volume/Intensity Difference)] for [Measurement Target Selection] is set to ON).
Bright/Dark [ ]	Outputs whether all the detected blobs are bright (1) or dark (-1) (when [Grayscale Information (Volume/Intensity Difference)] for [Measurement Target Selection] is set to ON).
Feret Diameter (X, Y) [ ]	Outputs all the length (Feret diameter) of the sides that are parallel to the horizontal axis (X axis) and vertical axis (Y axis) of the rectangle that is circumscribed around the blob in pixels. 
Perimeter [ ]	Outputs the length (perimeter) of all blob contours in pixels.
Roundness [ ]	Outputs how resemblant, represented by a numerical value from 0.000 to 1.000, to a perfect circle all the blobs detected in the inspection region are. If a blob is a perfect circle, 1.000 is output. The value will approach 0.000 as the similarity to a perfect circle decreases. 
Bounding Rectangle (Upper Left, Lower Left, Upper Right, Lower Right) (X, Y) [ ]	Outputs the bounding box position for all detected blobs in pixels.

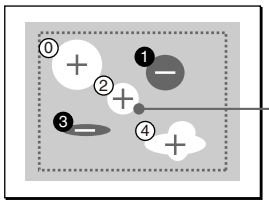
Measurement results	Description
Major Axis Bounding Rectangle (Upper Left, Lower Left, Upper Right, Lower Right) (X, Y) [ ]	Outputs the vertex positions of the major axis bounding box for all detected blobs in pixels. The positional relationship (top/bottom/left/right) is based on the orientation of the major axis angle.
Major Axis [ ]	Outputs all long sides of major axis bounding boxes in pixels (when [Major Axis Bounding Rectangle (Major/Minor Axis)] under [Measurement Target Selection] is set to ON).
Minor Axis [ ]	Outputs all short sides of major axis bounding boxes in pixels (when [Major Axis Bounding Rectangle (Major/Minor Axis)] under [Measurement Target Selection] is set to ON).
Axes Ratio [ ]	Outputs all axes ratios of major axis bounding boxes (when [Major Axis Bounding Rectangle (Major/Minor Axis)] under [Measurement Target Selection] is set to ON). The axes ratio is a value of the "Major axis/Minor axis," and a larger value represents a long and thinner shape. 
Equivalent Oval Major Axis [ ]	Outputs the length of the major axis of all the equivalent distributed ovals in pixels (when [Equivalent Oval] under [Measurement Target Selection] is set to ON).
Equivalent Oval Minor Axis [ ]	Outputs the length of the minor axis of all the equivalent distributed ovals in pixels (when [Equivalent Oval] under [Measurement Target Selection] is set to ON).
Equivalent Oval Aspect Ratio [ ]	Outputs all ratios of the major and minor axes of an equivalent distributed oval (when [Equivalent Oval] under [Measurement Target Selection] is set to ON). A larger value represents a long and thinner shape.  The equivalent oval detected from a blob is an approximate oval obtained from the shape of the blob.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits) or the specified blob does not exist, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Point The tolerance judgment target for options other than the total area, total volume, and label count is set in [Judged Label] (default: 0). If [All] is set in [Judged Label Type], the maximum and minimum of each item are the ones that are subject to tolerance judgment.

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

- Detection Order: Y>X: Ascending
- Label selected: 2



Bright blob: ⓪,②,④
Dark blob: ❶,❸
Number of labels: 5
Inspection target blob
Center of Gravity: X: 600, Y: 460
Area: 20,000
Roundness: 0.85

Properties

When setting the Grayscale Blob tool, use the [Properties] view. The [Properties] view for the Grayscale Blob tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Set the conditions to detect blobs during measurement. Additionally, set the other conditions that can be set for the Grayscale Blob tool as necessary.
Judgment	Sets the tolerances (upper and lower limits) for the measured values.
Display	Sets the display methods for the inspection and mask regions, and the detected blobs.

Region

Specify the area on the captured image to be used for measurement.

Point Changing the shape of the region resets some settings under [Detection].

Reference For details about how to set regions, see “Tool Common Setting Items” - "Region" - "Region Settings".

Detection

Set the conditions to detect blobs during measurement. You can also set the other conditions that can be set for the Grayscale Blob tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Detection Target

Select the tone to detect as blobs.

- **Bright**: Select this option when only features brighter than the reference intensity are to be extracted.
- **Dark**: Select this option when only features darker than the reference intensity are to be extracted.
- **Bright/Dark** (default): Select this option when both bright and dark features are to be extracted.
- **Individual**: Select this option when you want to extract features by setting the extraction sensitivity for bright and dark features separately.

Reference Intensity

Select the intensity value that serves as the reference for the intensity difference. The [Average], [Median] and [Mode] values are calculated from the segmented images.

- **Average**: Select this option to use the average intensity value in the inspection region as the reference intensity value.
- **Median** (default): Select this option to use the intensity in the center of the intensity distribution as the reference intensity value.
- **Mode**: Select this option to use the intensity value with the highest percentage as the reference intensity value.
- **Specified**: Select this option to set the reference intensity value by specifying a value.

Intensity

Displays the reference intensity value. When [Specified] is selected as [Reference Intensity], enter a value between 0 and 255 (default: 128).

Detection Threshold

Set the lower limit of the intensity difference to be detected as a blob in the range of 0 to 254 (default: 10). A group of segments with an intensity difference exceeding this value is detected as a blob.

Histogram

Displays the intensity distribution within the region. The settings for [Detection Target], [Reference Intensity], [Intensity], and [Detection Threshold] are applied. The reference intensity value is indicated as [BASE], the bright threshold value as [UP], and the dark threshold value as [LO].

Segment Settings

Set the segment size and other settings to measure the intensity.

Set by Direction

Turn this option on if you want to configure the segment settings individually for the XY directions.

- **OFF** (default): Does not configure the segment settings individually in the XY directions.
- **ON**: Configures the segment settings individually in the XY directions. It is possible to set X and Y independently for [Segment Size] and [Segment Shift].

High Speed Mode

Turn this option on if you want to speed up measurement.

- **ON** (default): Uses high speed measurement.
- **OFF**: Does not use high speed measurement.

If [High Speed Mode] is set to ON, [Segment Size] and [Segment Shift] can only be set in multiples of 4 (if the values are referenced, they are rounded to multiples of 4).

Segment Size

Set the size of the segment that moves in the inspection region in the X (horizontal) and Y (vertical) directions, respectively, from 1 to 256 (pixels) (default: 16).

Point

- If the segment size is larger than the inspection region, no measurement is performed.
- To set individual sizes for X and Y, set [Set by Direction] to ON.

Segment Interval Setting

- **Auto** (default): The segment shift amount for when calculating the average intensity of a segment is automatically set to 1/4 of the segment size.
- **Manual**: Set the segment shift amount for when calculating the average intensity of a segment in [Segment Shift].

Point

Select [Manual] to increase the segment shift amount to reduce processing time. However, note that this reduces the accuracy of detection.

Segment Shift

When [Manual] is selected for [Segment Interval Setting], set the segment shift amount for when calculating the average intensity of a segment in the range of 1 to 2432 (pixels). Note that if [High Speed Mode] is set to ON, this setting can only be set to a multiple of 4.

Point

If the value of [Segment Shift] is greater than the segment size, there will be places in the inspection region that are not reflected in the average intensity. If you want to detect defects smaller than the segment size, set [Auto] for [Segment Interval Setting] or set the segment shift amount to a value lower than the segment size.

Blob Settings

Detection Count

Set the maximum number of blobs to be detected during blob measurement in the range of 1 to 30000. For example, setting [3] will detect a maximum of three blobs (default: 10).

Fill Holes

Specify whether to fill the holes inside the blobs with the detection color. If there are parts inside the blob with a color different to the detection color, the area, center of gravity, major axis angle, and roundness measurements could be affected. In order to prevent this, the inside of blobs can be filled with the detection color.

- **OFF**: Does not fill the inside of the blob with the detection color.
- **ON** (default): Fills the inside of blobs with the detection color.

Fill holes: OFF

Fill holes: ON

Point
- The result of fill holes is not reflected on the processing screen.
- The area includes all filled-in areas, but the volume, average intensity difference, and maximum intensity difference are calculated from only those areas in the filled-in blob that exceed the detection threshold.

Active Border

Set whether to detect blobs located on the frame of the inspection region.

- **OFF** (default): Detects blobs that are on top of the frame lines of the inspection region as well.
- **ON**: Excludes blobs located on the frame of the inspection region from detection.

Point
The [Active Border] ON/OFF setting can only be specified if the inspection region is a rectangle and the mask or processed image regions are not set. If any other inspection region is selected, the [Active Border] will be processed as if set to OFF.

Angle Range

Specify the range of the major axis angle to be output.

- **180°**: Outputs angles in the range of -89.999° to 90.000°.
- **360°**: Outputs angles in the range of -179.999° to 180.000°.
- **None** (default): Always outputs 0 (degrees) without measuring the major axis angle (increasing the processing speed).

Point
The behavior may become unstable if [360°] is set for the angle range when measuring blobs with a symmetrical shape.

Options

Measurement Target Selection

Choose to enable or disable measurement targets as required. For enabled items, the result data is measured and can be set in [Filter Settings].

Grayscale Information (Volume/Intensity Difference)

– **ON** (default): Enables [Total Volume], [Volume], [Average Intensity Difference], [Maximum Intensity Difference], and [Bright/Dark] in the measurement results and [Judgment Conditions].
– **OFF**: Disables [Total Volume], [Volume], [Average Intensity Difference], [Maximum Intensity Difference], and [Bright/Dark] in the measurement results and [Judgment Conditions] ([Volume], [Average Intensity Difference], [Maximum Intensity Difference], and [Bright/Dark] are always output as 0 in the measurement results).

Major Axis Bounding Rectangle (Major/Minor Axis)

– **ON**: Enables [Major Axis], [Minor Axis] and [Axes Ratio] in the measurement results, [Judgment Conditions] and [Filter Settings].

– **OFF** (default): Disables [Major Axis], [Minor Axis] and [Axes Ratio] in the measurement results, [Judgment Conditions], and [Filter Settings] ([Major Axis], [Minor Axis] and [Axes Ratio] in the measurement results are always output as 0).

Equivalent Oval

– **ON**: Enables [Equivalent Oval Major Axis], [Equivalent Oval Minor Axis] and [Equivalent Oval Aspect Ratio] in the measurement results, [Judgment Conditions], and [Filter Settings].
– **OFF** (default): Disables [Equivalent Oval Major Axis], [Equivalent Oval Minor Axis] and [Equivalent Oval Aspect Ratio] in the measurement results, [Judgment Conditions], and [Filter Settings] ([Equivalent Oval Major Axis], [Equivalent Oval Minor Axis] and [Equivalent Oval Aspect Ratio] in the measurement results are always output as 0).

Point Setting [Grayscale Information (Volume/Intensity Difference)], [Major Axis Bounding Rectangle (Major/Minor Axis)], and [Equivalent Oval] to ON increases resource memory consumption and slows down processing.

Detection Order

Select the condition for attaching numbers to blobs. Select the condition by which the blob is given a number from the following methods (default: [Area: Descending]).

- **Y>X: Ascending**: Sorts blobs by their Y coordinate in ascending order. For blobs in which the Y range is close, sorts the blobs by their X coordinate in ascending order.
- **X>Y: Ascending**: Sorts blobs by their X coordinate in ascending order. For blobs in which the X range is close, sorts the blobs by their Y coordinate in ascending order.
- **X: Ascending**: Sorts blobs based on the one having the smallest X coordinate to the one with the largest.
- **X: Descending**: Sorts blobs based on the one having the largest X coordinate to the one with the smallest.
- **Y: Ascending**: Sorts blobs based on the one having the smallest Y coordinate to the one with the largest.
- **Y: Descending**: Sorts blobs based on the one having the largest Y coordinate to the one with the smallest.
- **Area: Ascending**: Sorts blobs by their area from smallest area to largest.
- **Area: Descending** (default): Sorts blobs by their area from largest area to smallest.
- **Roundness: Ascending**: Sorts blobs by their roundness from smallest value to largest.
- **Roundness: Descending**: Sorts blobs by their roundness from largest value to smallest.
- **Clockwise**: Sorts blobs in a clockwise direction based on the starting angle.
- **Counterclockwise**: Sorts blobs in a counterclockwise direction based on the starting angle.
- **Volume: Ascending**: Sorts blobs by their volume from smallest volume to largest.
- **Volume: Descending**: Sorts blobs by their volume from largest volume to smallest.
- **Average Intensity Difference: Ascending**: Sorts blobs by their average intensity difference from smallest to largest.
- **Average Intensity Difference: Descending**: Sorts blobs by their average intensity difference from largest to smallest.
- **Maximum Intensity Difference: Ascending**: Sorts blobs by their maximum intensity difference from smallest to largest.
- **Maximum Intensity Difference: Descending**: Sorts blobs by their maximum intensity difference from largest to smallest.

Starting Angle

Set the start angle for numbering blobs when [Clockwise] or [Counterclockwise] is selected for [Detection Order].

> **Point** No reference is made if [Detection Order] is set to an option other than [Clockwise] or [Counterclockwise].

Judged Label Type

Set the blob to be judged.

- **All**: Uses the maximum and minimum values measured from all blobs for the Pass/Fail judgment.
- **Specified** (default): Select this option to specify the blob to be judged by number.

Judged Label

If you selected [Specified] for [Judged Label Type], set the number (0 to 29999) of the blob that is to be judged (default: 0). Only the blob of the number set here becomes the target of judgment.

Filter Settings

Set the threshold for detection as blobs.

Area

Blobs with an area larger than the set upper limit (0.000 to 99999999, default: 99999999) or smaller than the lower limit (0.000 to 99999999, default: 100) are not detected as blobs (area filter).

Volume

Blobs with a volume larger than the set upper limit (0.000 to 99999999999, default: 99999999999) or smaller than the lower limit (0.000 to 99999999999, default: 0.000) are not detected as blobs (volume filter).

Average Intensity Difference

Blobs with an average intensity difference larger than the set upper limit (0 to 255, default: 255) or smaller than the lower limit (0 to 255, default: 0) are not detected as blobs (average intensity difference filter).

Maximum Intensity Difference

Blobs with a maximum intensity difference larger than the set upper limit (0 to 255, default: 255) or smaller than the lower limit (0 to 255, default: 0) are not detected as blobs (maximum intensity difference filter).

Roundness

Blobs with a roundness larger than the set upper limit (0.000 to 1.000, default: 1.000) (shape is close to a perfect circle) or smaller than the lower limit (0.000 to 1.000, default: 0.000) are not detected as blobs (roundness filter).

Major Axis

Blobs with a major axis length larger than the set upper limit (0.000 to 99999.999, default: 99999.999) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected as blobs (major axis filter).

Axes Ratio

Blobs with an axes ratio larger than the set upper limit (0.000 to 99999.999, default: 99999.999) (elongated shape) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected as blobs (axes ratio filter).

Equivalent Oval Major Axis

Blobs with an equivalent oval major axis length larger than the set upper limit (0.000 to 99999.999, default: 99999.999) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected as blobs (equivalent oval major axis filter).

Equivalent Oval Aspect Ratio

Blobs with an equivalent oval aspect ratio larger than the set upper limit (0.000 to 99999.999, default: 99999.999) (elongated equivalent oval) or smaller than the lower limit (0.000 to 99999.999, default: 0.000) are not detected as blobs (equivalent oval aspect ratio filter).

Detailed Settings

You can set the other conditions that can be set for the Grayscale Blob tool as necessary.

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point

- With the exception of [Major Axis Angle], a value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Total Area

Set the tolerance for the total area of all detected blobs.

- Unit: Pixel Count

- Range: 0.000 to 99999999.999

Total Volume

Set the tolerance for the total volume of all detected blobs.

- Unit: Pixel Count
- Range: 0.000 to 99999999999.999

Label Count

Set the tolerance for the number of blobs detected.

- Unit: Number of Blobs
- Range: 0 to 30000

Center of Gravity X/Center of Gravity Y

Set the tolerance for the position of the center of gravity of the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Major Axis Angle

Set the major axis angle tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Angle
- Range: -180.000 to 180.000

Area

Set the area tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0 to 99999999

Average Intensity Difference

Set the average intensity difference tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Number
- Range: 0 to 999

Maximum Intensity Difference

Set the maximum intensity difference tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Number
- Range: 0 to 999

Volume

Set the volume tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Number

- Range: 0 to 99999999999

Feret Diameter X/Feret Diameter Y

Set the Feret diameter tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Perimeter

Set the perimeter tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0 to 99999999

Roundness

Set the roundness tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Number
- Range: 0.000 to 1.000 (1.000 = perfect circle)

Major Axis

Set the major axis length tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Minor Axis

Set the minor axis length tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Axes Ratio

Set the axes ratio (major axis/minor axis) tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Number
- Range: 0.000 to 99999.999

Equivalent Oval Major Axis

Set the equivalent oval major axis length tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Equivalent Oval Minor Axis

Set the equivalent oval minor axis length tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Equivalent Oval Aspect Ratio

Set the equivalent oval aspect ratio tolerance for the blob to be judged. If [All] is selected for [Judged Label Type], [Maximum] and [Minimum] are displayed instead of [Current Value].

- Unit: Number
- Range: 0.000 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set so as to not judge if judgment targets are invalid data (default: ON). If set to ON, the tool will no longer result in an execution error arising from the occurrence of a judgment error that is due to the judging of invalid data.

Display

Set the display methods for the inspection and mask regions, and the detected blobs. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the detected position of the grayscale blob set for [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Circle, Plus/Minus, Plus/Minus with Arrow), size (4 to 1024), line thickness, and color for the indicator of the center of gravity position of the blob.
- **OFF**: Does not display the detected position.

Detected Position (Excluding Judged Label)

Select whether or not to display the detected position of the grayscale blobs other than the one set for [Judged Label].

- **ON** (default): Displays the detected position. Set the shape (Circle, Plus/Minus, Plus/Minus with Arrow), size (4 to 1024), line thickness, and color for the indicator of the center of gravity position of the blobs.
- **OFF**: Does not display the detected position.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The detected position setting is applied for the display color.

Display Label Number

Display Center of Gravity X

Display Center of Gravity Y

Display Major Axis Angle

Display Area

Display Average Intensity Difference

Display Maximum Intensity Difference

Display Volume

Display Feret Diameter X

Display Feret Diameter Y

Display Perimeter

Display Roundness

Display Major Axis

Display Minor Axis

Display Axes Ratio

Display Equivalent Oval Major Axis

Display Equivalent Oval Minor Axis

Display Equivalent Oval Aspect Ratio

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all results.

Reset

Restores the display options to their default settings.

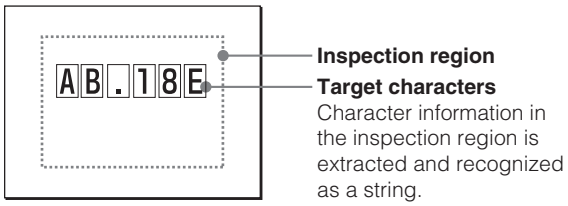
OCR2

#E027

This tool can recognize character strings in captured images by matching the character information extracted from the inspection region against library data. In addition to external output of recognized strings, pass/fail decisions can also be made in comparison with pre-registered content or dynamically changing content such as calendars or serial numbers.

Overview of functions

Image of the Measurement



Measurement Results Output

The measurement results output by the OCR2 tool are as follows.

Point If you select [Recognition] or [Fixed] as the block mode, all strings are treated as the first line. The measurement result corresponding to the second line is only output if [Auto] is selected as the block mode.

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Line 1: Detected String	Outputs the first recognized line of text.
Line 1: Registered String	Outputs the string that is used as judgment criteria for the first line.
Line 1: Number of Characters	Output the total number of characters in the first recognized line.
Line 1: Correlation (maximum, minimum)	Outputs for all the characters selected as Candidate 1 for the recognition results how similar they are to the data registered in the library, with a number from 0 to 99.
Line 1: Stability (maximum, minimum)	Output all the difference in correlation between candidate 1 and candidate 2 of the recognized characters in the first line as a number from 0 to 99.
Line 2: Detected String	Outputs the second recognized line of text.
Line 2: Registered String	Outputs the string that is used as judgment criteria for the second line.
Line 2: Number of Characters	Output the total number of characters in the second recognized line.

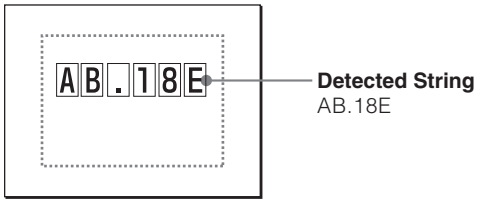
Measurement results	Description
Line 2: Correlation (maximum, minimum)	Outputs for all the characters selected as Candidate 2 for the recognition results how similar they are to the data registered in the library, with a number from 0 to 99.
Line 2: Stability (maximum, minimum)	Output all the difference in correlation between candidate 1 and candidate 2 of the recognized characters in the second line as a number from 0 to 99.
Line 1/2 [nth character]: Recognized Character	Output the nth character of the recognized line 1/2.
Line 1/2 [nth character]: Judgment Character	Output the nth character that is used as judgment criteria for Line 1/2.
Line 1/2 [nth character]: Character for Candidate 1	Output candidate 1 for the nth character of the recognized line 1/2.
Line 1/2 [nth character]: Correlation for Candidate 1	Output to what extent the nth character of Line 1/2, which is candidate 1 as a recognition result, is similar to the library registration data as a number from 0 to 99.
Line 1/2 [nth character]: Library registration number for Candidate 1	Output the library registration number of the nth character of Line 1/2, which is candidate 1 as a recognition result.
Line 1/2 [nth character]: Character for Candidate 2	Output candidate 2 for the nth character of the recognized line 1/2.
Line 1/2 [nth character]: Correlation for Candidate 2	Output to what extent the nth character of Line 1/2, which is candidate 1 as a recognition result, is similar to the library registration data as a number from 0 to 99.
Line 1/2 [nth character]: Library registration number for Candidate 2	Output the library registration number of the nth character of Line 1/2, which is candidate 2 as a recognition result.
Line 1/2 [nth character]: Stability	Output the difference in correlation between candidate 1 and candidate 2 for the nth character of the recognized line 1/2 as a number from 0 to 99.
Line 1/2 [nth character]: Intensity Deviation	Output the intensity deviation for the nth character of Line 1/2 as a number from 0 to 99.

Measurement results	Description
Tool judgment value	When the measurement result exceeds the set tolerance range, or the recognized string differs to the registered string, it is judged as "Fail". When the result is within the tolerance range and the recognized string matches the registered string, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

- Number of Characters: 6



Properties

When setting the OCR2 tool, use the [Properties] view. The [Properties] view for the OCR2 tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the OCR2 tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Sets the method for recognizing and extracting (blocking) individual characters from the inspection region. Additionally, set the other conditions that can be set for the OCR2 tool as necessary.
OCR Library	Registers the character patterns used for character recognition in the library.
Judgment	Sets the tolerance for the measured values and the registered string for judgment.
Display	Sets the display methods for things such as the inspection and mask regions.

Region

Specify the area on the captured image to be used for measurement.

Point

- The smaller the inspection region, the shorter the processing time.
- If there is a background in the inspection region other than the characters, the characters may not be correctly extracted. Set the inspection region in such a way that only the characters are enclosed as much as possible.
- Only the [Rectangle] or [Arc] inspection regions are available with the OCR2 tool.
- A large amount of the resource memory is consumed in the cases below. Be careful of resource memory overflow when the camera is changed to a high resolution camera when multiple OCR2 tools are already added to the task.
  –When [Block Mode] is set to [Recognition], and the region size exceeds 2544 pixels in width and 2544 pixels in height.
  –When [Shape] for the inspection region is set to [Rectangle] or [Arc], and the camera image pixels are increased.

Reference For details about how to set regions, see “Tool Common Setting Items” - "Region" - "Region Settings".

Detection

Configure the settings to recognize and extract individual characters from the inspection region. You can also set the other conditions that can be set for the OCR2 tool as necessary.
→Block Settings
→Block Conditions (for [Recognition])
→Block Conditions (for [Auto])
→Line Settings
→Character Settings
→Detailed Settings

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Block Settings

Select the method for recognizing and extracting (blocking) individual characters from the string in the inspection region.

Font Color

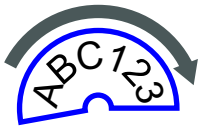
Select the color of characters to differentiate them from the background and recognize them as characters.

- **Black** (default): Recognizes black areas as characters.
- **White**: Recognizes white areas as characters.

String Direction

If the inspection region is set to [Arc], select the direction in which the string is to be read.

- **Clockwise** (default): Select this option if the characters in the upper arch are to be read from the left.



Detected String: ABC123

- **Counterclockwise**: Select this option if the characters in the lower arch are to be read from the left.

Detected String: ABC123

Block Mode

The process that separates the character information in the inspection region into individual characters is called "extraction". In order for the OCR2 tool to recognize characters correctly, a suitable extraction process is required. Select the character extraction method and configure its settings in such a way that the characters can be extracted per character on the [Image Viewer].

- **Recognition** (default): Automatically extracts up to 40 characters on one line from one inspection region. When you select [Recognition], configure the settings in [Block Conditions] as well.
  →"Block Conditions (for [Recognition])"
- **Auto**: Automatically extracts up to two lines of characters (maximum of 20 characters per line) from one inspection region. The projected waveform that serves as the guide for automatic extraction is displayed on the [Image Viewer]. When you select [Auto], configure the settings in [Block Conditions], [Line Settings], and [Character Settings] as well.
  →"Block Conditions (for [Auto])"
  →"Line Settings"
  →"Character Settings"
- **Fixed**: Extracts a single line of characters (a maximum of 20 characters) by manually setting a region for each character.

Point
- If you select [Recognition] or [Fixed], all strings are treated as the first line.
- Changing [Block Mode] resets some settings in [Detection].

Execute Tuning

Clicking this button automatically adjusts optimal settings for character extraction according to the settings in [Block Conditions].

Point
- This item is a setting item when [Recognition] is selected for [Block Mode].
- The targets for automatic tuning adjustment are the setting items of [Manual Setting] in [Block Conditions] for which the check box is disabled.

Mirrored Reading

Turn this option on to read inverted characters (characters captured through a mirror or prism). If you set it to ON.

Point
This item is only a setting item when [Fixed] is selected for [Block Mode].

Intensity Deviation Lower Limit

Set the lower limit (0 to 255) of the variation in intensity (intensity deviation) within the block region, which is recognized as a character (default: 10). If the intensity deviation is below the lower limit, it is perceived as “blank” with no characters.

Point This item is only a setting item when [Fixed] is selected for [Block Mode].

Fitting

Fine adjustment of the size of the block region determined by the projected waveform with the actual character size reduces the effect of character size variation on Correlation (default: ON).

Point This item is only a setting item when [Fixed] is selected for [Block Mode].

Block Region

Add

Click this button to add the block region to the [Image Viewer] by default (max: 20 regions). Draw a block region around the character to be recognized.

Point
- This item is only a setting item when [Fixed] is selected for [Block Mode].
- Only a rectangle can be used as the shape of the region.
- When position adjustment is to be applied to the block region of the fixed extraction mode, the adjustment will be applied to all blocks in the inspection tool.
- Make sure that only one character is included in a block region. Correct recognition cannot be achieved if two or more characters are present in the region.
- Make sure that the region does not go outside of the inspection region. Any part drawn outside the inspection region will not be included and correct extraction may not be possible.

n Rectangle

Set the [Width], [Height], [Center X], [Center Y] and [Rotation Angle] of the added block region by a value.

Point This item is only a setting item when [Fixed] is selected for [Block Mode].

Reference
- The added block region can be deleted in either of the following ways:
  –Select it on the [Image Viewer] and press the [Delete] key.
  –Click the [X] to the right of the [n Rectangle] title.
- When a block region is deleted, the number n is reassigned in ascending order starting from 0.

Block Conditions (for [Recognition])

Set the character extraction conditions when [Recognition] is selected for [Block Mode].

Point If extraction does not work correctly with [Recognition], change the settings as follows:
- Set [Active Border] to OFF.
- Reduce the values for [Noise Width Upper Limit] and [Noise Height Upper Limit].
- Increase the value for [Number of Characters].

Line Block Target

Set the target to extract as a line. If extraction does not work correctly due to background noise, extraction may be possible by changing the line extraction position.

- **Tallest Line** (default): Extracts the line with the maximum line height, irrespective of the direction of the text.
- **Top Line**: Extracts the top line in accordance with the reading direction.
- **Bottom Line**: Extracts the bottom line in accordance with the reading direction.

Character Block Target

Set the target to extract as a character. If character extraction does not work correctly due to background noise, extraction may be possible by changing the extraction target.

- **From Beginning** (default): Extracts the set number of characters from the beginning of the string in accordance with the direction of the characters.
- **From End**: Extracts the set number of characters from the end of the line in accordance with the direction of the characters.
- **From Wide Character**: Extracts the set number of characters in order from the one with the greatest width, irrespective of the direction of the characters.

Rotation Correction

Turn this option on if the height of the line is fluctuating because the extracted line is inclined against the inspection region (default: ON).

Character Tilt Correction

If the extracted characters are deformed at an angle, turn this option on to perform correction for the tilt (default: OFF).

Active Border

Noise on the border of the extraction region can cause malfunctions in fitting processing. Turn this option on to exclude noise on the border of the region from processing (default: ON).

Manual Setting

Select the item's check box and configure the setting to set the extraction conditions manually (default: OFF for all).

Point Setting items of [Manual Setting] for which the check box is selected are excluded from the [Auto Tuning] adjustment.

Number of Characters

Set the number of characters to be extracted from the inspection region to between 1 and 40 (default: 40).

Shading Level

Set the shading level for the Cutout Image. When the value is decreased, the characters become darker (0 to 255, default: 20).

Character Width Upper Limit (Line Height Ratio)

Set the upper limit of the character width to be extracted by its ratio against the height of the line. If the space between characters is narrow and two characters are mistakenly detected as

one, the characters can be forcibly separated and extracted using this setting (0.100 to 9.999, default: 1.000).

Noise Width Upper Limit

Set the upper limit of the character width to be treated as noise information in pixels. Characters with a width less than the upper limit are excluded from extraction as noise information (0 to 255, default: 5).

Noise Height Upper Limit

Set the upper limit of the character height to be treated as noise information in pixels. Characters with a height less than the upper limit are excluded from extraction as noise information (0 to 255, default: 5).

Period Height Upper Limit (Line Height Ratio)

Set the upper limit of the height of the symbols period (.) and hyphen (-) by their ratio against the height of the line. Use this option when periods and hyphens are mistakenly recognized (0.000 to 1.000, default: 0.400).

Dot Character Settings

Specify the interpolation settings for the X and Y directions in pixels respectively when interpolating the missing parts of characters such as dot characters and blurred characters before extraction.

X-Direction Interpolation (pixel)

Set the number of pixels to be complemented in the X direction for the missing area (0 to 255, default: 0).

Y-Direction Interpolation (pixel)

Set the number of pixels to be complemented in the Y direction for the missing area (0 to 255, default: 0).

Block Conditions (for [Auto])

Set the character extraction conditions when [Auto] is selected for [Block Mode].

Point If extraction cannot be performed correctly using [Auto], you need to change [Block Mode] to [Fixed] or configure detailed settings in [Line Settings] and [Character Settings]. For details, see "When Character Recognition for [Auto] Is Unstable".

Read Direction

If the string is rotated in 90° increments relative to the horizontal of the screen, change the read direction. An icon that indicates the read direction is displayed on the screen in accordance with the current read direction.

- → (default): Reads characters from the left to the right of the screen (positive position).
- ←: Reads characters from the right to the left of the screen (180° rotation).
- ↑: Reads characters from the bottom of the screen upwards (90° counterclockwise rotation).
- ↓: Reads characters from the top of the screen downwards (clockwise 90° rotation).

Point For inclinations of less than 90°, use a position adjustment tool to correct the inspection region.

Mirrored Reading

Turn this option on to read inverted characters (characters captured through a mirror or prism) (default: OFF). If you set it to ON, [Read Direction] is also linked.

Number of Lines

Set the maximum number of lines to be extracted from the inspection region to [1] or [2] (default: 1). If [2] is set, [Line 2: Number of Characters] is enabled.

Line 1: Number of Characters/Line 2: Number of Characters

Set the maximum number of characters to be extracted from a line to between 1 and 20 (default: 10).

Line Settings

Block Target

Set the direction from which lines are extracted with reference to [Read Direction]. You can avoid noise and other areas that you do not want to be read.

- **Tallest Line** (default): Extracts the line with the maximum line height, irrespective of the direction of the text.
- **Top Line**: Extracts the topmost line in accordance with [Read Direction].
- **Bottom Line**: Extracts the bottommost line in accordance with [Read Direction].

Rotation Correction

Turn this option on if the height of the line is fluctuating because the extracted line is inclined against the inspection region (default: ON).

Point

- Rotation correction is assumed to be about +/-15°. If there is a rotational deviation of more than this, use [Position Adjustment] to deal with it.
- The rotation correction results are also reflected to the character block region.

Block Tool

If the line extraction is unstable (e.g. narrow line spacing), change the extraction method.

- **Waveform** (default): Detects the space between lines based on changes in the projected waveform to extract the lines.
- **Ratio Specification**: Extracts lines by a set ratio to the projected waveform width of the entire line. This is effective when the ratio of line heights is constant, even if the line spacing is narrow. Select [Ratio Specification] to enable [Ratio Setup].

Point

If the number of lines varies, do not select [Ratio Specification]. The set number of lines is forcibly extracted regardless of the actual number of lines in the inspection region, which may cause mistaken recognition.

Ratio Setup

Click the button to open the [Ratio Setup] dialog box. The ratio at which the lines are extracted can be set as desired.

- **Start Position**: Set the start position for line extraction as a percentage (0.00 to 100.00) of the projected width of the entire line (default: 0.00).

- **Line Separation Position** (only if [Number of Lines] is set to [2]): Set the separation between the first and second line as a percentage (0.00 to 100.00) of the projected width of the entire line (default: 50.00).
- **End Position**: Set the end position for line extraction as a percentage (0.00 to 100.00) of the projected width of the entire line (default: 100.00).

Point If you change [Number of Lines], [Ratio Setup] returns to the default setting.

Smoothing Filter

Set the number of times (0 to 99) to apply expansion processing to the projected waveform (default: 0). Increasing the value results in a smoother waveform shape. This improves the situation in which characters composed of dots, for example, are extracted (separated) more than necessary, but may reduce the detection sensitivity to narrow line spacing.

Line Height Upper Limit (Region Ratio)

Set the upper limit for the height of the line to be extracted as a percentage of the inspection region width (0.100 to 1.000) (default: 1.000). If the height of a line exceeds this limit as a result of two lines with narrow spacing being mistakenly detected as one line, the waveform is analyzed to forcibly extract a line within the upper limit.

Reference This setting value is displayed as a range within a green frame (orange when an item is selected) near the wave in [Image Viewer].

Detection Threshold

Set the lower limit threshold for the projected waveform used in extraction by the waveform intensity (0 to 255, default: 40). Lowering the threshold increases the extraction sensitivity, but may increase the influence of noise.

Reference This setting is displayed as a straight green line across the line extraction waveform in the [Image Viewer].

Wave Width Lower Limit

Set the lower limit of the line height (0 to 255 pixels, default: 10) used for line extraction from the generated waveform. Projected waveforms below the lower limit generated by noise information can be excluded from extraction.

Reference This setting is a range displayed as a yellow frame near the line extraction waveform in the [Image Viewer].

Wave Intensity Lower Limit

Set the lower limit for the projected waveforms to be targeted for line extraction by the difference (0 to 255) from [Detection Threshold] (default: 25). Projected waveforms whose maximum intensity is below the lower limit can be excluded from extraction.

Reference This setting is displayed as a straight yellow line across the line extraction waveform in the [Image Viewer].

Character Settings

Line Number

Select the line number of the characters to be extracted.

Point

- If [Number of Lines] is set to [1], [2] cannot be set.
- The following items can be set by line:
  –[Block Target]
  –[Character Tilt Correction]
  –[Block Tool]
  –[Ratio Setup]
  –[Smoothing Filter]
  –[Character Width Upper Limit (Height Ratio)]
  –[Detection Threshold]
  –[Wave Width Lower Limit]
  –[Wave Intensity Lower Limit]
  –[Fitting]

Block Target

Set which direction characters are extracted from. Characters can be extracted avoiding unnecessary characters and noise at the beginning or end of lines.

- **From Beginning** (default): Extracts the set number of characters from the beginning of [Read Direction].
- **From End**: Extracts the set number of characters from the end of [Read Direction].
- **From Wide Character**: Extracts the set number of characters in descending order of character width, irrespective of [Read Direction].

Character Tilt Correction

Turn this option on if the extracted characters are deformed at an angle (default: OFF).

Point

Character tilt correction is assumed to be about +/-20°. Rotation of characters is not supported.

Noise Cancellation on the Border

Noise on the border of the block region can cause malfunctions in fitting processing. Turn this option on to exclude noise on the border of the region from processing. The ON/OFF setting applies to all lines. If the [Number of Lines] is set to [1], the display shows [Noise Cancellation on the Border]; if it is set to [2], the display shows [Active Border (Line Common)].

Block Tool

If character extraction is unstable (e.g. narrow character spacing), change the extraction method.

- **Waveform** (default): Detects the space between characters based on changes in the projected waveform to extract the characters.
- **Ratio Specification**: Extracts characters by a set ratio to the projected waveform width of the character. This is effective when the ratio between the number of characters and the character width is constant, even if the character spacing is narrow. Select [Ratio Specification] to enable [Ratio Setup].

Point If the number of characters varies, do not select [Ratio Specification]. The set number of characters is forcibly extracted regardless of the actual number of characters in the inspection region, which may cause mistaken recognition.

Ratio Setup

Click the button to open the [Ratio Setup] dialog box. The ratio at which characters are extracted can be set as desired.

- **Start Position**: Set the start position for character extraction as a percentage (0.00 to 100.00) of the projected waveform of all characters (default: 0.00).
- **n-n+1**: Set the separation between the nth and n+1 characters as a percentage (0.00 to 100.00) of the projected waveform of all characters (default: n*10.00).
- **End Position**: Set the end position for character extraction as a percentage (0.00 to 100.00) of the projected waveform of all characters (default: 100.00).

Point
- If you change the number of characters, [Ratio Setup] returns to the default setting.
- The ratio value should be set so that [Start Position] ≤ [n-n+1] ≤ [End Position].

Smoothing Filter

Set the number of times (0 to 99) to apply expansion processing to the projected waveform (default: 0). Increasing the value results in a smoother waveform shape. This improves the situation in which characters composed of dots, for example, are extracted (separated) more than necessary, but may reduce the detection sensitivity to narrow spacing between characters.

Character Width Upper Limit (Height Ratio)

Set the upper limit for the width of the character to be extracted by its ratio (0.100 to 1.000) against the height of the line (default: 1.000). The string is forced to be split so that the width of a single character does not exceed this percentage. If two characters are extracted together due to a narrow space between them, reducing the value may improve the situation.

Detection Threshold

Set the lower limit threshold for the projected waveform used in extraction by the waveform intensity (0 to 255, default: 40). Lowering the threshold increases the extraction sensitivity, but may increase the influence of noise.

Reference This setting is displayed as a straight green line across the character extraction waveform in the [Image Viewer].

Wave Width Lower Limit

Set the lower limit of the character height (0 to 255 pixels, default: 5) used for character extraction from the generated waveform. Projected waveforms below the lower limit generated by noise information can be excluded from extraction.

Reference This setting is a range displayed as a yellow frame near the character extraction waveform in the [Image Viewer].

Wave Intensity Lower Limit

Set the lower limit for the projected waveforms to be targeted for character extraction by the difference (0 to 255) from the detection threshold (default: 25). Projected waveforms whose maximum intensity is below the lower limit can be excluded from extraction.

Reference This setting is displayed as a straight yellow line across the character extraction waveform in the [Image Viewer].

Intensity Deviation Lower Limit

Set the lower limit (0 to 255) of the variation in intensity (intensity deviation) within the block region, which is recognized as a character (default: 10). If the intensity deviation is below the lower limit, it is perceived as “blank” with no characters. [Intensity Deviation Lower Limit] is displayed when [Number of Lines] is set to “1”, and [Intensity Deviation Lower Limit (Line Common)] is displayed when [Number of Lines] is set to “2”.

Fitting

Fine adjustment of the size of the block region determined by the projected waveform with the actual character size reduces the effect of character size variation on Correlation (default: ON).

Detailed Settings

You can set the other conditions that can be set for the OCR2 tool as necessary.

Reference For details about the items other than [Specified Label], see “Tool Common Setting Items” - "Detailed Settings".

Large Area Mode

Enable this mode when setting the inspection region to a large area. Enabling this setting increases consumption of program memory.

- **OFF** (default): Does not use Large Area Mode.
- **ON**: Uses Large Area Mode. If the region size exceeds 2544 pixels in width or 2544 pixels in height, Large Area Mode needs to be enabled.

OCR Library

Switch to a library where the character patterns to use for character recognition are registered. In addition to using pre-registered libraries, you can also create and edit libraries as registered libraries.

Library Settings

Library Name

Displays the name of the referenced library file. Click [...] to display the menu of file operations from which you can change the referenced library file, rename a library, or create a new library.

Reference
- When a new OCR2 tool is added, the existing library file is automatically referenced. If no library file exists, a library file (Library0) is automatically created and the library is referenced.
- The automatically created library file contains preset characters for each character.

Browse Libraries

You can check the saved date & time and file size of the referenced library.

Edit Library Name

You can change the name of the referenced library file. You can enter characters that can be used in Windows file names.

Create New Library

Click this to display the [New Library Creation] dialog box. Enter the library file name and click the [OK] button to create a new library file.

Edit Library

Click the button to display the [Edit Library] dialog box. Registered library data can be edited or deleted. Certain character patterns can also be temporarily disabled.

Point Deleted character patterns cannot be restored.

Registered Character List

Displays the list of registered characters in a matrix format.

Library Name

Displays the name of the referenced library file. By clicking , you can change the name. You can enter characters that can be used in Windows file names.

Register

Registers a character pattern for the character selected in the list. Click the button to display the [Register] dialog box. For details, see "Registering a Library".

Reference You can also use [Register String to Library] and [Library Registration] in [Library Settings] to register strings extracted on the screen to the library all at once.

Enable

Select a character pattern that is temporarily disabled (indicated by a red “x”) and then click this button to return the selected character pattern to enabled.

Disable

Clicking the button after selecting a character pattern temporarily disables the selected character pattern. Disabled characters are marked with a red “×”, but the data itself is not deleted, so they can be re-enabled later.

Delete

Deletes a selected character pattern.

Delete All

Deletes all registered character patterns.

Point If library settings are registered when no character patterns are registered in the library data after all registered characters have been deleted, the recognition result of the OCR2 tool referencing it will be "????" and correct measurement could no longer be performed.

Register String to Library

To register the string extracted on the screen to the library all at once, enter the strings corresponding to the recognized image.

Reference Characters that can be entered are A-Z, a-z, 0-9, -, . ,:, /, (,), +, and *. Note that "*" is used to set characters that are not subject to registration.

Library Registration

Batch registers the extracted characters to the library as the string entered in [Register String to Library].

Registering a Library

In the [Register] dialog box, select how you want to register the character pattern in the library.

Point
- The number of characters that can be registered in one library is a total of 600 for all the character types, but the actual number that can be registered may be less depending on the setting condition.
- If the same character pattern is registered to several different character types in the library, the character type with the smallest ASCII code is output as the recognition result for the character pattern regardless of the actual character content. As this may cause wrong judgment, do not register the same pattern to different character types.

Library Name

Displays the name of the library file to register to.

Individual Registration

Registers the characters extracted on the [Image Viewer] to the library while setting the character type per character.

1 Click the [Individual Registration] button.
The [Individual Registration] dialog box appears.

2 Select the region of the extracted string to be registered using [Line] and [Character].
The selected region appears highlighted on the [Image Viewer].

Reference The size of the extracted string region can be adjusted directly on the [Image Viewer].

3 Click the [OK] button.
The [Edit Library] dialog box appears.

4 Select the character type for which you want to register the character pattern, and then click the [Register] button.
The character pattern is registered in the library as characters extracted to the selected character type. Repeat steps 1 to 4 until the required character types are registered.

Point If multiple registrations are made for one character type, multiple characters are automatically registered as sub-patterns for one character type. Registering characters in different states as sub-patterns can stabilize Correlation as matching is made to the most approximate one among the registered characters, even if the character shape changes.

Register All

Batch registers the characters extracted on the [Image Viewer] as a string to the library.

1 Click the [Register All] button.
The [Register All] dialog box appears.

2 Enter the contents of each extracted line in [Line 1 String] (and in [Line 2 String] if [Block Mode] is set to [Auto] and [Number of Lines] is set to [2]), and then click the [Register] button.
The extracted characters are all registered in the library at one time.

Reference Characters that can be entered are A-Z, a-z, 0-9, -, . ,:, /, (,), +, and *. Note that “*” is used to set characters that are not subject to registration.

Point If the string to be registered contains more than one of the same character type, the second character onwards will be registered as a sub-pattern if the characters are entered as is. If you do not want to register more than one registration for one character type, enter “*” for the second character entry onwards.

Judgment

Set the judgment string (called "Registered String") for the recognized content and the tolerance for the recognition result measurements. If the character recognition result and the judgment string do not match even for one character or the measured value exceeds the tolerance, the result is judged “Fail”, and if the character string matches and the measured value is within the tolerance, the result is judged “Pass”. You can also limit the character types used for recognition by changing the reference character settings. The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is initialized.
- If no tolerance is set, no judgment action is performed even when measurement is executed.
- When a character is judged as "?" (unrecognizable), the result will be Fail even if [Registered String] is blank.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Point If [Block Mode] is set to [Auto] and [Number of Lines] is set to [2], you can also set the judgment conditions for the second line.

Registered String

Enter the judgment string to match the recognized content against, or reference the result data of another tool or a Vision Dashboard cell. Up to 40 characters can be entered (20 characters for each line if [Block Mode] is set to [Auto] and [Number of Lines] is set to [2]).

Point If you select [Auto] for [Block Mode] and [Number of Lines] is set to [2], set [Registered String] for each of the first and second lines.

Reference Characters that can be entered are A-Z, a-z, 0-9, -, . ,:, /, (,), +, *, # and _ (space).

- *: If the Correlation Lower Limit or Stability Lower Limit is set, the unrecognizable status is set to Fail and other characters are set to Pass.
- #: Regardless of the recognition result, no judgment is made on the character in the applicable position and it is always Pass.

Example: Differences in judgment results when using "*" versus "#"

Recognition result		Registered String	
		ABC*	ABC#
ABCD	→	Pass	Pass
ABC8	→	Pass	Pass
ABC?	→	Fail	Pass

Reflect Detected String

The current detected string is reflected to [Registered String].

Restriction Settings

Normally, all character types registered in the library are used for character recognition, but in situations where only certain characters are to be recognized and judged, it is also possible to limit the characters to be referred to. Limiting recognized characters may improve processing speed and eliminate mistaken recognition. In addition to a common setting for all character types, it can also be set for each recognized character.
Click the button to open the [Restriction Settings] dialog box.

Set Per Character

Displays the characters which are subject to recognition and the setting status for the character type to be recognized.

Character No.

Specify the character number in the Detected String for which to set character type restriction. You can also specify by clicking on the Valid Characters area in [Set Per Character].

Character Type

Set the character type to be recognized when recognizing the character in the string selected in [Set Per Character].

- ***:All Characters**: Recognizes the character using all characters registered in the library.
- **S:Specified Characters**: Recognizes the character using only characters that have been set. Click the [Set Specified Characters] button and set the character type(s) to be recognized in the [Selected Character] dialog box that appears.
- **J:Judged Characters**: Recognizes whether or not the character is the character that is in the same position in the registered string.

– **C:Character Groups**: Recognizes the character using only the type of the character at the same position in the registered string.
– **E:Except Lower Case**: Recognizes the character using only character types other than lowercase alphanumeric characters registered in the library.
– **N:Numbers Only**: Recognizes the character using only numbers (0 to 9) registered in the library.
– **A:Upper Case Only**: Recognizes the character using only the uppercase letters (A to Z) registered in the library.
– **a:Lower Case Only**: Recognizes the character using only the lowercase letters (a to z) registered in the library.
– **#:Symbols Only**: Recognizes the character using only symbols (-.:/()+ SPACE) registered in the library.

Reference

• Example of when [J:Judged Characters] is selected
If the registered string is “01”, only “0” for the first character and “1” for the second character are recognized.
If the character “20” is extracted during operation, neither the first character “0” nor the second character “1” in the registered string is applicable, so the recognized character is “??”.

• Example of when [C:Character Groups] is selected
If the registered string is “0A”, only “0-9” for the first character and “A-Z” for the second character are recognized.
If the character “A1” is extracted during operation, neither the first character type “0-9” nor the second character type “A-Z” in the registered string is applicable, so the recognized character is “??”.

Batch Setting

Set the character type to be recognized when recognizing characters for the entire detected string all at once. Click the [Settings] button to open the [Batch Setting] dialog. Select the character type and click the [OK] button.

Correlation

Set the lower limit of correlation for all recognized characters. As a result of checking against the library, characters that are below the lower limit of correlation are output as unrecognizable with a "?" and a Fail judgment is made. The current maximum and minimum correlation values are displayed. Select the [Lower Limit] check box and then enter the lower limit value.

• **Unit**: Number
• **Range**: 0 to 99

Point

If you select [Auto] for [Block Mode] and [Number of Lines] is set to [2], set [Correlation] for each of the first and second lines.

Stability

Set the lower limit of stability for all recognized characters. As a result of checking against the library, characters that are below the lower limit of stability are output as unrecognizable with a "?” and a Fail judgment is made. The current maximum and minimum stability values are displayed. Select the [Lower Limit] check box and then enter the lower limit value.

• **Unit**: Number
• **Range**: 0 to 99

Point If you select [Auto] for [Block Mode] and [Number of Lines] is set to [2], set [Stability] for each of the first and second lines.

Number of Characters

Set the upper and lower limits for the number of all recognized characters. The results of the recognition are displayed in real time for [Current Value]. Select the check boxes for [Upper Limit] or [Lower Limit], and then enter the number of characters.

- **Unit**: Number of Characters
- **Range**: 0 to 40

Point If you select [Auto] for [Block Mode] and [Number of Lines] in [Block Conditions] is set to [2], set [Number of Characters] for both the first and second lines.

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set so as to not judge if judgment targets are invalid data (default: OFF). If set to ON, the tool will no longer result in an execution error arising from the occurrence of a judgment error that is due to the judging of invalid data.

Display

Set the display methods for things such as the inspection and mask regions. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Line Block Region

This setting is displayed when [Block Mode] is set to [Recognition] or [Auto]. Select whether or not to display the line block region.

- **ON** (default): Displays the line block region. Set the display color and line thickness for the line block region.
- **OFF**: Does not display the line block region.

Character Block Region

This setting is displayed when [Block Mode] is set to [Recognition] or [Auto]. Select whether or not to display the character block region.

- **ON** (default): Displays the character block region. Set the display color and line thickness for the character block region.
- **OFF**: Does not display the character block region.

Fixed Cutout Block

This setting is displayed when [Block Mode] is set to [Fixed]. Select whether or not to display the fixed cutout block.

- **ON** (default): Displays the fixed cutout block. Set the display color and line thickness for the fixed cutout block.
- **OFF**: Does not display the fixed cutout block.

Fixed Cutout Block (Fitted Rectangle Line)

This setting is displayed when [Block Mode] is set to [Fixed]. Select whether or not to display the fixed cutout block (fitted rectangle line).

- **ON** (default): Displays the fixed cutout block (fitted rectangle line). Set the display color and line thickness for the fixed cutout block (fitted rectangle line).
- **OFF**: Does not display the fixed cutout block (fitted rectangle line).

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. For the display color, [Character Block Region] is applied when [Block Mode] is set to [Recognition] or [Auto], and [Fixed Cutout Block (Fitted Rectangle Line)] is applied when [Block Mode] is set to [Fixed].

Display Recognized Characters

Display Correlation

Display Stability

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all results.

Reference When Display Stability is turned on and Display Correlation is turned off, stability will be displayed shifted upwards.

Reset

Restores the display options to their default settings.

When Character Recognition for [Auto] Is Unstable

The [Auto] extraction mode extracts characters (lines) by detecting the space between characters (lines) from the extraction waveform. If the spaces are too narrow or the characters (lines) are slanted, the waveform line may overlap and correct extraction may not be possible. To make extraction possible and stable, the extraction method can be set to [Fixed] or the advanced extraction settings for [Auto] can be adjusted while checking the waveform displayed on the [Image Viewer].

Changing the Detailed Settings for Line Extraction

Change the settings related to line extraction processing.

1 Click [Block Conditions] in the detection settings.

2 For [Number of Lines], set the number of lines (1 to 2) to be extracted from the inspection region.

3 Click [Line Settings].

4 Select the extraction direction in [Block Target].

If extraction does not work correctly due to background noise, extraction may be possible by changing the line extraction position.

- **Tallest Line** (default): The line with the maximum line height is extracted, irrespective of the direction of the text.
- **Top Line**: The topmost line is extracted in accordance with [Read Direction].
- **Bottom Line**: The bottommost line is extracted in accordance with [Read Direction].

5 If the line height varies due to the string being at angle to the inspection region, set [Rotation Correction] to ON.

Point
- Rotation correction assumes a rotational deviation of about +/-15°. If there is a rotational deviation of more than this, use position adjustment.
- The rotation correction results are also reflected to the character block region.

6 If line extraction is unstable (e.g. narrow line spacing), use [Block Tool] to change the automatic extraction method.

- **Waveform** (default): Detects the space between lines based on changes in the projected waveform to extract the lines.
- **Ratio Specification**: Extracts lines by a set ratio to the projected waveform width of the entire line. This is effective when the ratio of line heights is constant, even if the line spacing is narrow.

Point
If the number of lines varies, do not select [Ratio Specification]. The set number of lines is forcibly extracted regardless of the actual number of lines in the inspection region, which may cause mistaken recognition.

Setting the Ratio

If [Ratio Specification] is selected, click the [Ratio Setup] button to set the desired values.

- **Start Position**
  Set the start position for line extraction as a percentage (0.00 to 100.00) of the projected waveform for the entire line (default: 0.00).
- **Line Separation Position** (only if [Number of Lines] is set to [2])
  Set the separation between the first and second line as a percentage (0.00 to 100.00) of the projected waveform for the entire line (default: 50.00).
- **End Position**
  Set the end position for line extraction as a percentage (0.00 to 100.00) of the projected waveform for the entire line (default: 100.00).

Point If you change [Number of Lines], [Ratio Setup] returns to the default setting.

7 If necessary, change the detailed settings regarding the projected waveform.

Although it is not usually necessary to make changes, it may be possible to improve the extraction results by adjusting the state of the projected waveform, which is the basis of automatic extraction.

Smoothing Filter

Set the number of times (0 to 99) to apply expansion processing to the projected waveform (default: 0). Increasing the value results in a smoother waveform shape. This improves the situation in which characters composed of dots, for example, are extracted (separated) more than necessary, but may reduce the detection sensitivity to narrow line spacing.

Line Height Upper Limit (Region Ratio)

Set the upper limit for the height of the line to be extracted as a percentage of the inspection region width (0.100 to 1.000) (default: 1.000). If the height of a line exceeds this limit as a result of two lines with narrow spacing being mistakenly detected as one line, the waveform is analyzed to forcibly extract a line within the upper limit, which may result in a successful line extraction.

Reference This setting is a range displayed as a green frame (orange when the item is selected) near the line extraction waveform in the [Image Viewer].

Detection Threshold

Set the lower limit threshold for the projected waveform used in extraction by the waveform intensity (0 to 255, default: 40). Lowering the threshold increases the extraction sensitivity, but may increase the influence of noise.

Reference This setting is displayed as a straight green line across the line extraction waveform in the [Image Viewer].

Wave Width Lower Limit

Set the lower limit of the line height (0 to 255 pixels, default: 10) used for line extraction from the generated waveform. Projected waveforms below the lower limit generated by noise information are excluded from extraction.

Reference This setting is a range displayed as a yellow frame near the line extraction waveform in the [Image Viewer].

Wave Intensity Lower Limit

Set the lower limit for the projected waveforms to be targeted for line extraction by the difference (0 to 255) from [Detection Threshold] (default: 25). Projected waveforms whose maximum intensity is below the lower limit can be excluded from extraction.

Reference This setting is displayed as a straight yellow line across the line extraction waveform in the [Image Viewer].

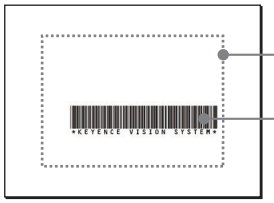
1D Code Reader

#E028

A tool that detects 1D code information in the inspection region and reads the character strings contained in the 1D codes in the captured image. In addition to external output of read strings, pass/fail decisions can also be made in comparison with pre-registered content or dynamically changing content such as calendars or serial numbers.

Overview of functions

Image of the Measurement



Inspection region

Reading target code

1D code information in the inspection region is detected and recognized as a string.

Codes Supported by the 1D Code Reader Tool

The following code formats are supported.

CODE39

CODE39 can be read.

Point Full ASCII conversion is not supported.

CODE128

CODE128 can be read.

Point The "FNC2" character used to link messages is not supported.

EAN/JAN/UPC

EAN (JAN) and UPC can be read. EAN (JAN)-8 and EAN (JAN)-13, UPC-A, and UPC-E can be read.

Barcodes with an appended 2- or 5-character add-on code can also be read.

GS1 Databar

GS1 Databar can be read. Databar, Databar Stacked, Databar Limited, Databar Expanded, and Databar Expanded Stacked can be read.

ITF

ITF can be read.

Codabar/NW-7

Codabar/NW-7 can be read.

Pharmacode

Pharmacode can be read.

CODE93

CODE93 can be read.

Measurement Results Output

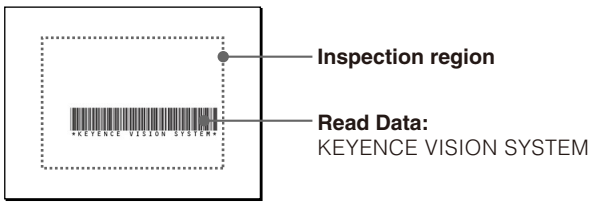
The measurement results output by the 1D Code Reader tool are as follows.

Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Read Data	Outputs the read data as a string.
Collation Pattern	Outputs the string of the collation pattern.
Read Data Length	Outputs the read data length in bytes.
Position X	Outputs the center coordinate X of the detected 1D code in pixels.
Position Y	Outputs the center coordinate Y of the detected 1D code in pixels.
Detected Angle	Outputs the difference angle from the base angle of the detected 1D code.
Detected Code Resolution	Outputs the resolution of the detected 1D code as the number of pixels per module.
Code Color	Outputs the print color of the detected 1D code (0: Not detected, 1: Black, 2: White).
Code Angle	Outputs the detected angle of the detected 1D code when the base angle is 0°.
Code Data Length	Outputs the length of the entire code data contained in the detected 1D code in bytes.
Reading Stability	Outputs the read stability (5: High to 1: Low, 0: Reading failed).
Reading Error	Outputs whether a read error has occurred (0: Reading successful, 1: Reading failed).
Reading Error Cause	Outputs the cause of the occurrence of the read error (0: Reading successful, 1: Decoding failed, 2: Timeout).
Detection Region: (Point 1, Point 2, Point 3, Point 4) (X, Y)	Outputs the region information of the detected 1D code in pixels.
Quality Verification	The overall symbol grade of the 1D code print quality verification and each grade of each print quality item is output as numerical data from 4 to 0.
Tool judgment value	When the measurement result exceeds the set tolerance (upper and lower limits), or the read string differs to the collation conditions, it is judged as "Fail". When the result is within the tolerance range and the read string matches the collation conditions, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

- Code Type: CODE39
- Start Digit: 1
- Data Length: 100



Properties

When setting the 1D Code Reader tool, use the [Properties] view. The [Properties] view for the 1D Code Reader tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the 1D Code Reader tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Sets the conditions to detect 1D code during measurement. Additionally, set the other conditions that can be set for the 1D Code Reader tool as necessary.
Read Data	Sets the reading method for 1D code data.
Judgment	Sets the tolerance (upper and lower limits) for the measured values and the collation pattern.
Display	Sets the display methods for things such as the inspection and mask regions.

Region

Specify the area on the captured image to be used for measurement.

Point

- The smaller the inspection region, the shorter the processing time.
- The presence of backgrounds other than 1D codes in the inspection region can significantly increase processing and auto-tuning time. Set the inspection region as necessary.
- If two or more codes matching the detection criteria exist in the inspection region, it is not possible to specify which code to detect (the behavior is uncertain).
- [Verification] is not available when the inspection region size exceeds 2544 pixels in width or 2544 pixels in height.

Reference For details about how to set regions, see “Tool Common Setting Items” - "Region" - "Region Settings".

Detection

Set the conditions to detect 1D code during measurement. You can also set the other conditions that can be set for the 1D Code Reader tool as necessary.
→Detection Conditions
→Detection Parameters
→Options
→Detailed Settings

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Set the type of 1D code to be read and the direction to read barcodes.

Code Type

Select the type of the 1D code to be read.

- **Not Set** (default)
- **CODE39**: Measures CODE39 format codes.
- **CODE128**: Measures CODE128 format codes.
- **EAN/JAN/UPC**: Measures EAN/JAN/UPC format codes.
- **GS1 Databar**: Measures GS1 Databar format codes.
- **ITF**: Measures ITF format codes.
- **Codabar/NW-7**: Measures Codabar/NW-7 format codes.
- **Pharmacode:** Measures Pharmacode format codes.
- **CODE93**: Measures CODE93 format codes.

Point

- Changing the code type resets some settings on the screen.
- When the UPC-A format code is read, the read string is output as 13 digits.
- When the UPC-E format code is read, the read string is output as 7 digits.

The setting items vary depending on the selection for [Code Type]. Read the description of the setting items after referring to the following table.

Setting item for each code

Setting item	1D Code							
	CODE39	CODE128	EAN/JAN/UPC	GS1 Databar	ITF	Codabar/NW-7	CODE93	Pharmacode
Read Direction	-	-	-	-	-	-	-	✓
Code Resolution (pixel)	✓	✓	✓	✓	✓	✓	✓	✓
Code Detail	-	-	✓	✓	-	-	-	-
Reference Contrast	✓	✓	✓	✓	✓	✓	✓	✓
Number of Read Digits	✓	✓	-	✓	✓	✓	✓	✓
Code Color	✓	✓	✓	✓	✓	✓	✓	✓
Starting Angle	✓	✓	✓	✓	✓	✓	✓	✓
Scale Variations	✓	✓	✓	✓	✓	✓	✓	✓
Check Digit	✓	-	-	-	✓	✓	-	-
Verification	✓	✓	✓	✓	✓	✓	✓	✓
Overall Symbol Grade	✓	✓	✓	✓	✓	✓	✓	✓
Timeout (sec)	✓	✓	✓	✓	✓	✓	✓	✓
Large Area Mode	✓	✓	✓	✓	✓	✓	✓	✓

Read Direction

Select the direction to read barcodes.

- → (default): Reads barcodes from the left to the right of the screen.
- ←: Reads barcodes from the right to the left of the screen (180° inversion).
- ↑: Reads barcodes from the bottom of the screen upwards (90° counterclockwise rotation).
- ↓: Reads barcodes from the top of the screen downwards (clockwise 90° rotation).

Point
- This setting item is only available when [Pharmacode] is selected for [Code Type].
- The results obtained from Pharmacode depend on the read direction.

Code Resolution (pixel)

The resolution of the code read is displayed as a result of auto-tuning. Depending on the resolution, the color is red if the resolution is well below the recommended value, orange if the resolution is below the recommended value, and blue if the resolution meets the recommended value. When the resolution is displayed in red, the gray text string [Unset/Invalid] will be displayed below the numbers.

Reading Results	Red	Orange	Blue
Normal	Less than 1.2 pixels	1.2 pixels or more Less than 1.5 pixels	1.5 pixels or more
When the inspection region size exceeds 2544 pixels in width or 2544 pixels in height	Less than 1.2 pixels	1.2 pixels or more Less than 3.0 pixels	3.0 pixels or more
When the inspection region size exceeds 2544 pixels in width and 2544 pixels in height	Less than 3.0 pixels	3.0 pixels or more Less than 6.4 pixels	6.4 pixels or more

Detection Parameters

Perform auto-tuning or tuning by manual setting.

Point
- Setting items for which the [Manual Setting] check box is selected must be manually set. Auto-tuning is not made.
- Auto-tuning will also fail if a configuration error occurs or if normal detection is also unsuccessful (e.g. due to a small timeout value).
- If the inspection region is large, auto-tuning may fail or the time required for auto-tuning may significantly increase due to background noise. Reduce the size of the inspection region as necessary.
- If two or more codes exist in the inspection region, it is not possible to specify which code to detect (the behavior is uncertain). Make sure that only one code is shown in the inspection region when capturing images.
- For Pharmacode, bar codes with a Number of Read Digits of 3 digits or more will be targets of auto-tuning.
- If the optimum setting cannot be achieved by auto-tuning or if you want to change the setting made by auto-tuning, configure the setting manually.

Auto-Tuning

Clicking this button runs auto-tuning and automatically adjusts the optimal settings for detecting the code.

Code Resolution (pixel)

Set the resolution (pixels) of the module width of the 1D code to be read within the range of 0.00 to 200.00 (default: 0.00).

Code Detail

Set the code type details for the EAN/JAN/UPC format or the GS1 Databar format. Select the [Code Detail] check box and click the [Select Code Detail] button to display the [Select Code Detail] dialog box.

- In the case of EAN/JAN/UPC format
  - EAN-13, UPC-A
  - EAN-13, UPC-A & 2-digit
  - EAN-13, UPC-A & 5-digit
  - EAN-8
  - EAN-8 & 2-digit
  - EAN-8 & 5-digit
  - UPC-E
  - UPC-E & 2-digit
  - UPC-E & 5-digit
- In the case of GS1 Databar format
  - Databar
  - Databar Stacked
  - Databar Limited
  - Databar Expanded
  - Databar Expanded Stacked

Reference Contrast

Select the contrast information to be used as a reference when extracting code features from [Highest], [High], [Normal], [Low], and [Lowest] (default: [Normal]). Lowering the contrast increases the likelihood of detecting even weak contrasts, but if it is too low, the detection may become susceptible to noise and unstable. During auto-tuning, a setting value slightly lower than the upper detectable limit is selected based on the image at the time of tuning.

Number of Read Digits

To limit the number of digits in the code to be read, select the [Number of Read Digits] check box and set the maximum and minimum number of digits in the code within the range of 1 to 128 (default setting for maximum number of digits: 128; default setting for minimum number of digits: 1).

Code Color

Select the color of the code to be detected (code color against background).

- **Both** (default): Both black and white codes can be detected. However, it takes longer to process than when only [Black] or [White] is selected.
- **Black**: Only black codes on a white background are detected.
- **White**: Only white codes on a black background are detected.

Starting Angle

Set the starting angle for detecting codes within the range of -180.000 to 179.999 (default: 0.000).

Reference The base angle of 0° for each code is the state of the code in "Codes Supported by the 1D Code Reader Tool".

Options

Scale Variations

Select how much variation to allow for when the size of the code varies. The smaller the allowed variation, the less chance for false detection.

- **Small** (default): Detects codes with a +/-10% size variation.
- **Medium**: Detects codes with a +/-20% size variation.
- **Large**: Detects codes with a +/-30% size variation.
- **Unrestricted**: Allows detection of all size variations.

Point If [Unrestricted] is selected, the read stability may decrease.

Check Digit

Set whether the check digit of the decoded string is to be inspected.

Point This setting item is only available when [Code Type] is set to [CODE39], [ITF], or [Codabar/NW-7].

Verification

Verification is performed on the captured 1D code in accordance with the print quality assessment defined by a third-party organization, and in addition to the output of the verification results, the overall grading process is judged against the set thresholds. Verification results can be used as judgment conditions.

- **Off** (default): Does not use the verification function.
- **ISO/IEC 15416**: Verifies print quality using the ISO/IEC 15416 method. A standard for 1D code print quality assessment set by the International Organization for Standardization. It is mainly used to evaluate 1D codes printed on labels.

Point

- In order to use verification, set the width of the inspection region to 2544 pixels or less and the height to 2544 pixels or less.
- The device's print quality verification function is only a function for evaluating the print quality of 1D codes in accordance with standards on the captured image, and cannot be used as an official 1D code verifier.
- Changing the [Verification] setting resets the print quality tolerance setting in [Judgment Conditions].

Overall Symbol Grade

Set the print quality items to be included in the judging of the overall print quality grade.

Point

- The overall grade is the lowest value among the selected items.
- Each print quality item can be output from the data output tool as numerical data on a scale of 0 to 4 (-1 is output if no assessment has been performed).

In the [Overall Symbol Grade Condition] dialog box that appears when you click the [Select Data] button, select the print quality items to be included in the judgment.

- **Decode (DEC)**: Assesses whether decoding is possible.
- **Edge Determination (EDGE)**: Determines whether the number of edges read equals the expected number of edges.
- **Symbol Contrast (SC)**: Assesses the difference between the maximum (Rmax) and minimum luminance value (Rmin) in the code area.

- **Minimum Reflectance (MINR)**: Assesses the minimum reflectance in the scan waveform.
- **Minimum Edge Contrast (MINE)**: Assesses the minimum difference between the reflectance of a space (including the quiet zone) and the neighboring bar.
- **Modulation (MOD)**: Assesses the ratio of the minimum edge contrast to the symbol contrast.
- **Minimum Quiet Zone (QZ)**: Assesses whether the quiet zone width meets the standard.
- **Decodability (DCD)**: Assesses the defined decode margin (the size of the error between the ideal line width pattern and the actual line width pattern) for each code type.
- **Defects (DEF)**: Assesses color irregularities inside the element.
- **Wide-Narrow Ratio (WNR):** Assesses whether the ratio of fine to thick elements complies with the standard. This print quality item is only available when [Code Type] is set to [CODE39] or [ITF].
- **Inter Character Gap (CGAP)**: Assesses whether the space width between characters is too large. This print quality item is only available when [Code Type] is set to [CODE39].

Timeout (sec)

Set the upper limit to the processing time. When the processing time for a given single tool exceeds the limit set for it (0.01 to 60.00 seconds, default: 3.00 seconds) due to the state of the current image, the tool processing will return a timeout error.

Point The setting value is an approximation. The actual timeout may vary.

Large Area Mode

Enable this mode when setting the inspection region to a large area. Turning this ON increases the consumption of the memory.

- **Off** (default): Large Area Mode is not used.
- **ON**: Uses Large Area Mode. If the region size exceeds 2544 pixels in width or 2544 pixels in height, Large Area Mode needs to be enabled.

Point
- This option is available when a camera greater than 5 megapixels is set.
- [Large Area Mode] and [Verification] cannot be used simultaneously. To enable [Large Area Mode], set [Verification] to Off.
- If you enable or disable [Large Area Mode], perform auto-tuning again.

Detailed Settings

You can set the other conditions that can be set for the 1D Code Reader tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Read Data

Set how the 1D code data detected by the parameters set in the detection conditions is to be read.

Read Data Settings

Read Data

Displays the content of the data read with the current setting. Hold the mouse pointer over the string of read data to see the full text of the read data.

Read Start Digit

Set the digit number (1 to 128, default: 1) of the detected code from where to start reading data.

Read Data Length

Set how many characters (1 to 128 characters, in bytes, default: 100) of data are to be read from the start digit.

Point As data is forcibly separated at the specified position, garbled characters may occur if the start/end digit of the data falls in the middle of 2-byte characters such as kanji or kana.

Output Symbol Identifier

Select whether to add an identifier (3 characters: 3 bytes) to comply with ISO/IEC 15424/JIS X 0530.

- **OFF** (default): Does not add a symbol identifier.
- **ON**: Adds a symbol identifier (3 bytes) as defined in ISO/IEC 15424/JIS X 0530 Data Carrier Identifiers (including Symbology Identifiers) to the beginning of the read data.

The symbol identifier to be added is shown in the table below.

Code Type	Added Data	Condition
CODE39	]A0	No check character verification and full ASCII processing.
	]A1	Check characters are verified and sent.
CODE128	]C0	Standard case. FNC1 does not come in the first or second symbol character position following the start character.
	]C1	EAN/UCC-128. When the first symbol character is FNC1.
	]C2	When the second symbol character is FNC1.
EAN/JAN/UPC	]E0	Standard data entirely in EAN format. EAN/JAN-13, UPC-A, UPC-E (excluding add-ons)
	]E3	Composite data consisting of EAN/JAN-13/UPC-A/UPC-E + add-ons
	]E4	EAN/JAN-8 data (independent of the presence or absence of add-ons)
GS1 Databar	]e0	No option regulation ("]e0" is always output)
ITF	]I0	No check character verification.
	]I1	Check characters are verified and sent.
Codabar/NW-7	]F0	Standard codabar symbol. No special processing.
	]F2	The reader has already completed check character verification.
Pharmacode	]X0	No option regulation ("]X0" is always output)
CODE93	]G0	No option regulation ("]G0" is always output)

Judgment

Set the collation pattern (character string to be checked against) for the read code content and the tolerance (upper and lower limits) for the detection result. If the code read result and the collation conditions do not match or the measured value exceeds the specified tolerance, the result is judged “Fail”, and if the code read result and the collation conditions match and the measured value also is within the tolerance, the result is judged “Pass”. The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point

- If no tolerance is set, no judgment action is performed even when measurement is executed.
- The tolerance unit varies depending on the type of measured value.
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Data Collation

Set the judgment conditions for the content of the read 1D code.

Read Data

Displays the content of the data read with the current setting. Hold the mouse pointer over the string of read data to see the full text of the read data.

Collation Pattern

Enter the string to be set as the collation pattern. Click the [Copy from Read Data] button to automatically enter the string displayed in [Read Data] into the text box. In the [Collation Pattern Setting] dialog box that is displayed when clicking the [Collation Pattern Setting] button, select how to handle the special characters "#", "*", and "!".

- **Normal**: Handles "#", "*", and "!" as normal characters.
- **Special**: Handles "#", "*", and "!" as special characters. "#" and "*" are always judged as Pass without performing collation for one character. "!" is always judged as Pass without collating 0 or more characters. If two or more instances of "!", which is treated as a special character, are set in one collation pattern, an error will occur.

Read Data Length

Set the tolerance for the number of characters of the code read.

- Unit: Number of Characters (in bytes)
- Range: 0 to 999

Point
- [Read Data Length] in [Read Data Settings] is the subject of the number of characters.
- Half-width characters such as alphanumeric characters are treated as one byte per character, and full-width characters such as Kanji (Chinese characters) and Kana (Japanese syllabary characters) are treated as two bytes (character code: Shift_JIS) or three to four bytes (character code: UTF-8) per character.

Position X/Position Y

Set the tolerance for the coordinates of the code's detected position.
- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Detected Angle

Set the tolerance for the code tilt angle.
- Unit: Angle
- Range: -180.000 to 180.000

Point
The Detected Angle is the difference angle from the [Starting Angle] in [Detection Parameters].

Quality Verification > Overall Symbol Grade

Set the tolerance for the overall grade of the print quality set for [Options] - [Overall Symbol Grade] under the [Detection] tab.
- The overall grade is the lowest value among the selected items.
- Each print quality item can be output from the data output tool as numerical data on a scale of 0 to 4 (-1 is output if no assessment has been performed).
- Unit: Number
- Range: 0.0 to 4.0

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point
The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set the display methods for things such as the inspection and mask regions. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the detected position of the 1D code.

- **ON** (default): Displays the detected position. Set the shape (Cross, Cross with Arrow), size (4 to 1024), line thickness, and color for the detection point (center of the code) and region of the detected code.
- **OFF**: Does not display the detected position.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The detected position setting is applied for the display color.

Display Read Data

Display Read Data Length

Display Position X

Display Position Y

Display Detected Angle

Display Overall Symbol Grade

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all results.

Reset

Restores the display options to their default settings.

When codes cannot be read correctly

If the code cannot be tuned or read, check for the issues listed herein.

Code resolution is low

Capture as large an image of the code as possible so as to have a module size of 1.5 pixels or more, or use a high-pixel camera.

Code contrast is low

Try using Contrast Conversion or another image enhancement filter of [Image Enhance] to improve the contrast. If [Grayscale] is selected for [Color Extraction] with a color camera, using [RGB Grayscale] may improve the contrast.

Code is out of focus

Check the lens focus adjustment and shutter speed.

Little blank space (quiet zone) around code

Check that there is sufficient blank space around the code within the inspection region. If the position of the code shifts to an edge of the inspection region, consider using Position Adjustment.

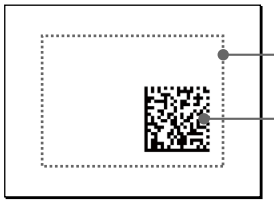
2D Code Reader

#E029

A tool that detects 2D code information in the inspection region and reads the character strings contained in the 2D codes in the captured image. In addition to external output of read strings, pass/fail decisions can also be made in comparison with pre-registered content or dynamically changing content such as calendars or serial numbers.

Overview of functions

Image of the Measurement



Inspection region

Reading target code

2D code information in the inspection region is detected and recognized as a string.

Codes Supported by the 2D Code Reader Tool

The following code formats are supported.

QR

QR codes (Model 1 and Model 2) can be read.

Point Linking functions are not supported.

Micro QR

Micro QR code can be read.

Point Linking functions are not supported.

DataMatrix

Data Matrix (ECC200) can be read.

Point
- ECC000 to ECC140 are not supported.
- Linking functions are not supported.

Rectangular DataMatrix

Rectangular Data Matrix can be read.

Point Linking functions are not supported.

PDF417

PDF417 code can be read and print quality can be verified.

MicroPDF417

MicroPDF417 code can be read and print quality can be verified.

Composite Code

Composite Codes (CC-A, CC-B, and CC-C) can be read.

Measurement Results Output

The measurement results output by the 2D Code Reader tool are as follows.

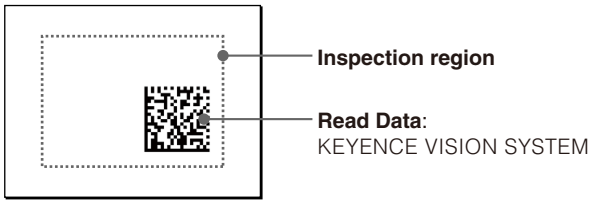
Measurement results	Description
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Read Data Length	Outputs the read data length in bytes.
Read Data	Outputs the read data as a string.
Position X	Outputs the center coordinate X of the detected 2D code in pixels.
Position Y	Outputs the center coordinate Y of the detected 2D code in pixels.
Detected Angle	Outputs the difference angle from the base angle of the detected 2D code.
Detected Code Resolution	Outputs the resolution of the detected 2D code as the number of pixels per cell.
Unused Error Correction Rate	Outputs the available (unused) error correction of the detected 2D code as a percentage (0 to 100%).
Number of Rows	Outputs the number of cells of the detected 2D code in the vertical direction.
Number of Columns	Outputs the number of cells of the detected 2D code in the horizontal direction.
Code Color	Outputs the print color of the detected 2D code (0: Not detected, 1: Black, 2: White).
Mirrored Reading	Outputs mirrored reading information for the detected 2D code (0: Not detected, 1: No mirror inversion, 2: With mirror inversion).
Code Angle	Outputs the detected angle of the detected 2D code when the base angle is 0°.
Code Data Length	Outputs the length of the entire code data contained in the detected 2D code in bytes.
Reading Error	Outputs whether a read error has occurred (0: Reading successful, 1: Reading failed).
Reading Error Cause	Outputs the cause of the occurrence of the read error (0: Reading successful, 1: Code detection failed, 2: Decoding failed, 3: Timeout).
Collation Pattern	Outputs the string of the collation pattern.
Detection Region: (Point 1, Point 2, Point 3, Point 4) (X, Y)	Outputs the region information of the detected 2D code in pixels.
Quality Verification	Outputs the overall symbol grade of the 2D code print quality verification and each grade of each print quality item as numerical data of 4 to 0.
Tool judgment value	When the measurement result exceeds the set tolerance (upper and lower limits), or the read string differs to the collation conditions, it is judged as "Fail". When the result is within the tolerance range and the read string matches the collation conditions, it is judged as "Pass".

Point When handling binary data, numerical data after 0 (NULL) cannot be displayed nor collated.

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

- Code Type: DataMatrix
- Start Digit: 1
- Data Length: 100



Properties

When setting the 2D Code Reader tool, use the [Properties] view. The [Properties] view for the 2D Code Reader tool is made up of the tabs below. Configure the settings as required.

Properties	Settings
General	Displays information about the 2D Code Reader tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Converts the imported color image to a black and white image using any extraction method if a color image is used for the current image. Additionally, set the filter processing to apply to the image.
Detection	Sets the conditions to detect 2D code during measurement. Additionally, set the other conditions that can be set for the 2D Code Reader tool as necessary.
Read Data	Sets the reading method for 2D code data.
Judgment	Sets the tolerance (upper and lower limits) for the measured values, and the collation pattern.
Display	Sets the display methods for things such as the inspection and mask regions.

Region

Specify the area on the captured image to be used for measurement.

Point

- The smaller the inspection region, the shorter the processing time.
- The presence of backgrounds other than 2D codes in the inspection region can significantly increase processing and auto-tuning time. Set the inspection region as necessary.
- If two or more codes matching the detection criteria exist in the inspection region, it is not possible to specify which code to detect (the behavior is uncertain).
- Only the Rectangle shape inspection region is available with the 2D Code Reader.
- [Verification] is not available when the inspection region size exceeds 2544 pixels in width or 2544 pixels in height.

Reference For details about how to set regions, see “Tool Common Setting Items” - "Region" - "Region Settings".

Detection

Set the conditions to detect 2D code during measurement. You can also set the other conditions that can be set for the 2D Code Reader tool as necessary.
→Detection Conditions
→Detection Parameters
→Options
→Detailed Settings

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Conditions

Sets the type of 2D code to be read.

Code Type

Select the type of 2D code to be read.

- **Not Set** (default)
- **QR**: Measures QR format codes.
- **Micro QR**: Measures Micro QR format codes.
- **DataMatrix**: Measures DataMatrix format codes.
- **Rectangular DataMatrix**: Measures rectangular DataMatrix format codes.
- **PDF417**: Measures PDF417 format codes.
- **MicroPDF417**: Measures MicroPDF417 format codes.
- **Composite Code**: Measures composite codes consisting of 2D and 1D codes.

Point Changing the code type resets some settings on the screen.

The setting items differ depending on what you select for [Code Type]. Read the description of the setting items after referring to the following table.

Setting item	2D Code						
	QR	Micro QR	DataMatrix	Rectangular DataMatrix	PDF417	MicroPDF417	Composite Code
2D Code							
Code Detail	-	-	-	-	-	-	✓
1D Code							
Code Type	-	-	-	-	-	-	✓
Code Detail	-	-	-	-	-	-	✓
Read Data Length	-	-	-	-	-	-	✓
Code Resolution (pixel)	✓	✓	✓	✓	✓	✓	✓
Reference Contrast	✓	✓	✓	✓	✓	✓	✓
Number of Cells	✓	✓	✓	✓	-	-	-
Code Color	✓	✓	✓	✓	✓	✓	✓
Mirrored Reading	✓	✓	✓	✓	✓	✓	✓
Starting Angle	✓	✓	✓	✓	✓	✓	✓
Angle Range (+/-)	✓	✓	✓	✓	-	-	-
Scale Variations	✓	✓	✓	✓	✓	✓	✓
Verification	✓	✓	✓	✓	✓	✓	✓

Setting item	2D Code						
	QR	Micro QR	DataMatrix	Rectangular DataMatrix	PDF417	MicroPDF417	Composite Code
Overall Symbol Grade	✓	✓	✓	✓	✓	✓	✓
Timeout (sec)	✓	✓	✓	✓	✓	✓	✓
Large Area Mode	✓	✓	✓	✓	✓	✓	✓

Code Resolution (pixel)

The resolution of the code read is displayed as a result of auto-tuning. Depending on the resolution, the color is red if the resolution is well below the recommended value, orange if the resolution is below the recommended value, and blue if the resolution meets the recommended value. When the resolution is displayed in red, the gray text string [Unset/Invalid] will be displayed below the numbers.

- When [Code Type] is set to [PDF417], [MicroPDF417], or [Composite Code]

Reading Results	Red	Orange	Blue
Normal	Less than 1.2 pixels	1.2 pixels or more Less than 1.5 pixels	1.5 pixels or more
When the inspection region size exceeds 2544 pixels in width or 2544 pixels in height	Less than 1.2 pixels	1.2 pixels or more Less than 3.0 pixels	3.0 pixels or more
When the inspection region size exceeds 2544 pixels in width and 2544 pixels in height	Less than 3.0 pixels	3.0 pixels or more Less than 6.4 pixels	6.4 pixels or more

- When [Code Type] is set to one of [QR], [Micro QR], [DataMatrix], or [Rectangular DataMatrix]

Reading Results	Red	Orange	Blue
Normal	Less than 1.0 pixel	1.0 pixel or more Less than 4.0 pixels	4.0 pixels or more
When the inspection region size exceeds 2544 pixels in width or 2544 pixels in height	Less than 1.0 pixel	1.0 pixel or more Less than 8.0 pixels	8.0 pixels or more

Detection Parameters

Perform auto-tuning or perform tuning by manual setting.

Point

- Setting items for which the [Manual Setting] check box is selected must be manually set. Auto-tuning is not performed.
- Auto-tuning will also fail if a configuration error occurs or if normal detection is also unsuccessful (e.g. a small timeout value).
- If the inspection region is large, auto-tuning may fail or the time required for auto-tuning may significantly increase due to background noise. Reduce the size of the inspection region as necessary.
- If two or more codes exist in the inspection region, it is not possible to specify which code to detect (the behavior is uncertain). Make sure that only one code is shown in the inspection region when capturing images.
- If the optimum setting cannot be achieved by auto-tuning or if you want to change the setting made by auto-tuning, configure the settings manually.

Auto-Tuning

Clicking this button runs auto-tuning and automatically adjusts the optimal settings for detecting the code.

2D Code

Set [Code Detail] as the detection conditions for the 2D code part of the composite code.

Point This setting item is only available when [Code Type] is set to [Composite Code].

Code Detail

Set the code type details for the 2D code. In the [Select Code Detail] dialog box that appears when you click the [Select Code Detail] button, select the code type details for the 2D code.

- **CC-A**
- **CC-B**
- **CC-C**

1D Code

Set [Code Type], [Code Detail], and [Number of Read Digits] as the detection conditions for the 1D code part of the composite code.

Point This setting item is only available when [Code Type] is set to [Composite Code].

Code Type

Set the 1D code type (default: ON for all). In the [Select Code Types] dialog box that appears when you click the [Select Code Types] button, select the code type for the 1D code.

- **EAN/JAN/UPC**
- **GS1 Databar**
- **GS1 128**

Point If only [CC-C] is selected for ["Code Detail"] of [2D Code], only [GS1 128] will be displayed.

Code Detail

Set the code type details for the 1D code (default: ON for all). In the [Select Code Detail] dialog box that appears when you click the [Select Code Detail] button, select the code type details for the 1D code.

Point Not available when only [GS1 128] is selected for [Code Type].

The [Code Detail] that can be selected varies depending on the selected [Code Type].

- **Databar**
- **Databar Stacked**
- **Databar Limited**
- **Databar Expanded**
- **Databar Expanded Stacked**
- **EAN-13, UPC-A**
- **EAN-13, UPC-A & 2-digit**
- **EAN-13, UPC-A & 5-digit**
- **EAN-8**
- **EAN-8 & 2-digit**
- **EAN-8 & 5-digit**
- **UPC-E**
- **UPC-E & 2-digit**
- **UPC-E & 5-digit**

Number of Read Digits

Set the maximum and minimum number of digits for the code to be read within the range of 1 to 128 (default setting for maximum number of digits: 128; default setting for minimum number of digits: 1). This setting option is available when [GS1 Databar] is selected for [Code Type] and [Databar Expanded] or [Databar Expanded Stacked] is selected for [Code Detail]. It is also available when [GS1 128] is selected for [Code Type]. A value smaller than [Minimum] cannot be set for [Maximum]. Additionally, a value greater than [Maximum] cannot be set for [Minimum].

Code Resolution (pixel)

Set the resolution (pixels) per cell or module of the 2D code to be read within the range of 0.00 to 200.00 (default: 0.00). Setting a value close to the actual 2D code to be read will enable faster and more stable detection.

Reference The recommended values are displayed below by the code type:

- QR, Micro QR, DataMatrix, Rectangular DataMatrix: 4.00
- PDF417, MicroPDF417, Composite Code: 1.50 (3.20)*

*The figure inside the brackets () indicates the recommended value for a monochrome image with position adjustment and no interpolation.

Reference Contrast

Select the contrast information to be used as a reference when extracting code features from [Highest], [High], [Normal], [Low], and [Lowest] (default: [Normal]). Lowering the contrast increases the likelihood of detecting even weak contrasts, but if it is too low, the detection may become susceptible to noise and unstable. During auto-tuning, a setting value slightly lower than the upper detectable limit is selected based on the image at the time of tuning.

Number of Cells

You can set the number of vertical and horizontal cells for the 2D code to be detected.

Point This setting item is only available when [Code Type] is set to [QR], [Micro QR], [DataMatrix], or [Rectangular DataMatrix].

The numbers of cells that can be set are as follows (default: [Any]):

- QR: **Any**, **21 x 21** to **177 x 177**
- Micro QR: **Any**, **11 × 11** to **17 × 17**
- DataMatrix: **Any**, **10 × 10** to **144 × 144**
- Rectangular DataMatrix: **Any**, **8 × 18** to **16 × 48**

Selecting [Any] enables codes to be detected regardless of the number of cells, but the processing time increases. During auto-tuning, it is set to the number of cells of the 2D code that was detected.

Point If you select a specific value of number of cells, 2D codes with any other number of cells will not be detected.

Code Color

Select the color of the code to be detected (code color against background).

- **Both** (default): Both black and white codes can be detected. However, it takes longer to process than when [Black] or [White] is selected.
- **Black**: Only black codes on a white background are detected.

- **White**: Only white codes on a black background are detected.

Mirrored Reading

Switch the internal processing to accommodate mirror-image codes that are captured through mirrors or prisms or from behind transparent sheets, for example.

- **Standard and Mirrored** (default): Both normal codes and mirror-image codes can be detected. However, it takes longer to process than when [Mirrored Only] or [Standard Only] is selected.
- **Mirrored Only**: Only mirror-image codes are detected (normal codes cannot be detected).
- **Standard Only**: Only normal codes are detected (mirror-image codes cannot be detected).

Point If image inversion was used in the Capture tool, mirror inversion processing is applied to the inverted image.

Starting Angle

Set the starting angle for detecting codes within the range of -180.000 to 179.999 (default: 0.000).

Reference The base angle of 0° for each code is the state of the code in "Codes Supported by the 2D Code Reader Tool".

Angle Range (+/-)

Set the range to detect codes for the starting angle within the range of 0.000 to 180.000 (default: 180.000). By limiting the angle range, faster and more stable detection is possible.

Point This setting item is only available when [Code Type] is set to [QR], [Micro QR], [DataMatrix], or [Rectangular DataMatrix].

Reference The base angle for the detection range set in [Angle Range (+/-)] uses the value set in [Starting Angle].

Options

Scale Variations

Select how much variation to allow for when the size of the code varies. The smaller the allowed variation, the more stable detection of the code.

- **Small** (default): Detects codes with a ±10% size variation.
- **Medium**: Detects codes with a ±20% size variation.
- **Large**: Detects codes with a ±30% size variation.
- **Unrestricted**: Allows detection of all size variations.

Point When [Unrestricted] is selected, the system can operate with [Code Resolution (pixel)] unset, but setting a value close to the actual 2D code to be read will enable faster and more stable detection.

Verification

Verification is performed on the captured 2D code in accordance with the print quality assessment defined by a third-party organization, and in addition to the output of the verification results, the overall grading process is judged against the set thresholds. Verification results can be used as judgment conditions.

- **Off** (default): Does not use the verification function.

- **ISO/IEC 15415**: Verifies print quality using the ISO/IEC 15415 method. A standard for 2D code print quality assessment set by the International Organization for Standardization (ISO). It is mainly used to evaluate 2D codes printed on labels.
- **AIM DPM-1-2006** (other than [PDF417] and [MicroPDF417] and [Composite Code]): Verifies print quality using the AIM DPM-1-2006 method. Direct part marking 2D code print quality assessment standard set by the Automatic Identification Manufacturers (AIM). It is based on ISO/IEC 15415.
- **SAE AS9132** (only when [DataMatrix] or [Rectangular DataMatrix] is selected): Verifies print quality using the SAE AS9132 method. Standard set by the Society of Automotive Engineers (SAE) for evaluating the print quality of DataMatrix codes used in the aerospace industry.

Point

- In order to use verification, set the width of the inspection region to 2544 pixels or less and the height to 2544 pixels or less.
- The device's print quality verification function is only a function for evaluating the print quality of 2D codes in accordance with standards on the captured image, and cannot be used as an official 2D code verifier.
- If [Code Type] in [Detection Conditions] is changed from [DataMatrix] (or [Rectangular DataMatrix]) to [QR] (or [Micro QR]) when [SAE AS9132] is selected, [Verification] is reset to [Off].
- The only assessment method that can be set when using [PDF417] and [MicroPDF417] is [ISO/IEC 15415].
- Changing the [Verification] setting resets the tolerance setting for [Quality Verification] in [Judgment Conditions].

Overall Symbol Grade

Set the print quality items to be included in the judging of the overall print quality grade.

Point

- The overall grade is the lowest value among the selected items.
- Each print quality item can be output from the data output tool as numerical data on a scale of 0 to 4 (-1 is output if no assessment has been performed).

The available print quality verification items vary depending on the print quality verification method.

Table of supported verification items for each print quality verification method (for QR, Micro QR, DataMatrix, and Rectangular DataMatrix)

Verification item	Verification method		
	ISO/IEC 15415	AIM DPM-1-2006	SAE AS9132
Decode (DEC)	✓	✓	-
Quiet Zone (QZ)	-	-	✓
Symbol Contrast (SC)	✓	-	✓
Cell Contrast (CC)	-	✓	-
Modulation (MOD)	✓	-	-
Cell Modulation (CM)	-	✓	-
Angular Distortion (AD)	-	-	✓
Module Fill (MF)	-	-	✓
Reflectance Margin (RM)	✓	✓	-
Fixed Pattern Damage (FPD)	✓	✓	-
Axial Nonuniformity (AN)	✓	✓	-

Verification item	Verification method		
	ISO/IEC 15415	AIM DPM-1-2006	SAE AS9132
Grid Nonuniformity (GN)	✓	✓	-
Unused Error Correction (UEC)	✓	✓	-
Format Information Damage (FID)	✓	✓	-
Version Information Damage (VID)	✓	✓	-
Print Growth Horizontal (PGH)	✓	✓	-
Print Growth Vertical (PGV)	✓	✓	-

Table of supported verification items for each code type (for PDF417, MicroPDF417, and Composite Code)

Verification method (ISO/IEC 15415) Verification item	Code Type		
	PDF417/ MicroPDF417	Composite Code (2D Code)	Composite Code (1D Code)
Decode (DEC)	✓	✓	✓
Edge Determination (EDGE)	✓	✓	✓
Symbol Contrast (SC)	✓	✓	✓
Minimum Reflectance (MINR)	✓	✓	✓
Minimum Edge Contrast (MINE)	✓	✓	✓
Modulation (MOD)	✓	✓	✓
Minimum Quiet Zone (QZ)	✓	✓	✓
Decodability (DCD)	✓	✓	✓
Defects (DEF)	✓	✓	✓
Codeword Yield (CY)	✓	✓	-
Codeword Print Quality (CPQ)	✓	✓	-
Unused Error Correction (UEC)	✓	✓	-

Point For [Format Information Damage (FID)] and [Version Information Damage (VID)], judgment is only made when [Code Type] is set to [QR] or [Micro QR]. In addition, even if the check box on the [Overall Symbol Grade Condition] dialog box is selected, it is not included in the overall symbol grade judgment.

In the [Overall Symbol Grade Condition] dialog box that appears when you click the [Select Data] button, select the print quality items to be included in the judgment with reference to "Table of supported verification items for each print quality verification method (for QR, Micro QR, DataMatrix, and Rectangular DataMatrix)" and "Table of supported verification items for each code type (for PDF417, MicroPDF417, and Composite Code)" above.

- **Decode (DEC)**: Assesses whether decoding is possible.
- **Quiet Zone (QZ)**: Assesses whether there is a quiet zone of 1 cell or more around the code.
- **Symbol Contrast (SC)**:
  - For ISO/IEC 15415: Assesses the difference between the maximum (Rmax) and minimum luminance value (Rmin) in the code area.
  - For SAE AS9132: Assesses the difference between the maximum luminance value of the dark cell and the minimum luminance value of the light cell in the code area.
- **Cell Contrast (CC)**: Assesses the difference between the average of the light cell luminance values (ML) and the average of the dark cell luminance values (MD).
- **Modulation (MOD)**: Assesses the degree of variation in cell luminance.
- **Cell Modulation (CM)**: Assesses the degree of variation in cell luminance.

- **Angular Distortion (AD)**: Assesses the degree of distortion from 90° of the angle formed by the lines of the L-shaped part.
- **Module Fill (MF)**: Assesses the deviation of the cell size from the correct size.
- **Reflectance Margin (RM)**: Assesses the degree of variation in cell luminance with reference to the black and white of the correct cell.
- **Fixed Pattern Damage (FPD)**: Assesses the degree of damage to the fixed pattern dependent on the code type.
- **Axial Nonuniformity (AN)**: Assesses the degree of distortion in the vertical and horizontal size of the code.
- **Grid Nonuniformity (GN)**: Assesses the maximum deviation of the position of each cell.
- **Unused Error Correction (UEC)**: Assesses the percentage of error correction that was not used during decoding.
- **Format Information Damage (FID)**: Assesses the degree of damage to the QR code's format information.
- **Version Information Damage (VID)**: Assesses the degree of damage to the version information of the QR code (model 2 version 7 or later).
- **Print Growth Horizontal (PGH)**: Assesses the extension/shrinkage of the mark cell in the horizontal direction.
- **Print Growth Vertical (PGV)**: Assesses the extension/shrinkage of the mark cell in the vertical direction.
- **Edge Determination (EDGE)**: Determines whether the number of edges read equals the expected number of edges.
- **Minimum Reflectance (MINR)**: Assesses the minimum reflectance in the scan waveform.
- **Minimum Edge Contrast (MINE)**: Assesses the minimum difference between the reflectance of a space (including the quiet zone) and the neighboring bar.
- **Minimum Quiet Zone (QZ)**: Assesses whether the quiet zone width meets the standard.
- **Decodability (DCD)**: Assesses the defined decode margin (the size of the error between the ideal line width pattern and the actual line width pattern) for each code type.
- **Defects (DEF)**: Assesses color irregularities inside the element.
- **Codeword Yield (CY)**: Assesses the success rate of reading codewords.
- **Codeword Print Quality (CPQ)**: Assesses the codeword print quality.

Timeout (sec)

Set the upper limit to the processing time. When the processing time for a given single tool exceeds the limit set for it (0.01 to 60.00 seconds, default: 3.00 seconds) due to the state of the current image, the tool processing will return a timeout error.

Point The setting value is an approximation. The actual timeout may vary.

Large Area Mode

Enable this mode when setting the inspection region to a large area. Turning this ON increases the consumption of the memory.

- **OFF** (default): Does not use Large Area Mode.
- **ON**: Uses Large Area Mode. If the region size exceeds 2544 pixels in width or 2544 pixels in height, Large Area Mode needs to be enabled.

Point
- This option is available when a camera greater than 5 megapixels is set.
- [Large Area Mode] and [Verification] cannot be used simultaneously. To enable [Large Area Mode], set [Verification] to Off.
- If you enable or disable [Large Area Mode], perform auto-tuning again.

Detailed Settings

You can set the other conditions that can be set for the 2D Code Reader tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Read Data

Set how the 2D code data detected by the parameters set in the detection conditions is to be read.

Read Data Settings

Read Data

Displays the content of the data read with the current setting. When a text string is too long to be displayed, hold the mouse pointer over the string of read data to see the full text of the read data.

Read Start Digit

Set the digit number (1 to 9999, default: 1) of the detected code from where to start reading data.

Read Data Length

Set how many characters (1 to 512 characters, in bytes, default: 100) of data are to be read from the start digit.

Point As data is forcibly separated at the specified position, garbled characters may occur if the start/end digit of the data falls in the middle of 2-byte characters such as kanji or kana.

Output Symbol Identifier

Select whether to add an identifier (3 characters: 3 bytes) to comply with ISO/IEC 15424/JIS X 0530.

- **OFF** (default): Does not add a symbol identifier.
- **ON**: Adds a symbol identifier (3 bytes) as defined in ISO/IEC 15424/JIS X 0530 Data Carrier Identifiers (including Symbology Identifiers) to the beginning of the read data.

The symbol identifier to be added is shown in the table below.

Code Type	Added Data	Condition
QR (including Micro QR)	]Q0	Model 1 (or Micro QR)
	]Q1	Model 2 (not including ECI)
	]Q2	Model 2 (including ECI)
	]Q3	Model 2 (not including ECI; FNC1: Present at the first position)
	]Q4	Model 2 (including ECI; FNC1: Present at the first position)
	]Q5	Model 2 (not including ECI; FNC1: Present at the second position)
	]Q6	Model 2 (including ECI; FNC1: Present at the second position)
DataMatrix (including Rectangular DataMatrix)	]d1	ECC 200 (not including ECI)
	]d2	ECC 200 (not including ECI; FNC1: Present at the first or fifth position)
	]d3	ECC 200 (not including ECI; FNC1: Present at the second or sixth position)
	]d4	ECC 200 (including ECI)
	]d5	ECC 200 (including ECI; FNC1: Present at the first or fifth position)
	]d6	ECC 200 (including ECI; FNC1: Present at the second or sixth position)
PDF417/ MicroPDF417	]L0	Set by the reader according to the protocol defined in the 1994 PDF417 Symbology Specification
Composite Code (EAN/JAN/UPC)	]E0 (barcode data)]e0 (2D code data)	Standard data entirely in EAN format (EAN-13/JAN-13/UPC-A/ UPC-E (excluding add-ons))
	]E3 (barcode data)]e0 (2D code data)	Composite data consisting of EAN-13/JAN-13/UPC-A/UPC-E + add-ons
	]E4 (barcode data)]e0 (2D code data)	EAN-8/JAN-8 data (independent of the presence or absence of add-ons)
Composite Code (GS1 Databar/GS1 128)	]e0 (barcode data) (2D code data)	No option regulation (]e0" is always output)

Extended Channel Interpretation (ECI)

Select how to handle codes that contain ECIs (does not affect the reading of codes that do not contain ECIs).

- **Ignore** (default): Does not output ECI.
- **Output**: Outputs ECI.

Point This setting item is available when [Code Type] is set to [QR], [Micro QR], [DataMatrix], or [Rectangular DataMatrix].

Judgment

Set the collation pattern (character string to be checked against) for the read code content and the tolerance (upper and lower limits) for the detection result. If the code read result and the collation conditions do not match or the measured value exceeds the specified tolerance, the result is judged "Fail", and if the code read result and the collation conditions match and the measured value also is within the tolerance, the result is judged "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- If no tolerance is set, no judgment action is performed even when measurement is executed.
- The tolerance unit varies depending on the type of measured value.
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Data Collation

Set the judgment conditions for the content of the read 2D code.

Read Data

Displays the content of the data read with the current setting.

Collation Pattern

Enter the string to be set as the collation pattern. Click the [Copy from Read Data] button to automatically enter the string displayed in [Read Data] into the text box. In the [Collation Pattern Setting] dialog box that is displayed when clicking the [Collation Pattern Setting] button, select how to handle the special characters "#", "*", and "!".

– **Normal**: Handles "#", "*", and "!” as normal characters.
– **Special**: Handles "#", "*", and "!” as special characters. "#” and "*” are always judged as Pass without performing collation for one character. "!” is always judged as Pass without collating 0 or more characters. If two or more instances of "!", which is treated as a special character, are set in one collation pattern, the data will always be judged as Fail.

Example: Differences in judgment results when using "*" ("#") versus "!"

Reading results		Collation pattern	
		AB*(AB#)	AB!
AB	→	Fail	Pass
ABC	→	Pass	Pass
ABCD	→	Fail	Pass

Read Data Length

Set the tolerance for the number of characters of the code read.

- Unit: Number of Characters (in bytes)
- Range: 0 to 999

Point
- [Read Data Length] in [Read Data Settings] is the subject of the number of characters.
- Half-width characters such as alphanumeric characters are treated as one byte per character, and full-width characters such as Kanji (Chinese characters) and Kana (Japanese syllabary characters) are treated as two bytes (character code: Shift_JIS) or three to four bytes (character code: UTF-8) per character.

Position X/Position Y

Set the tolerance for the coordinates of the code's detected position.

- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Detected Angle

Set the tolerance for the code tilt angle.

- Unit: Angle
- Range: -180.000 to 180.000

Point The detected angle is the difference angle from the [Starting Angle] in [Detection Parameters].

Quality Verification

Overall Symbol Grade

Set the tolerance for the overall grade of the print quality set for [Options] - [Overall Symbol Grade] under the [Detection] tab.

- The overall grade is the lowest value among the selected items.
- Each print quality item can be output from the data output tool as numerical data on a scale of 0 to 4 (-1 is output if no assessment has been performed).
- Unit: Number
- Range: 0 to 4

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set the display methods for things such as the inspection and mask regions. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Inspection Region

Select whether or not to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether or not to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Detected Position

Select whether or not to display the detected position of the 2D code.

- **ON** (default): Displays the detected position. Set the shape (Cross and Cross with Arrow), size (4 to 1024), line thickness, and color for the detection point (center of the code) and region of the detected code.
- **OFF**: Does not display the detected position.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The detected position setting is applied for the display color.

Display Read Data

Display Read Data Length

Display Position X

Display Position Y

Display Detected Angle

Display Overall Symbol Grade

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all results.

Reset

Restores the display options to their default settings.

When codes cannot be read correctly

If the code cannot be tuned or read, check for the issues listed herein.

Code resolution is low

As a guideline, capture as large an image of the code as possible so that 1 cell size (pixels) is 4 pixels or more, or use a high-pixel camera.

Code contrast is low

Try using Contrast Conversion or another image enhancement filter of [Image Enhance] to improve the contrast. If [Grayscale] is selected for [Color Extraction] with a color camera, using [RGB Grayscale] may improve the contrast.

Code is out of focus

Check the lens focus adjustment and shutter speed.

Printing of the code itself is either distorted or there is deviation/collapse of the cell

Check the state of the code.

Gaps between cells or holes in cells

Try a combination of Expand and Shrink or other image enhancement filters of [Image Enhance] to process the connecting and filling of holes between cells.

Small quiet zone (less than 2 cells)

Check that there is sufficient blank space (at least a space equivalent to the size of 2 cells) around the code within the inspection region. If the position of the code shifts to the edge of the inspection region, consider using Position Adjustment.

Measurements & Dimensions

Measurements and dimensions tools are used to measure distances and angles between the detection results of other tools, and to detect lines, circles, to the line and points from detection results. Measurements and dimensions tools include the dedicated tools shown below.

List of measurement and detection items

Measurement and detection items	Overview of functions
Measuring distance	
Points Distance	Specify two points (point 1 and point 2) and then measure the distance between the two points, the distance in the X-direction, and the distance in the Y-direction.
Point/Line Distance	Specify a point and a line, and then measure the distance between the point and the foot of a perpendicular line down from the point to the line (length of the perpendicular line), the distance in the X-direction, and the distance in the Y-direction.
Lines Distance	Specify two lines (line 1 and line 2), and then measure the length of a perpendicular line drawn from the midpoint of line 1 down to line 2.
Point/Circle Distance	Specify a point and a circle, and then measure the distance from the point to the center of the circle, the distance in the X-direction, and the distance in the Y-direction.
Line/Circle Distance	Specify a line and a circle, and then measure the distance between the center of the circle and the foot of a perpendicular line down from the center of the circle to the line, the distance in the X-direction, and the distance in the Y-direction.
Circles Distance	Specify two circles (circle 1 and circle 2) and then measure the distance from the center of one circle to the center of the other circle, the distance in the X-direction, and the distance in the Y-direction.
Detecting a line and measuring an angle	
Line Detection	Set the area where edges are detected by drawing a line on the edge area where a line is to be detected, and the line is detected from the edge information of the points that are detected.
Line Passing Two Points	Specify two points (point 1 and point 2) to obtain a line passing through the two points, and then measure the angle the line makes against the horizontal line.
Bisection of Two Lines	Specify two lines (line 1 and line 2), obtain the median (bisector) of the two lines, and then measure the angle that the median makes against the horizontal line.
Angle Formed by Two Lines	Specify two lines (line 1 and line 2) and then measure the angle formed by the two lines.
Detecting a circle	
Circle Detection	Set the area where edges are detected by drawing a ring or arc on the edge area where a circle is to be detected, and the circle is detected from the edge information of the points that are detected.
Detecting points	

Measurement and detection items			Overview of functions
	Obtaining an intersection		
		Line/V-Line Intersection	Specify a point and a line, and then output the intersection coordinate of the line and the perpendicular line down from the point to the line.
		Two Lines Intersection	Specify two lines (line 1 and line 2) and then output the intersection coordinate of the two lines.
	Obtaining the center		
		Center of Quadrangle	Specify four lines (line 1, line 2, line 3, and line 4) and then output the center coordinates of the square formed by the four lines.
		Midpoint of Points	Specify two points (point 1 and point 2) and then output the midpoint coordinates of the two points.

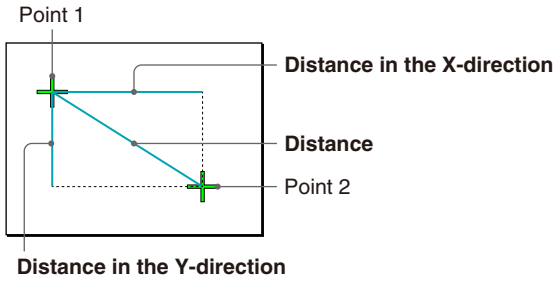
Points Distance

#E030

Specify two points (point 1 and point 2) and then measure the distance between the two points, the distance in the X-direction, and the distance in the Y-direction.

Overview of functions

Image of the Measurement



Reference The distance in the X-direction represents the length of the upper side of the bounding rectangle whose diagonal vertices are points 1 and 2, and the distance in the Y-direction represents the length of the left side.

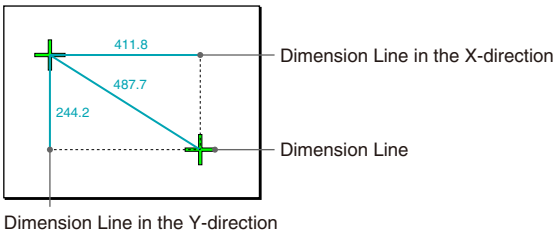
Measurement Results Output

The measurement results output by the [Points Distance] tool are as follows.

Measurement results	Description
Distance	Outputs the distance between two points in pixels.
Distance X	Outputs the distance in the X-direction between two points in pixels.
Distance Y	Outputs the distance in the Y-direction between two points in pixels.
Detected Point 1 (X, Y) /Detected Point 2 (X, Y)	Outputs the position coordinates (X, Y) for the specified detected points (point 1 and point 2) in pixels.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Points Distance] tool, use the [Properties] view. The [Properties] view for the [Points Distance] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Points Distance] tool to a task in the [Task] view displays a navigation dialog box for setting two points. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specifies the two points for which the distance is to be measured. You can also set the other conditions that can be set for the [Points Distance] tool as necessary.
Judgment	Sets the tolerances (upper limit and lower limit) for the measured values.
Display	Sets how detection results and dimension lines are displayed.

Detection

Specifies the two points for which the distance is to be measured. You can also set the other conditions that can be set for the [Points Distance] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Point (1st)/Specify Point (2nd)

Specify the point 1 and point 2 to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for the point 1 and point 2 to be detected. If the detection results of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified detection point are displayed.

Detailed Settings

You can set the other conditions that can be set for the [Points Distance] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Distance

Set the tolerances (upper and lower limits) for the measured distance.
- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance X

Set the tolerances (upper and lower limits) for the measured X-direction distance.
- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance Y

Set the tolerances (upper and lower limits) for the measured Y-direction distance.
- Unit: Pixel Count
- Range: 0.000 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results and dimension lines are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Points

Select whether or not to display the detected points.

- **ON** (default): Displays the detected points. Set the display color and line thickness for the detected points.
- **OFF**: Does not display the detected points.

Dimension Line

Select whether or not to display the dimension line.

- **ON** (default): Displays the dimension line. Set the display color and the line thickness of the dimension line.
- **OFF**: Does not display the dimension line.

X Dimension Line

Select whether or not to display the dimension line in the X-direction.

- **ON** (default): Displays the X dimension line. Set the display color and line thickness of the X dimension line.
- **OFF** : Does not display the X dimension line.

Y Dimension Line

Select whether or not to display the dimension line in the Y-direction.

- **ON** (default): Displays the Y dimension line. Set the display color and line thickness of the Y dimension line.
- **OFF**: Does not display the Y dimension line.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Points] setting is applied for the display color.

Display Distance

Display Distance X

Display Distance Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

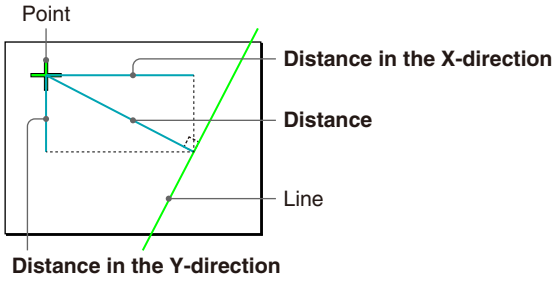
Point/Line Distance

#E031

Specify a point and a line, and then measure the distance between the point and the foot of a perpendicular line down from the point to the line (length of the perpendicular line), the distance in the X-direction, and the distance in the Y-direction.

Overview of functions

Image of the Measurement



Reference The distance in the X-direction represents the length of the upper side of the bounding rectangle whose diagonal vertices are a point and the foot of a perpendicular line drawn from the point down to a line, and the distance in the Y-direction represents the length of the left side.

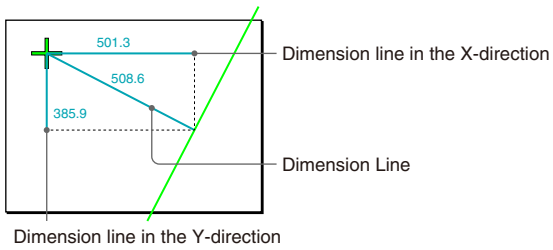
Measurement Results Output

The measurement results output by the [Point/Line Distance] tool are as follows.

Measurement results	Description
Distance	Outputs the distance between a point and foot of a perpendicular line down from the point to the line in pixels.
Distance X	Outputs the distance in the X-direction between a point and foot of a perpendicular line down from the point to the line in pixels.
Distance Y	Outputs the distance in the Y-direction between a point and foot of a perpendicular line down from the point to the line in pixels.
Detected Point (X, Y)	Outputs the position coordinates (X, Y) for the specified detected point in pixels.
Detected Line (Angle, X, Y)	Outputs the position coordinates (X, Y) for the midpoint and angle of the specified detected line.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Point/Line Distance] tool, use the [Properties] view. The [Properties] view for the [Point/Line Distance] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Point/Line Distance] tool to a task in the [Task] view displays a navigation dialog box for setting a point and line. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specifies the point and line for the distance to be measured. You can also set the other conditions that can be set for the [Point/Line Distance] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and dimension lines are displayed.

Detection

Specify the point and line for the distance to be measured. You can also set the other conditions that can be set for the [Point/Line Distance] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Point

Specify a point to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for a point to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified detection point are displayed.

Specify Line

Specify a line to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for a line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified line to be detected are displayed.

Angle

Specify the angle of the line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the angle of the specified detected line is displayed.

Detailed Settings

You can set the other conditions that can be set for the [Point/Line Distance] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Distance

Set the tolerances (upper and lower limits) for the measured distance.
- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance X

Set the tolerances (upper and lower limits) for the measured X-direction distance.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance Y

Set the tolerances (upper and lower limits) for the measured Y-direction distance.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results and dimension lines are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Point, Detected Line

Select whether or not to display the detected point and line.

- **ON** (default): Displays the detected point and line. Set the display color and line thickness for the detected point and line.
- **OFF**: Does not display the detected point and line.

Dimension Line

Select whether or not to display the dimension line.

- **ON** (default): Displays the dimension line. Set the display color and the line thickness of the dimension line.
- **OFF**: Does not display the dimension line.

X Dimension Line

Select whether or not to display the dimension line in the X-direction.

- **ON**: Displays the X dimension line. Set the display color and line thickness of the X dimension line.

- **OFF** (default): Does not display the X dimension line.

Y Dimension Line

Select whether or not to display the dimension line in the Y-direction.

- **ON**: Displays the Y dimension line. Set the display color and line thickness of the Y dimension line.
- **OFF** (default): Does not display the Y dimension line.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Point, Detected Line] setting is applied for the display color.

Display Distance

Display Distance X

Display Distance Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

Lines Distance

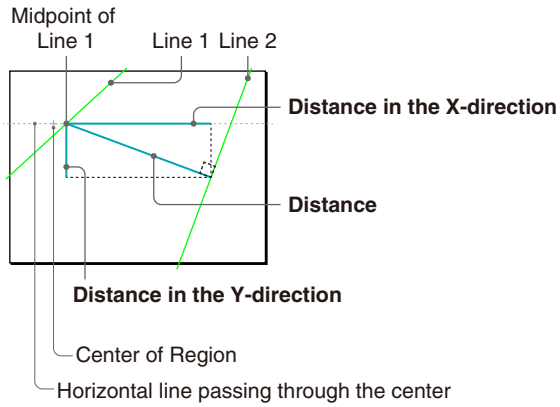
#E032

Specify two lines (line 1 and line 2), and then measure the length of a perpendicular line drawn from the midpoint of line 1 downward to line 2.

Reference "Midpoint of Line 1" refers to the set or referenced X/Y position and angle coordinates.

Overview of functions

Image of the Measurement



Reference The distance in the X-direction represents the length of the upper side of the bounding rectangle whose diagonal vertices are the midpoint of line 1 and the foot of a perpendicular line drawn from the midpoint down to line 2, and the distance in the Y-direction represents the length of the left side.

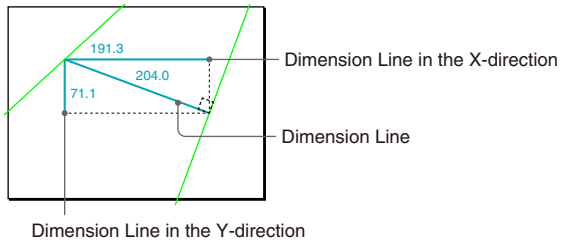
Measurement Results Output

The measurement results output by the [Lines Distance] tool are as follows.

Measurement results	Description
Distance	Outputs the distance between the midpoint of line 1 and foot of a perpendicular line down from the midpoint to line 2 in pixels.
Distance X	Outputs the distance in the X-direction between the midpoint of line 1 and foot of a perpendicular line down from the midpoint to line 2 in pixels.
Distance Y	Outputs the distance in the Y-direction between the midpoint of line 1 and foot of a perpendicular line down from the midpoint to line 2 in pixels.
Detected line 1 (angle, X, Y)/ Detected line 2 (angle, X, Y)	Outputs the position coordinates (X, Y) for the midpoint of each line and angle of the specified detected line (line 1 and line 2).
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Lines Distance] tool, use the [Properties] view. The [Properties] view for the [Lines Distance] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Lines Distance] tool to a task in the [Task] view displays a navigation dialog box for setting two lines. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specify the two lines for which the distance is to be measured. You can also set the other conditions that can be set for the [Lines Distance] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and dimension lines are displayed.

Detection

Specify two lines. You can also set the other conditions that can be set for the [Lines Distance] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Line (1st)/Specify Line (2nd)

Specify a line to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for the line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified line is displayed.

Angle

Specify the angle of the line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the angle of the specified detected line is displayed.

Detailed Settings

You can set the other conditions that can be set for the [Lines Distance] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Distance

Set the tolerances (upper and lower limits) for the measured distance.
- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance X

Set the tolerances (upper and lower limits) for the measured X-direction distance.
- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance Y

Set the tolerances (upper and lower limits) for the measured Y-direction distance.
- Unit: Pixel Count

- Range: 0.000 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

> **Point** The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results and dimension lines are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Line

Select whether or not to display the detected line.

- **ON** (default): Displays the detected line. Set the display color and line thickness for the detected line.
- **OFF**: Does not display the detected line.

Dimension Line

Select whether or not to display the dimension line.

- **ON** (default): Displays the dimension line. Set the display color and the line thickness of the dimension line.
- **OFF**: Does not display the dimension line.

X Dimension Line

Select whether or not to display the dimension line in the X-direction.

- **ON**: Displays the X dimension line. Set the display color and line thickness of the X dimension line.
- **OFF** (default): Does not display the X dimension line.

Y Dimension Line

Select whether or not to display the dimension line in the Y-direction.

- **ON**: Displays the Y dimension line. Set the display color and line thickness of the Y dimension line.

- **OFF** (default): Does not display the Y dimension line.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Line] setting is applied for the display color.

Display Distance

Display Distance X

Display Distance Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

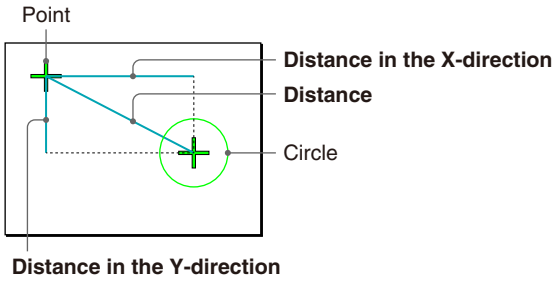
Point/Circle Distance

#E033

Specify a point and a circle, and then measure the distance from the point to the center of the circle, the distance in the X-direction, and the distance in the Y-direction.

Overview of functions

Image of the Measurement



Reference The distance in the X-direction represents the length of the upper side of the bounding rectangle whose diagonal vertices are a point and the center of a circle, and the distance in the Y-direction represents the length of the left side.

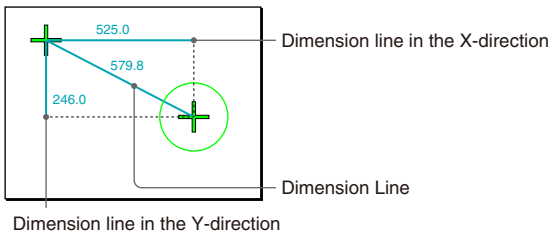
Measurement Results Output

The measurement results output by the [Point/Circle Distance] tool are as follows.

Measurement results	Description
Distance	Outputs the distance between a point and the center of a circle in pixels.
Distance X	Outputs the distance in the X-direction between a point and the center of a circle in pixels.
Distance Y	Outputs the distance in the Y-direction between a point and the center of a circle in pixels.
Detected Point (X, Y)	Outputs the position coordinates (X, Y) for the specified detection points in pixels.
Detected Circle (Center X, Center Y, Radius, Diameter)	Outputs the radius and diameter of a circle, and the position coordinates (X, Y) for the midpoint of the specified detected circle.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Point/Circle Distance] tool, use the [Properties] view. The [Properties] view for the [Point/Circle Distance] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Point/Circle Distance] tool to a task in the [Task] view displays a navigation dialog box for setting a point and circle. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specify the point and circle for the distance to be measured. You can also set the other conditions that can be set for the [Point/Circle Distance] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and dimension lines are displayed.

Detection

Specify the point and circle for the distance to be measured. You can also set the other conditions that can be set for the [Point/Circle Distance] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Point

Specify a point to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for a point to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified detection point are displayed.

Specify Circle

Specify a circle to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Center X/Center Y

Specify the positional coordinates for the center of a circle to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the center of the specified detection circle are displayed.

Radius

Specify the radius of a circle to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the radius of the specified circle to be detected is displayed.

Detailed Settings

You can set the other conditions that can be set for the [Point/Circle Distance] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Distance

Set the tolerances (upper and lower limits) for the measured distance.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance X

Set the tolerances (upper and lower limits) for the measured X-direction distance.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance Y

Set the tolerances (upper and lower limits) for the measured Y-direction distance.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results and dimension lines are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Point, Detected Circle

Select whether or not to display the detected point and circle.

- **ON** (default): Displays the detected point and circle. Set the display color and line thickness for the detected point and circle.
- **OFF**: Does not display the detected point and circle.

Dimension Line

Select whether or not to display the dimension line.

- **ON** (default): Displays the dimension line. Set the display color and the line thickness of the dimension line.
- **OFF**: Does not display the dimension line.

X Dimension Line

Select whether or not to display the dimension line in the X-direction.

- **ON**: Displays the X dimension line. Set the display color and line thickness of the X dimension line.
- **OFF** (default): Does not display the X dimension line.

Y Dimension Line

Select whether or not to display the dimension line in the Y-direction.

- **ON**: Displays the Y dimension line. Set the display color and line thickness of the Y dimension line.
- **OFF** (default): Does not display the Y dimension line.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Point, Detected Circle] setting is applied for the display color.

Display Distance

Display Distance X

Display Distance Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

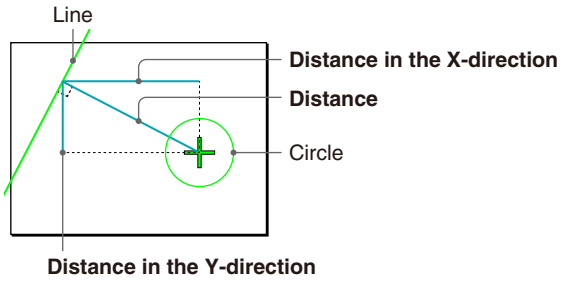
Line/Circle Distance

#E034

Specify a line and a circle, and then measure the distance between the center of the circle and the foot of a perpendicular line down from the center of the circle to the line, the distance in the X-direction, and the distance in the Y-direction.

Overview of functions

Image of the Measurement



Reference The distance in the X-direction represents the length of the upper side of the bounding rectangle whose diagonal vertices are the center of a circle and the foot of a perpendicular line drawn from the center of the circle down to the line, and the distance in the Y-direction represents the length of the left side.

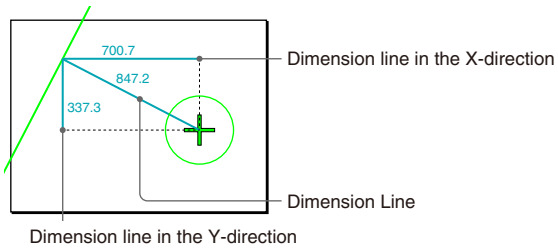
Measurement Results Output

The measurement results output by the [Line/Circle Distance] tool are as follows.

Measurement results	Description
Distance	Outputs the distance between the center of a circle and foot of a perpendicular line down from the center of the circle to a line in pixels.
Distance X	Outputs the distance in the X-direction between the center of a circle and foot of a perpendicular line down from the center of the circle to a line in pixels.
Distance Y	Outputs the distance in the Y-direction between the center of a circle and foot of a perpendicular line down from the center of the circle to a line in pixels.
Detected Line (Angle, X, Y)	Outputs the position coordinates (X, Y) for the midpoint and angle of the specified detected line.
Detected Circle (Center X, Center Y, Radius, Diameter)	Outputs the radius and diameter of a circle, and the position coordinates (X, Y) for the midpoint of the specified detected circle.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Line/Circle Distance] tool, use the [Properties] view. The [Properties] view for the [Line/Circle Distance] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Line/Circle Distance] tool to a task in the [Task] view displays a navigation dialog box for setting a line and circle. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specify the line and circle for the distance to be measured. You can also set the other conditions that can be set for the [Line/Circle Distance] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and dimension lines are displayed.

Detection

Specify the line and circle for the distance to be measured. You can also set the other conditions that can be set for the [Line/Circle Distance] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Line

Specify a line to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for a line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified line are displayed.

Angle

Specify the angle of the line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the angle of the specified detected line is displayed.

Specify Circle

Specify a circle to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Center X/Center Y

Specify the positional coordinates for the center of a circle to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the center of the specified detection circle are displayed.

Radius

Specify the radius of a circle to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the radius of the specified circle to be detected is displayed.

Detailed Settings

You can set the other conditions that can be set for the [Line/Circle Distance] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Distance

Set the tolerances (upper and lower limits) for the measured distance.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance X

Set the tolerances (upper and lower limits) for the measured X-direction distance.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance Y

Set the tolerances (upper and lower limits) for the measured Y-direction distance.

- Unit: Pixel Count
- Range: 0.000 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results and dimension lines are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Line, Detected Circle

Select whether or not to display the detected line and circle.

- **ON** (default): Displays the detected line and circle. Set the display color and line thickness for the detected line and circle.
- **OFF**: Does not display the detected line and circle.

Dimension Line

Select whether or not to display the dimension line.

- **ON** (default): Displays the dimension line. Set the display color and the line thickness of the dimension line.
- **OFF**: Does not display the dimension line.

X Dimension Line

Select whether or not to display the dimension line in the X-direction.

- **ON**: Displays the X dimension line. Set the display color and line thickness of the X dimension line.
- **OFF** (default): Does not display the X dimension line.

Y Dimension Line

Select whether or not to display the dimension line in the Y-direction.

- **ON**: Displays the Y dimension line. Set the display color and line thickness of the Y dimension line.
- **OFF** (default): Does not display the Y dimension line.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Line, Detected Circle] setting is applied for the display color.

Display Distance

Display Distance X

Display Distance Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

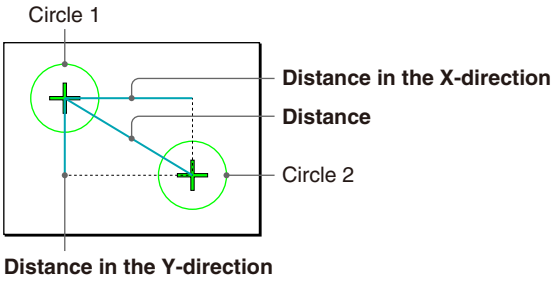
Circles Distance

#E035

Specify two circles (circle 1 and circle 2) and then measure the distance from the center of one circle to the center of the other circle, the distance in the X-direction, and the distance in the Y-direction.

Overview of functions

Image of the Measurement



Reference The X-direction distance represents the length of the upper side of the bounding rectangle whose diagonal vertices are the centers of two circles, and the Y-direction distance represents the length of the left side.

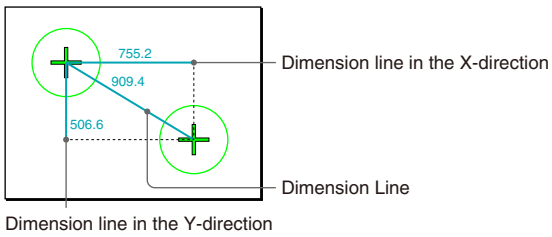
Measurement Results Output

The measurement results output by the [Circles Distance] tool are as follows.

Measurement results	Description
Distance	Outputs the distance between the centers of two circles in pixels.
Distance X	Outputs the distance in the X-direction between the centers of two circles in pixels.
Distance Y	Outputs the distance in the Y-direction between the centers of two circles in pixels.
Detected Circle 1 (Center X, Center Y, Radius, Diameter)/ Detected Circle 2 (Center X, Center Y, Radius, Diameter)	Outputs the radius and diameter of a circle, and the position coordinates (X, Y) for the centers of the specified detected circles (circle 1 and circle 2).
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Circles Distance] tool, use the [Properties] view. The [Properties] view for the [Circles Distance] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Circles Distance] tool to a task in the [Task] view displays a navigation dialog box for setting two circles. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specifies the two circles for which the distance is to be measured. You can also set the other conditions that can be set for the [Circles Distance] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and dimension lines are displayed.

Detection

Specifies the two circles for which the distance is to be measured. You can also set the other conditions that can be set for the [Circles Distance] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Circle (1st)/Specify Circle (2nd)

Specify circle 1 and circle 2 to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Center X/Center Y

Specify the positional coordinates for the centers of circle 1 and circle 2 to be detected. If the detection results of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the center of the specified detection circle are displayed.

Radius

Specify the radius of a circle to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the radius of the specified circle to be detected is displayed.

Detailed Settings

You can set the other conditions that can be set for the [Circles Distance] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Distance

Set the tolerances (upper and lower limits) for the measured distance.
- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance X

Set the tolerances (upper and lower limits) for the measured X-direction distance.
- Unit: Pixel Count
- Range: 0.000 to 99999.999

Distance Y

Set the tolerances (upper and lower limits) for the measured Y-direction distance.
- Unit: Pixel Count
- Range: 0.000 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results and dimension lines are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Circle

Select whether or not to display the detected circle.

- **ON** (default): Displays the detected circle. Set the display color and line thickness for the detected circle.
- **OFF**: Does not display the detected circle.

Dimension Line

Select whether or not to display the dimension line.

- **ON** (default): Displays the dimension line. Set the display color and the line thickness of the dimension line.
- **OFF**: Does not display the dimension line.

X Dimension Line

Select whether or not to display the dimension line in the X-direction.

- **ON**: Displays the X dimension line. Set the display color and line thickness of the X dimension line.
- **OFF** (default): Does not display the X dimension line.

Y Dimension Line

Select whether or not to display the dimension line in the Y-direction.

- **ON**: Displays the Y dimension line. Set the display color and line thickness of the Y dimension line.
- **OFF** (default): Does not display the Y dimension line.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Circle] setting is applied for the display color.

Display Distance

Display Distance X

Display Distance Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

Line Detection

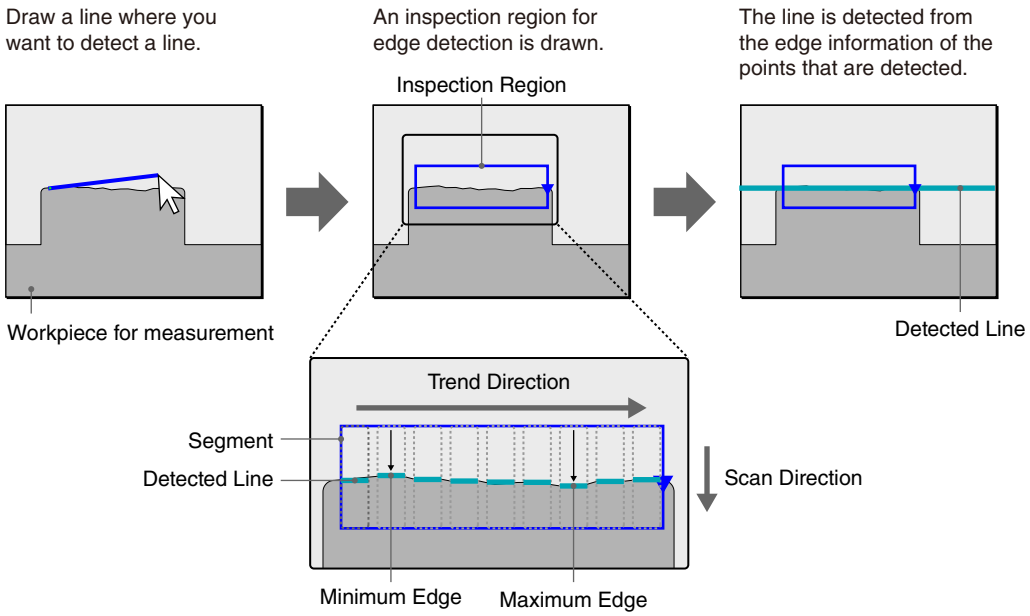
#E036

Set the edge detection area by drawing a line on the edge part where you want to detect the line, and detect a line from the detected multi-point edge information.

Point The [Line Detection] tool is based on the functionality of the [Profile Position] tool.

Overview of functions

Image of the Measurement



Measurement Results Output

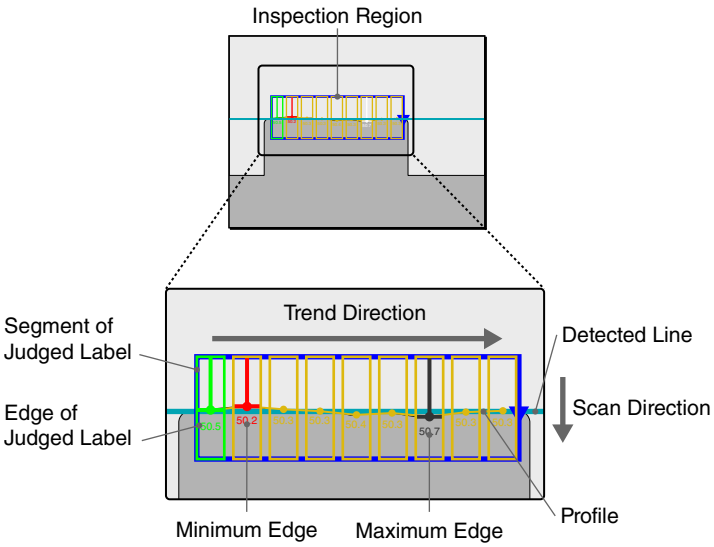
The measurement results output by the [Line Detection] tool are as follows.

Measurement results	Description
Number of Segments	Outputs the set number of segments.
Number of Detected Segments	Outputs the number of segments that were actually measured.
Detected Line Angle	Outputs the angle of the detected line (-180.000° to 180.000°).
Detected Line Center X	Outputs the X-coordinate of the midpoint on the detected line in pixels.
Detected Line Center Y	Outputs the Y-coordinate of the midpoint on the detected line in pixels.
Maximum Distance	Outputs the distance of the maximum edge position segment from the measurement start position in pixels.
Minimum Distance	Outputs the distance of the minimum edge position segment from the measurement start position in pixels.

Measurement results	Description
Judged Label [] (Distance)	Outputs the distance from the measurement start position of the segment specified as the judged label in pixels.
Label [] (Distance)	Outputs the distance of each segment from the measurement start position in pixels by label.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Line Detection] tool, use the [Properties] view. The [Properties] view for the [Line Detection] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Line Detection] tool to a task in the [Task] view displays a navigation dialog box for setting a line segment on the edge where the line is to be detected. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Region	Set the range to be used to detect the line. When a line segment is set in the navigation dialog box, the region is automatically set. The shape of the region is fixed as [Rectangle].
Image Enhance	If a color image is used for the current image, the captured color image is converted to a black and white image using any extraction method. Additionally, set the filter processing to apply to the image.
Detection	Set the scan direction, edge direction, detailed conditions for detecting an edge as an edge, and other conditions to detect the edge. You can also set the other conditions that can be set for the Line Detection tool as necessary.

Properties	Settings
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set the display methods for the inspection and mask regions, and the detected edge and edge waveforms.

Point The [Line Detection] tool is based on the functionality of the [Profile Position] tool. For details of the settings for each property, see [Measurement] - [Profile Position].

Line Passing Two Points

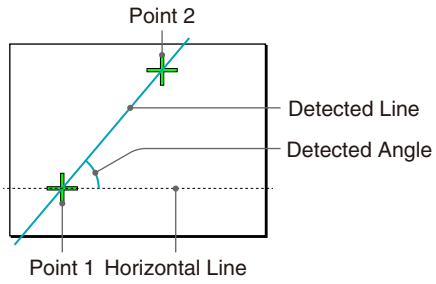
#E037

Specify two points (point 1 and point 2) to obtain a line passing through the two points, and then measure the angle the line makes against the horizontal line.

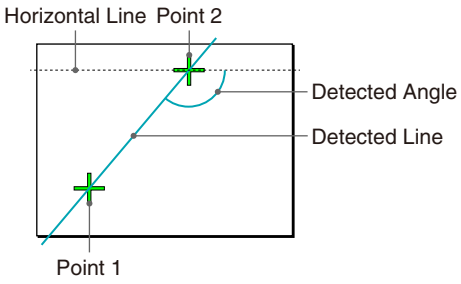
Overview of functions

Image of the Measurement

When [Measurement Target] is [Angle 1]



When [Measurement Target] is [Angle 2]



Reference
- [Angle 1]: Measures the angle from the horizontal line passing through point 1 to the line from point 1 to point 2.
- [Angle 2]: Measures the angle from the horizontal line passing through point 2 to the line from point 2 to point 1.

Measurement Results Output

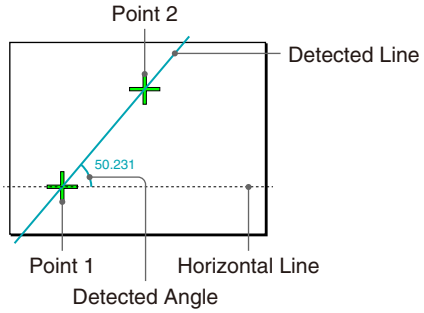
The measurement results output by the [Line Passing Two Points] tool are as follows.

Measurement results	Description
Detected Line Angle	Outputs the angle (-180.000° to 180.000°) of the line passing through the two specified detection points from the horizontal line.
Detected point 1 (X, Y) /Detected circle 2 (X, Y)	Outputs the position coordinates (X, Y) for the specified detected points (point 1 and point 2) in pixels.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

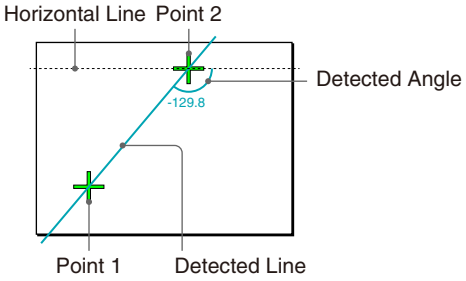
Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

When [Measurement Target] is [Angle 1]



When [Measurement Target] is [Angle 2]



Properties

When setting the [Line Passing Two Points] tool, use the [Properties] view. The [Properties] view for the [Line Passing Two Points] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Line Passing Two Points] tool to a task in the [Task] view displays a navigation dialog box for setting two points. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specify two points for detecting a line and select the angle to be measured. You can also set the other conditions that can be set for the [Line Passing Two Points] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and dimension lines are displayed.

Detection

Specify two points for detecting a line and select the type of angle to be measured. You can also set the other conditions that can be set for the [Line Passing Two Points] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Point (1st)/Specify Point (2nd)

Specify point 1 and point 2 to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

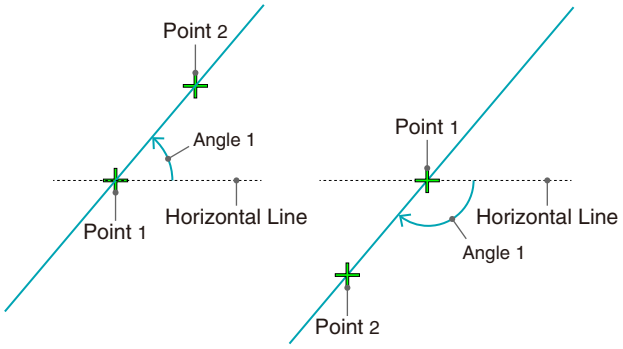
Specify the positional coordinates for point 1 and point 2 to be detected. If the detection results of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified detection point are displayed.

Measurement Target

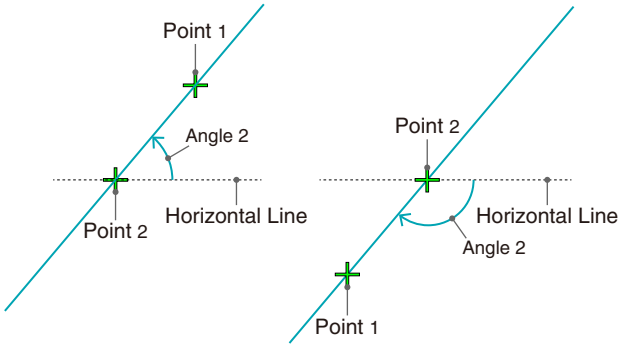
Angle

Select the type of angle to be measured.

- **Angle 1: Point 1 to Point 2:**Measures the angle from the horizontal line passing through point 1 to the line passing from point 1 to point 2.



- **Angle 2: Point 2 to Point 1:**Measures the angle from the horizontal line passing through point 2 to the line passing from point 2 to point 1.



Detailed Settings

You can set the other conditions that can be set for the [Line Passing Two Points] tool as necessary.

Reference For details, see “Tool Common Setting Items” - Detailed Settings.

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Detected Line Angle

Set the tolerances (upper and lower limits) for the angle of the detected line from the horizontal line.
- Unit: Angle
- Range: -180.000 to 180.000

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results and dimension lines are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Points

Select whether or not to display the detected points.
- **ON** (default): Displays the detected points. Set the display color and line thickness for the detected points.
- **OFF**: Does not display the detected points.

Dimension Line

Select whether or not to display the dimension line.
- **ON** (default): Displays the dimension line. Set the display color and the line thickness of the dimension line.
- **OFF**: Does not display the dimension line.

Auxiliary Line

Select whether or not to display the auxiliary line (angle arc).
- **ON** (default): Displays the auxiliary line. Set the display color and the line thickness of the auxiliary line.

- **OFF** : Does not display the auxiliary line.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Points] setting is applied for the display color.

Display Detected Line Angle

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

Bisection of Two Lines

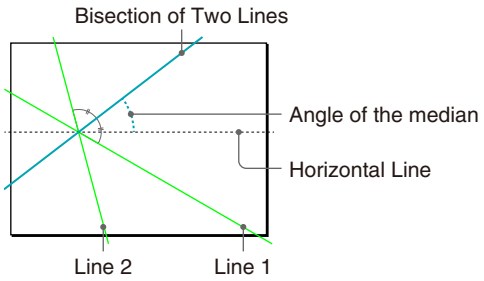
#E038

Specify two lines (line 1 and line 2), obtain the median (bisector of the angle formed by the two lines) that passes through the intersection of the two lines, and then measure the angle that the median makes against the horizontal line.

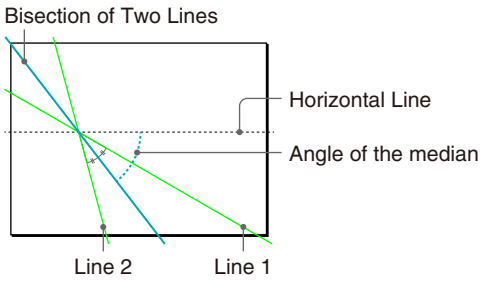
Overview of functions

Image of the Measurement

When [Measurement Target] is [Median 1]



When [Measurement Target] is [Median 2]



Reference
- [Median 1]: Obtain the bisector of the angle from line 1 anti-clockwise to line 2.
- [Median 2]: Obtain the bisector of the angle from line 1 clockwise to line 2.
- The angle of the median is the angle that both [Median 1] and [Median 2] form with the horizontal line.

Measurement Results Output

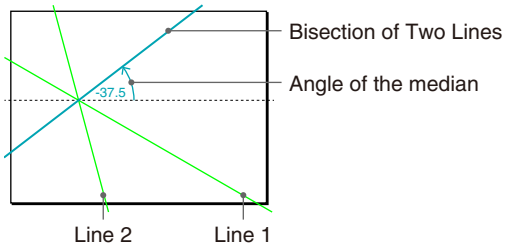
The measurement results output by the [Bisection of Two Lines] tool are as follows.

Measurement results	Description
Median (Angle, X, Y)	Outputs the position coordinates (X, Y) of the detected median and its angle (-90.000° to 90.000°) from the horizontal line.
Detected line 1 (angle, X, Y)/ Detected line 2 (angle, X, Y)	Outputs the position coordinates (X, Y) for the midpoints of each line and angle of the specified detected line (line 1 and line 2).
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

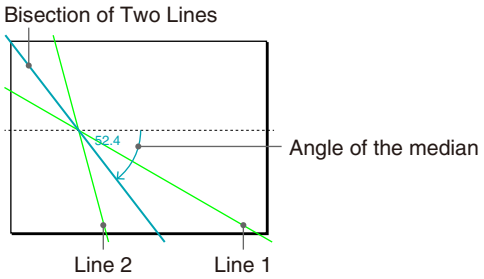
Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

When [Measurement Target] is [Median 1]



When [Measurement Target] is [Median 2]



Properties

When setting the [Bisection of Two Lines] tool, use the [Properties] view. The [Properties] view for the [Bisection of Two Lines] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Bisection of Two Lines] tool to a task in the [Task] view displays a navigation dialog box for setting two lines. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specify two lines for detecting the median and select the median angle to be measured. You can also set the other conditions that can be set for the [Bisection of Two Lines] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how the detection results and median are displayed.

Detection

Specify two lines for detecting the median and select the type of median to be measured. You can also set the other conditions that can be set for the [Bisection of Two Lines] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Line (1st)/Specify Line (2nd)

Specify a line to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for a line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified line are displayed.

Angle

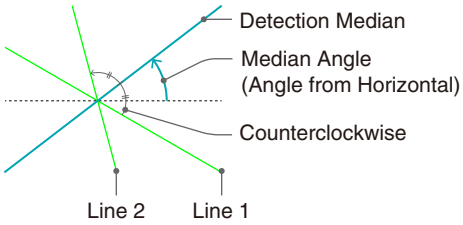
Specify the angle of the line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the angle of the specified detected line is displayed.

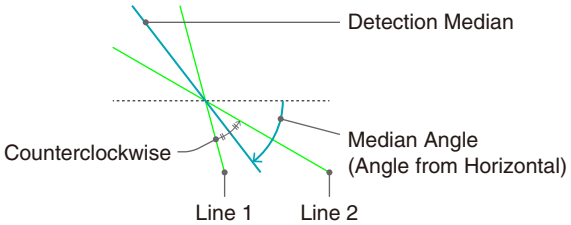
Measurement Target

Median

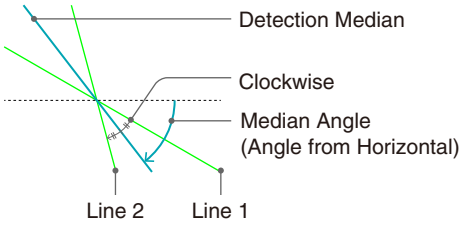
Select the type of median to be measured.

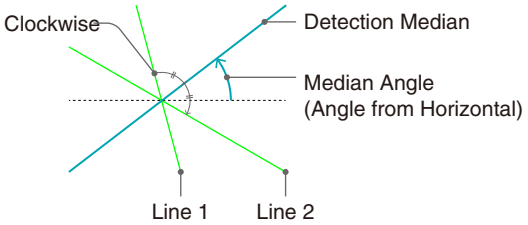
- **Median 1**: Obtain the bisector of the angle from line 1 anti-clockwise to line 2.





- **Median 2**: Obtain the bisector of the angle from line 1 clockwise to line 2.





Detailed Settings

You can set the other conditions that can be set for the [Bisection of Two Lines] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point

- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Median Angle

Set the tolerances (upper and lower limits) for the detected median angle.

- Unit: Angle
- Range: -90.000 to 90.000

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how the detection results and median are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Line

Select whether or not to display the detected line.

- **ON** (default): Displays the detected line. Set the display color and line thickness for the detected line.
- **OFF**: Does not display the detected line.

Median

Select whether or not to display the median.

- **ON** (default): Displays the median. Set the display color and line thickness for the median.
- **OFF**: Does not display the median.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Line] setting is applied for the display color.

Display Bisector Angle

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

Angle Formed by Two Lines

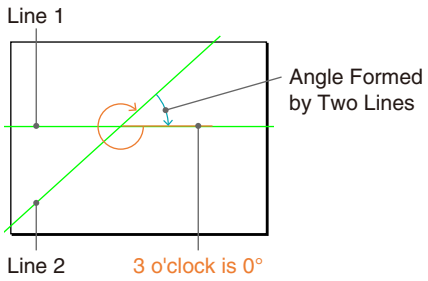
#E039

Specify two lines (line 1 and line 2) and then measure the angle formed by the two lines.

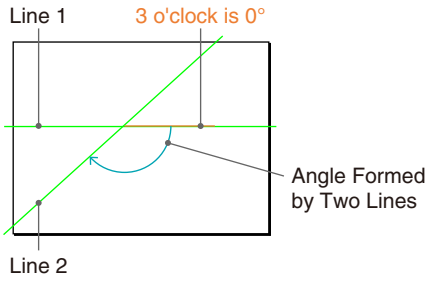
Overview of functions

Image of the Measurement

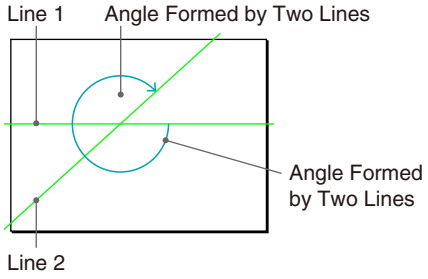
When [Measurement Target] is [Angle 1]



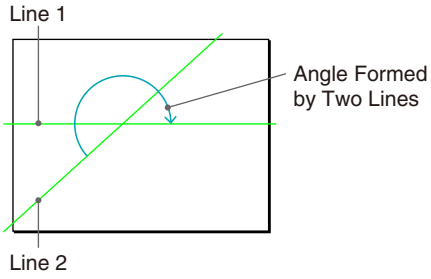
When [Measurement Target] is [Angle 2]



When [Measurement Target] is [Angle 3]



When [Measurement Target] is [Angle 4]



Reference
- [Angle 1]: Measures the angle from line 2 clockwise to line 1.
- [Angle 2]: Measures the angle from line 1 clockwise to line 2.
- [Angle 3]: Measures the angle from 360° minus angle 1.
- [Angle 4]: Measures the angle from 360° minus angle 2.
- If you select [Angle 1] or [Angle 2], measurements will be taken with 3 o'clock as 0°.

Measurement Results Output

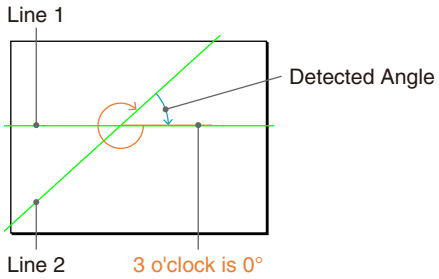
The measurement results output by the [Angle Formed by Two Lines] tool are as follows.

Measurement results	Description
Angle	Outputs the angle (0.000° to 360.000°) formed by the two specified detected lines.
Detected line 1 (angle, X, Y)/ Detected line 2 (angle, X, Y)	Outputs the position coordinates (X, Y) for the midpoints of each line and angle of the specified detected line (line 1 and line 2).
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

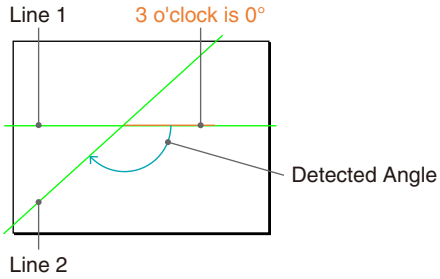
Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example

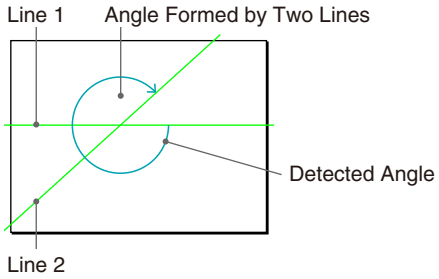
When [Measurement Target] is [Angle 1]



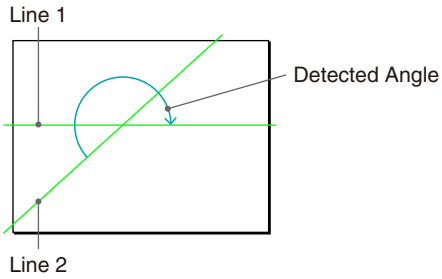
When [Measurement Target] is [Angle 2]



When [Measurement Target] is [Angle 3]



When [Measurement Target] is [Angle 4]



Properties

When setting the [Angle Formed by Two Lines] tool, use the [Properties] view. The [Properties] view for the [Angle Formed by Two Lines] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Angle Formed by Two Lines] tool to a task in the [Task] view displays a navigation dialog box for setting two lines. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specify two lines and select the angle to be measured. You can also set the other conditions that can be set for the [Angle Formed by Two Lines] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and the angle auxiliary line are displayed.

Detection

Specify two lines and select the type of angle to be measured. You can also set the other conditions that can be set for the [Angle Formed by Two Lines] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Line (1st)/Specify Line (2nd)

Specify a line to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for a line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified line are displayed.

Angle

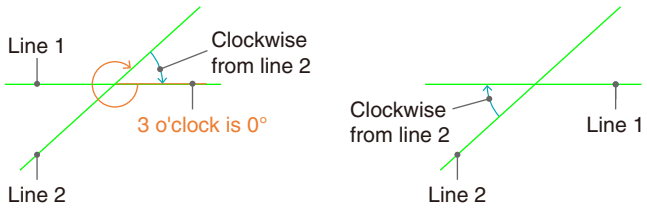
Specify the angle of the line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the angle of the specified detected line is displayed.

Measurement Target

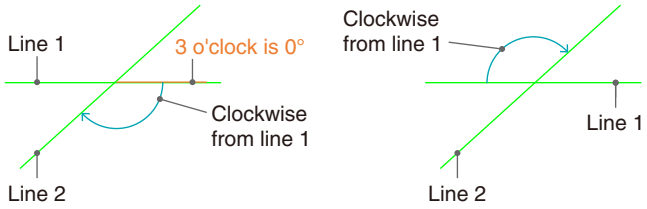
Angle

Select the type of angle to be measured. Regardless of which of [Angle 1] through to [Angle 4] is selected, the angle on the side where the region in which line 1 is detected is set is measured.

- **Angle 1: Line 2 to Line 1 (Clockwise)**: Measures the angle from line 2 clockwise to line 1.

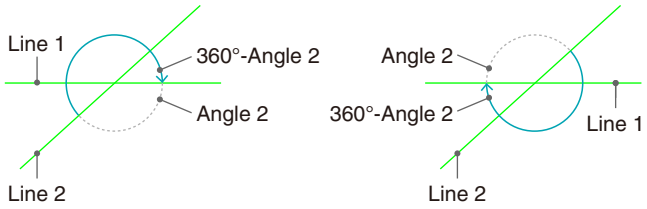


- **Angle 2: Line 1 to Line 2 (Clockwise)**: Measures the angle from line 1 clockwise to line 2.



- **Angle 3: 360° – Angle 1**: Measures the angle from 360° minus angle 1.

- **Angle 4: 360° – Angle 2**: Measures the angle from 360° minus angle 2.



Inverse Target

When this check box is selected, the target is inverted and the opposite angle is measured.

Detailed Settings

You can set the other conditions that can be set for the [Angle Formed by Two Lines] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Angle

Set the tolerances (upper and lower limits) for the detected angle.
- Unit: Angle
- Range: 0.000 to 360.000

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results and the angle auxiliary line are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Line

Select whether or not to display the detected line.

- **ON** (default): Displays the detected line. Set the display color and line thickness for the detected line.
- **OFF**: Does not display the detected line.

Angle Auxiliary Line

Select whether or not to display the angle auxiliary line.

- **ON** (default): Displays the angle auxiliary line. Set the display color and the line thickness of the angle auxiliary line.
- **OFF**: Does not display the angle auxiliary line.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Line] setting is applied for the display color.

Display Angle

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

Circle Detection

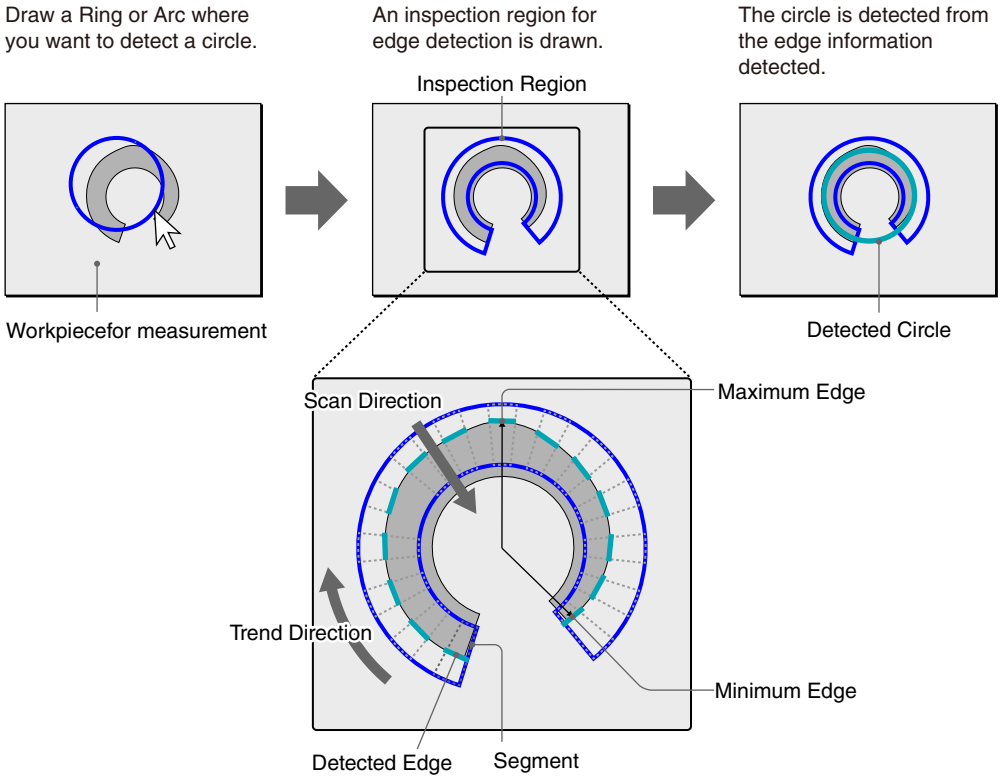
#E040

Set the area where edges are detected by drawing a ring or arc on the edge area where a circle is to be detected, and the circle is detected from the edge information of the points that are detected.

Point The [Circle Detection] tool is based on the functionality of the [Profile Position] tool.

Overview of functions

Image of the Measurement



Measurement Results Output

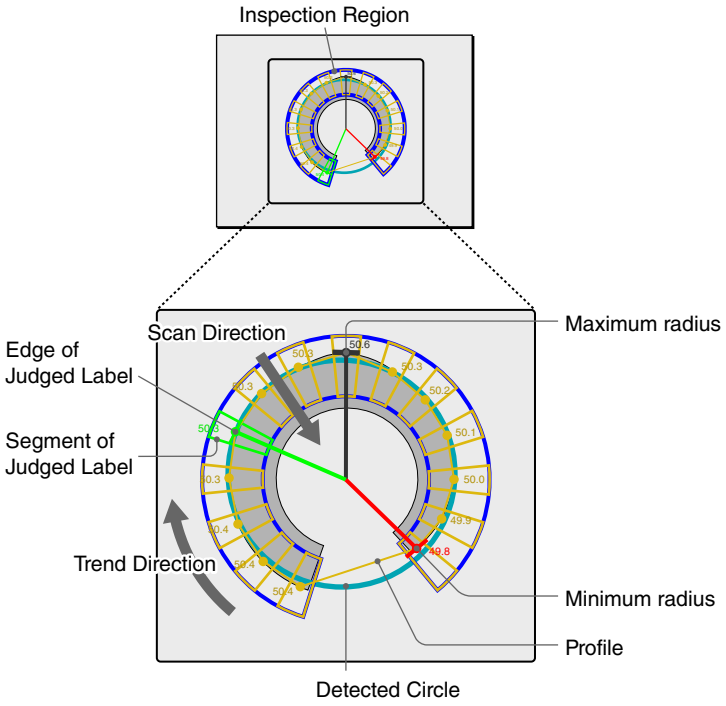
The measurement results output by the [Circle Detection] tool are as follows.

Measurement results	Description
Number of Segments	Outputs the set number of segments.
Number of Detected Segments	Outputs the number of segments that were actually measured.
Detected Circle Center X	Outputs the X-coordinate for the center of the detected circle in pixels.
Detected Circle Center Y	Outputs the Y-coordinate for the center of the detected circle in pixels.

Measurement results	Description
Detected Circle Radius	Outputs the radius of the detected circle.
Detected Circle Diameter	Outputs the diameter of the detected circle.
Maximum Radius	Outputs the radius of the maximum radius segment in pixels.
Minimum Radius	Outputs the radius of the minimum radius segment in pixels.
Judged Label [] (Radius)	Outputs the radius of the segment specified as the judged label in pixels.
Label [] (Radius)	Outputs the radius of each segment by label in pixels.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Circle Detection] tool, use the [Properties] view. The [Properties] view for the [Circle Detection] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Circle Detection] tool to a task in the [Task] view displays a navigation dialog box for setting a ring or arc on the edge where a circle is to be detected. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Region	Set the range to be used to detect the circle. When a ring or arc is set in the navigation dialog box, the region is automatically set. The shape of the region is fixed as [Ring] or [Arc].
Image Enhance	If a color image is used for the current image, the captured color image is converted to a black and white image using any extraction method. Additionally, set the filter processing to apply to the image.
Detection	Set the scan direction, edge direction, detailed conditions for detecting an edge as an edge, and other conditions to detect the edge. You can also set the other conditions that can be set for the Circle Detection tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set the display methods for the inspection and mask regions, and the detected edge and edge waveforms.

Point The [Circle Detection] tool is based on the functionality of the [Profile Position] tool. For details of the settings for each property, see [Measurement] - [Profile Position].

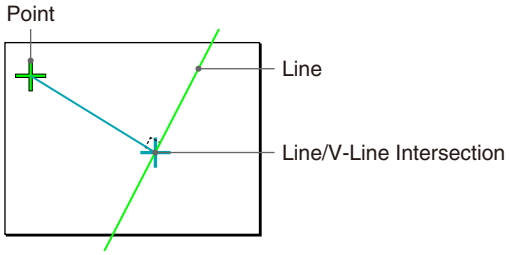
Line/V-Line Intersection

#E041

Specify a point and a line, and then output the intersection coordinate of the line and the perpendicular line down from the point to the line.

Overview of functions

Image of the Measurement



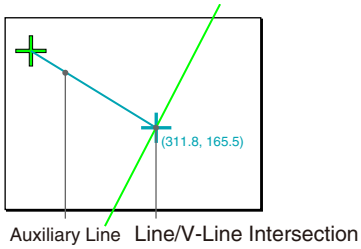
Measurement Results Output

The measurement results output by the [Line/V-Line Intersection] tool are as follows.

Measurement results	Description
Intersection X	Outputs the X-coordinate of the intersection of a line and perpendicular line in pixels.
Intersection Y	Outputs the Y-coordinate of the intersection of a line and perpendicular line in pixels.
Detected Line (Angle, X, Y)	Outputs the position coordinates (X, Y) for the midpoint and angle of the specified detected line.
Detected Point (X, Y)	Outputs the position coordinates (X, Y) for the specified detected point in pixels.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Line/V-Line Intersection] tool, use the [Properties] view. The [Properties] view for the [Line/V-Line Intersection] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Line/V-Line Intersection] tool to a task in the [Task] view displays a navigation dialog box for setting a line and point. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specify the line and point for the intersection of the line and perpendicular line to be measured. You can also set the other conditions that can be set for the [Line/V-Line Intersection] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and the auxiliary line are displayed.

Detection

Specify the line and point for the intersection of the line and perpendicular line to be measured. You can also set the other conditions that can be set for the [Line/V-Line Intersection] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Line

Specify a line to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for a line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified line to be detected are displayed.

Angle

Specify the angle of the line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the angle of the specified detected line is displayed.

Specify Point

Specify a point to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for a point to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified detection point are displayed.

Detailed Settings

You can set the other conditions that can be set for the [Line/V-Line Intersection] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Intersection X

Set the tolerances (upper and lower limits) for the X coordinate of the measured intersection.
- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Intersection Y

Set the tolerances (upper and lower limits) for the Y coordinate of the measured intersection.
- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results and the auxiliary line are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Line, Detected Point

Select whether or not to display the detected line and point.

- **ON** (default): Displays the detected line and point. Set the display color and line thickness for the detected line and point.
- **OFF**: Does not display the detected line and point.

Auxiliary Line

Select whether or not to display the auxiliary line.

- **ON** (default): Displays the auxiliary line. Set the display color and the line thickness of the auxiliary line.
- **OFF**: Does not display the auxiliary line.

Intersection

Select whether or not to display the intersection.

- **ON** (default): Displays the intersection. Set the display color and line thickness for the intersection.
- **OFF**: Does not display the intersection.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Line, Detected Point] setting is applied for the display color.

Display Intersection X

Display Intersection Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

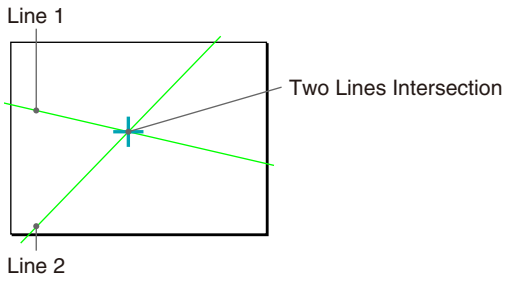
Two Lines Intersection

#E042

Specify two lines (line 1 and line 2) and then output the intersection coordinate of the two lines.

Overview of functions

Image of the Measurement



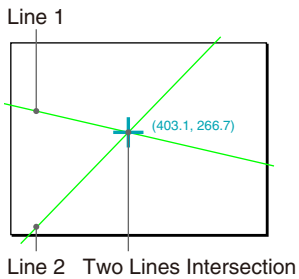
Measurement Results Output

The measurement results output by the [Two Lines Intersection] tool are as follows.

Measurement results	Description
Intersection X	Outputs the X-coordinate of the intersection of two lines in pixels.
Intersection Y	Outputs the Y-coordinate of the intersection of two lines in pixels.
Detected line 1 (angle, X, Y)/ Detected line 2 (angle, X, Y)	Outputs the position coordinates (X, Y) for the midpoints of each line and angle of the specified detected line (line 1 and line 2).
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Two Lines Intersection] tool, use the [Properties] view. The [Properties] view for the [Two Lines Intersection] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Two Lines Intersection] tool to a task in the [Task] view displays a navigation dialog box for setting two lines. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specify two lines to measure the intersection of those lines. You can also set the other conditions that can be set for the [Two Lines Intersection] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and the intersection are displayed.

Detection

Specify two lines to measure the intersection of those lines. You can also set the other conditions that can be set for the [Two Lines Intersection] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Line (1st)/Specify Line (2nd)

Specify a line to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for a line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified line to be detected are displayed.

Angle

Specify the angle of the line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the angle of the specified detected line is displayed.

Detailed Settings

You can set the other conditions that can be set for the [Two Lines Intersection] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Intersection X

Set the tolerances (upper and lower limits) for the X coordinate of the measured intersection.
- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Intersection Y

Set the tolerances (upper and lower limits) for the Y coordinate of the measured intersection.
- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results and the intersection are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Line

Select whether or not to display the detected line.

- **ON** (default): Displays the detected line. Set the display color and line thickness for the detected line.
- **OFF**: Does not display the detected line.

Intersection

Select whether or not to display the intersection.

- **ON** (default): Displays the intersection. Set the display color and line thickness for the intersection.
- **OFF**: Does not display the intersection.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Line] setting is applied for the display color.

Display Intersection X

Display Intersection Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

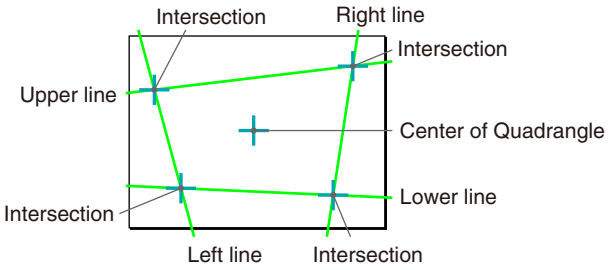
Center of Quadrangle

#E043

Specify four lines (upper, right, lower, left) and then output the center coordinates of the square formed by the four lines.

Overview of functions

Image of the Measurement



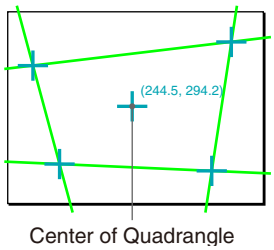
Measurement Results Output

The measurement results output by the [Center of Quadrangle] tool are as follows.

Measurement results	Description
Center X	Outputs the X-coordinate for the center of the quadrangle in pixels.
Center Y	Outputs the Y-coordinate for the center of the quadrangle in pixels.
Detected Line 1 to 4 (Angle, X, Y)	Outputs the position coordinates (X, Y) for the midpoints of each line and angle of the specified detected line (line 1 to 4).
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Center of Quadrangle] tool, use the [Properties] view. The [Properties] view for the [Center of Quadrangle] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Center of Quadrangle] tool to a task in the [Task] view displays a navigation dialog box for setting four lines. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specify four lines to measure the center of the quadrangle. You can also set the other conditions that can be set for the [Center of Quadrangle] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and the intersection are displayed.

Detection

Specify four lines to measure the center of the quadrangle. You can also set the other conditions that can be set for the [Center of Quadrangle] tool as necessary.

Point Upper line, Right line, Lower line, Left line must be selected clockwise or counterclockwise.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Line (Upper)/Specify Line (Right)/Specify Line (Lower)/Specify Line (Left)

Specify a line to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for a line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified line to be detected are displayed.

Angle

Specify the angle of the line to be detected. If the detection result of another tool were specified in the navigation dialog box when adding the tool, the angle of the specified detected line is displayed.

Detailed Settings

You can set the other conditions that can be set for the [Center of Quadrangle] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point

- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Center X

Set the tolerances (upper and lower limits) for the X-coordinate of the measured center.

- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Center Y

Set the tolerances (upper and lower limits) for the Y-coordinate of the measured center.

- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Line

Select whether or not to display the detected line.

- **ON** (default): Displays the detected line. Set the display color and line thickness for the detected line.
- **OFF**: Does not display the detected line.

Intersection

Select whether or not to display the intersection.

- **ON** (default): Displays the intersection. Set the display color and line thickness for the intersection.
- **OFF**: Does not display the intersection.

Center

Select whether or not to display the center.

- **ON** (default): Displays the center. Set the display color and line thickness for the center.
- **OFF**: Does not display the center.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Line] setting is applied for the display color.

Display Center Point X

Display Center Point Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

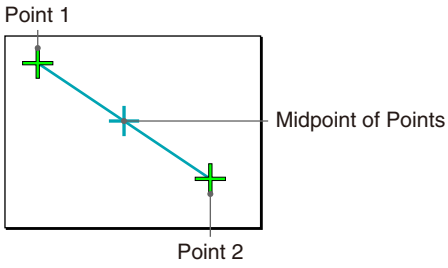
Midpoint of Points

#E044

Specify two points (point 1 and point 2) and then output the midpoint coordinates of the two points.

Overview of functions

Image of the Measurement



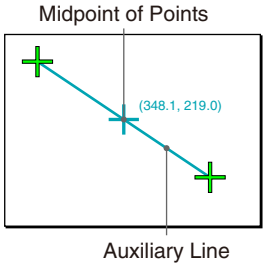
Measurement Results Output

The measurement results output by the [Midpoint of Points] tool are as follows.

Measurement results	Description
Midpoint X	Outputs the X-coordinate of the midpoint of two points in pixels.
Midpoint Y	Outputs the Y-coordinate of the midpoint of two points in pixels.
Detected Point 1 (X, Y) /Detected Point 2 (X, Y)	Outputs the position coordinates (X, Y) for the specified detected points (point 1 and point 2).
Tool judgment value	When the measurement result is outside of the set tolerance range (upper and lower limits), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [Midpoint of Points] tool, use the [Properties] view. The [Properties] view for the [Midpoint of Points] tool is made up of the tabs below. Configure the settings as required.

Reference Adding the [Midpoint of Points] tool to a task in the [Task] view displays a navigation dialog box for setting two points. For details, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Detection	Specify the two points for which midpoint of the two points is to be measured. You can also set the other conditions that can be set for the [Midpoint of Points] tool as necessary.
Judgment	Set the tolerances (upper and lower limits) for the measured values.
Display	Set how detection results and the midpoint are displayed.

Detection

Specify the two points for which midpoint of the two points is to be measured. You can also set the other conditions that can be set for the [Midpoint of Points] tool as necessary.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Detection Target

Specify Point (1st)/Specify Point (2nd)

Specify point 1 and point 2 to be detected. Clicking [Select Feature] displays a navigation dialog box enabling you to re-specify the detection results of other tools displayed on the [Image Viewer] view.

Reference For details about the navigation dialog box, see “Tool Common Setting Items” - “Navigation Dialogs When Adding a Tool” - "Measurements & Dimensions".

Position X/Position Y

Specify the positional coordinates for point 1 and point 2 to be detected. If the detection results of another tool were specified in the navigation dialog box when adding the tool, the positional coordinates of the specified detection point are displayed.

Detailed Settings

You can set the other conditions that can be set for the [Midpoint of Points] tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Set the tolerances (upper and lower limits) for the measured values. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the check boxes for [Upper Limit] and [Lower Limit], and then enter the tolerances.

Point
- A value smaller than [Lower Limit] cannot be set for [Upper Limit]. Additionally, a value greater than [Upper Limit] cannot be set for [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it will be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Midpoint X

Set the tolerances (upper and lower limits) for the X coordinate of the measured midpoint.
- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Midpoint Y

Set the tolerances (upper and lower limits) for the Y coordinate of the measured midpoint.
- Unit: Pixel Count
- Range: -99999.999 to 99999.999

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Do Not Judge Invalid Data

This option can be set to not judge if judgment targets are invalid data (default: OFF). When set to ON, the occurrence of judgment errors from judging invalid data which lead to tool execution errors can be eliminated.

Display

Set how detection results are displayed. You can change the display color based on the judgment result for that tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Points

Select whether or not to display the detected points.

- **ON** (default): Displays the detected points. Set the display color and line thickness for the detected points.
- **OFF**: Does not display the detected points.

Auxiliary Line

Select whether or not to display the auxiliary line.

- **ON** (default): Displays the auxiliary line. Set the display color and the line thickness of the auxiliary line.
- **OFF**: Does not display the auxiliary line.

Midpoint

Select whether or not to display the midpoint.

- **ON** (default): Displays the midpoint. Set the display color and line thickness for the midpoint.
- **OFF**: Does not display the midpoint.

Result Display

Use the toggle switch to show or hide the results, and set the text size for when the results are displayed. The [Detected Points] setting is applied for the display color.

Display Midpoint X

Display Midpoint Y

Font Size

Set the font size for the detection results to be displayed. The font size is the same for all functions.

Reset

Restores the display options to their default settings.

AI Inspection

AI Inspection tools are tools that enable the detection of defective objects and the classification of types by just training the AI with captured images and without having to set detailed conditions. The following inspection tools are included with this device.

AI Inspection Tool List

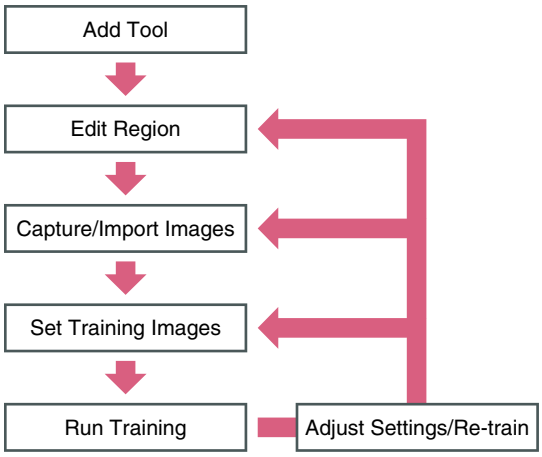
AI Inspection tools	Overview of functions
AI Classification	A tool that allows AI to learn images for each type and classify which type the captured images are of.
AI Detection	A tool that allows AI to learn images of good and defective objects and detect the defective areas in the captured image.
AI Segmentation	A tool that allows AI to learn images of defective objects and detect defective areas that are smaller than what AI Detection can detect.
AI OCR	A tool that allows AI to read character information and perform sorting and editing tasks.

Overview of functions

#E045

AI Inspection tools can inspect complex distinctions and quality variations by learning features from images with fewer set-up parameters than other measurement tools. Once you have added the AI Inspection tool to the task, you can train the AI like you would configure the properties of a measurement tool.

Workflow of the AI Inspection Tool Setting



Add Tool/Edit Region

When an AI Inspection tool is added to the [Task] view, the [Edit Inspection Region] Dialog is displayed in the same way as with the measurement tools other than AI Inspection tools. Edit the inspection region in the input image to be learned by AI in [Image Viewer].

Point

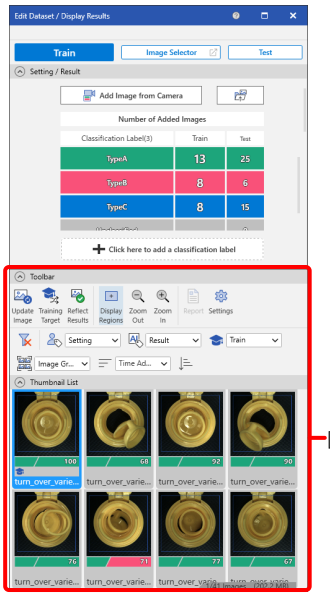
- If an error occurs in the input image settings, the AI Inspection tool cannot be configured. By properly reconfiguring the input image settings, the AI Inspection tool can be configured.
- Depending on the settings of the tools already added, there may be several candidates for the input image. If there is more than one candidate input image, the [Current Image] Dialog is displayed.
- Contrast images generated by the AI Inspection tool cannot be used as current images for the AI Inspection tool.
- If another AI Inspection tool has already been added and a dataset created when the tool is added, the [Browse Datasets] dialog box appears.
- After adding a tool, you cannot directly edit the inspection region on the [Image Viewer]. To modify the region, edit it from the [Properties] view - [Region] tab - [Edit].
  →"Editing the Inspection Region of the AI Inspection Tool"

Capture/Import Images

The AI Inspection tool imports images for use in setup. These imported images are called a “dataset”. Datasets can also be shared and used by several AI Inspection tools.
Imported images can be viewed in the [Thumbnail Section] on the [Edit Dataset / Display Results] dialog box.

Point

- When saving a program setting that has datasets, if the storage capacity of the PC is insufficient, the save operation will be canceled. If the storage capacity on this device is insufficient, a dialog will be displayed confirming whether the dataset should be saved only on the PC.
- If a part of a dataset with multiple images, such as LumiTrax or MultiSpectrum, cannot be saved on this device, the partially saved images will be deleted so as to maintain the state of having the images as a complete set.
- Images without write permission cannot be imported.



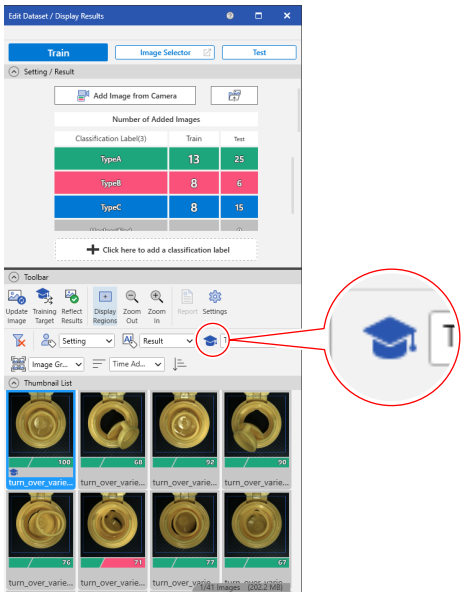
[Thumbnail Section]

Set Training Images

A training image is a model image used for training. Classification labels are set for the images imported into the dataset according to the tool processing content and the images are registered as training images.

- **AI Classification tool**: Set the classification label name for each image to determine which classification the target image is of.
- **AI Detection tool**: Set [Good (Pass)]/[Defective (Fail)] for each image to determine whether the target image is good or defective. Mainly learns Good (Pass) images.
- **AI Segmentation tool**: Set [Good (Pass)]/[Defective (Fail)] for each image to determine whether the target image is good or defective. Mainly learns Defective (Fail) images.

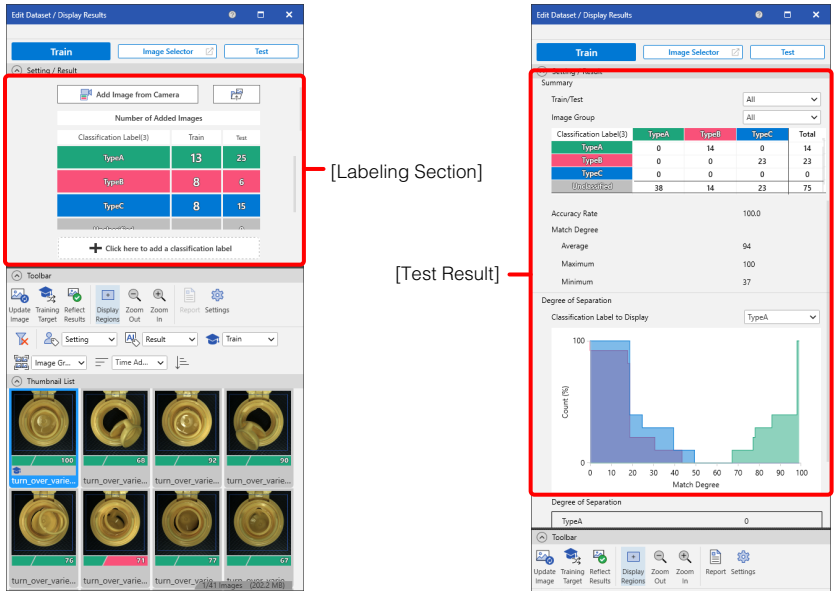
Images imported into the dataset that are not targeted for training are treated as test images and are used to test the training results during the training run.



Reference Information on classification labels and training flags set on the dataset images can be partially pasted into different AI tools.
→[Partially pasting a tool].

Run Training

Once the training images are set, run the training. The training images are analyzed and an inference model is created. Once training is complete, the test is subsequently performed on all images in the dataset. The results of training can be viewed in [Summary] and [Degree of Separation Graph] on the [Edit Dataset / Display Results] dialog box.



Point Training of the AI Inspection tool supports monochrome (8-bit) or color (24-bit) PNG/BMP/JPG images. Training with unsupported images is not supported.

Shared AI Training

Referencing the generated inference model from other tools enables shared AI training across multiple tools with different datasets.
→Shared AI Training

Adjust Settings/Re-train

If the measurement results are incorrect, adjust the training image settings or the setting parameters in the [Properties] view as necessary, and run the training again to improve AI accuracy.

AI Classification

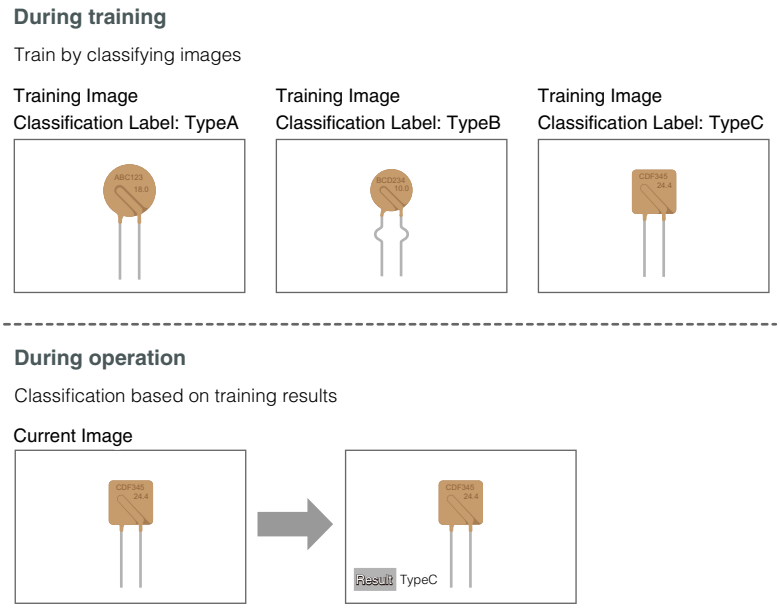
#E046

Let the AI learn images for each classification label, and the AI detects the features of the input image based on the training results to determine which classification label the image is of.

Overview of functions

Image of the Measurement

The device is trained by setting classification labels for each image, and it then compares the features of the input images and assigns them to the set classification labels.



Measurement Results Output

The measurement results output by the [AI Classification] tool are as follows.

Measurement result	Description of output
Result Classification Label	Outputs the name of the classified classification label relegated as the execution result.
Match Degree	Outputs the [Match Degree] between the current image and the training result in the classification label relegated as the execution result. The closer the value of [Match Degree] is to 100, the more it matches the registered classification label.
Result Classification Label [ ]	Outputs the names of the classification labels in descending order of the match degree between the current image and the training result.
Match Degree [ ]	Outputs the match degree between the current image and the training result for each classification label in descending order. The closer the value of [Match Degree] is to 100, the more it matches the registered classification labels.
Tool judgment value	When the measurement result is outside of the set tolerance range (lower limit), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

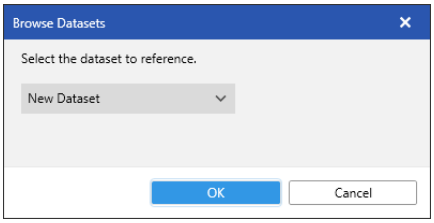
Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement workflow

The setup workflow, from adding the [AI Classification] tool to the [Task] view and setting the inspection region up to measurement, is as follows.

1 Add the [AI Classification] tool to the [Task] view.

Point If another AI Inspection tool has already been added and a dataset created when the tool is added, the [Browse Datasets] dialog box appears.



- To create a new dataset for the AI Inspection tool to be added, select [New Dataset] and then click [OK].
- If you want to use an existing dataset, select the dataset to be referenced and then click [OK].
  Images in the shared dataset can be viewed in the [Thumbnail Section] on the [Edit Dataset / Display Results] dialog box.
  →[Thumbnail Section] on the [Edit Dataset / Display Results] dialog box

2 Set the inspection region that is to be the target for training on [Image Viewer].
→Drawing a Region

3 Perform training from the [Train] tab on the [Properties] view.
The following two training methods are available.

Training by Capturing Images

This is the method wherein training is performed after images of workpieces are captured with the camera and the classification label to assign is set for each captured image.
The [Add Image from Camera] dialog box that appears when you click [Add Image from Camera] enables you to capture images, set classification labels, and train.
→[Add Image from Camera] dialog box

Training with Captured Images

This is the method wherein training is performed after existing images, such as recorded images, simulation images, and output images from other inspections, are added to the dataset and the classification label to assign is set for each image.
The [Edit Dataset / Display Results] dialog box that appears when you click [Edit Dataset] enables you to import images, set classification labels, and train.
→[Edit Dataset / Display Results] dialog box

Once training is complete, the [AI Classification] tool is subsequently executed on the images in the dataset.

4 View the results in [Summary] and [Degree of Separation Graph] of the [Edit Dataset / Display Results] dialog box to check whether the dataset images are correctly classified into the set type.
→[Summary] / [Degree of Separation Graph] of [Edit Dataset / Display Results] dialog box
If the result classification labels are incorrect, you can adjust them by re-importing, reclassifying, and re-training images. When they are classified correctly, the setup is complete. Switch to Run Mode and start measurement.
→Change Mode

Properties

The [Properties] view for the [AI Classification] tool is made up of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	Displays the tool information. You can also enter the tool name and comments. Additionally, set a captured image to use for measurement and the execution conditions for the tool.
Region	Set the reference position for the tool's coordinate system. Additionally, specify the area on the captured image to be used for measurement.
Image Enhance	If a color image is used for the current image, the captured color image is converted to a monochrome image using the color extraction function.
Train	Set classification labels and add images for the dataset, run training, and display the test result of the tool that was based on the training.
Judgment	Set the tolerance (lower limit) setting for the measured value.
Display	Set the display methods for the inspection and mask regions.

Region

Set the reference position for the tool's coordinate system. Additionally, specify the area on the captured image to be used for measurement.

Point
- Re-training is necessary when the inspection region is edited.
- The Shared Region tool with position adjustment or image region set cannot be referenced.

Reference For details about how to set regions, see “Tool Common Setting Items” - "Region".

Image Enhance

If a color image is used for the current image, the captured color image is converted to a monochrome image using the color extraction function.

Point The [Image Enhance] tab is not displayed if monochrome images are used for the current image.

Reference For details about the color extraction, see "Color Extraction".

Train

Set classification labels and add images for the dataset, run training, and display the test result of the tool that was based on the training.

- Dataset
- Train
- Test Result
- Options

Dataset

Add Image from Camera

Click to open the [Add Image from Camera] dialog box. In the [Add Image from Camera] dialog box, you can set classification labels for images captured by the camera and perform training.
→[Add Image from Camera] dialog box

Dataset Name

The name of the dataset used by the [AI Classification] tool is displayed.

··· (Settings Menu)

Click to display the dataset settings menu.

- **Browse Dataset**: Selecting this menu item displays the [Browse Dataset] dialog box, which lists the names of existing datasets and the number of AI Inspection tools that reference them. Selecting a dataset name other than the one in use and clicking [OK] switches the datasets.

  Point When the dataset is changed, the following information associated with the images in the dataset in use is deleted:
  - Training settings
  - Setting classification labels
  - Test results

- **Edit Dataset Name**: Selecting this menu item displays the [Edit Dataset Name] dialog box. Edit the dataset name and click [OK] to change the name (up to 64 characters).
  – Prohibited characters: \ / : * ? ” < > |
- **Create New Dataset**: Selecting this menu item displays the [Create New Dataset] dialog box. Edit the dataset name and click [OK] to create an empty dataset with no imported images.

  Point A maximum of 100 datasets can be created. However, this number varies depending on the free space available on the device and the computer.

- **Delete Dataset**: Selecting this menu item displays the [Delete Dataset] dialog box. Select a dataset and click [OK] to delete the selected dataset.

Point

- The datasets that are already being referenced by an AI Inspection tool cannot be deleted.
- When a dataset is deleted, the following information associated with the images in the dataset is deleted:
  - –Images
  - –Training settings
  - –Setting classification labels
  - –Test results
  - –Image group settings
- For an AI Inspection tool without a dataset referenced, a referencing error will occur and the name of the dataset will be displayed in red text.

- **Export Dataset**: Selecting this menu item displays a dialog box for selecting the output destination for the dataset. When the output destination is selected, a folder containing the dataset images is created.

Edit Dataset

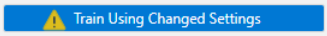
Click to display the [Edit Dataset / Display Results] dialog box. In the [Edit Dataset / Display Results] dialog box, you can set classification labels for imported existing image files and perform training.
→[Edit Dataset / Display Results] dialog box

Train

Train

Click this button to perform training based on the classification labels set for the training images, and to test all images in the dataset based on the training results. The test results of the AI classification tool can be viewed on [Summary] and [Degree of Separation Graph] in the [Edit Dataset / Display Results] dialog box.

Point

Meaning of the display of 

This icon is displayed when some parameters have been changed after training.
In the AI Inspection tool, if some parameters are changed, the changes will not be reflected unless you train and test again. The result displayed on the screen may not reflect the parameter change made after training has been performed.
This icon indicates that the change made after training has been performed is not reflected, and that training and testing are required again. The icon disappears after training and testing again.

Reference

- [Train] is performed on the training images. Training images are those which have the icon that signifies a training image displayed on the [Thumbnail Image] in the [Edit Dataset / Display Results] dialog box.
- The [Result Classification Label] and [Match Degree] of the [AI Classification] tool can also be viewed on the image in [Image Viewer].

Multi-Tool Training

Click this button to open the [Multi-Tool Training] dialog box, and display the images in the dataset for which multi-tool training is to be executed and the classification labels (depending on the tool

settings) and training flags (Train/Test) for each AI Classification tool set for those images. After checking and editing the classification label and training flag for each image, click the [Multi-Tool Training] button in the lower right corner of the [Multi-Tool Training] dialog box to execute multi-tool training.

Reference The display images can be switched with the ◀ ▶ button in the lower right corner of the dialog.

Test Result

Display the test result of the AI Classification for the images in the dataset.

Display Results

Click this button to open the [Edit Dataset / Display Results] dialog box and display the [Summary] section. If the [Edit Dataset / Display Results] dialog box is already open, clicking the button will make it scroll to the [Summary] position.

Options

Shared AI Training

Enable this to select a shared AI training tool from the drop-down menu of [Referenced AI Classification Tool] (default: OFF).
→Shared AI Training

Judgment

Set the tolerance (lower limit) setting for the measured value. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement result is displayed in [Current Value]. Select the [Lower Limit] check box, and then enter the tolerance.

Point
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for the setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Match Degree

Set the tolerance (lower limit) for the measured match degree.
- Unit: Number
- Range: 0 to 100

Judge Specified Classification Label as Pass

The tool judgment can be set to Pass if the current image is assigned to the specified classification label.
Enable [Judge Specified Classification Label as Pass] and select the check boxes for the classification labels to be judged as a Pass.

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured values on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, the judgment conditions settings are still valid.

Display

Set the display method for the inspection region, mask region, and test result. The display color can be changed based on the judgment result for the tool. Also, use the toggle switch to show or hide the display.

Display Settings

Inspection Region

Select whether to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Result Display

For the result classification label displayed on the [Image Viewer] image, use the toggle switch to show or hide the results, and set the number of characters to be displayed, whether to display the match degree, and the text size for when the results are displayed.

Display Result Classification Label

Select whether to display the result classification label. If the [Display Result Classification Label] is disabled, the [Match Degree] will also be hidden.

Display Character Count

Set the number of characters to be displayed for the result classification label name.

Result Classification Label Count

Set the number of result classification labels to display.

Display Match Degree

Select whether the match degree should be displayed according to the result classification label.

Font Size

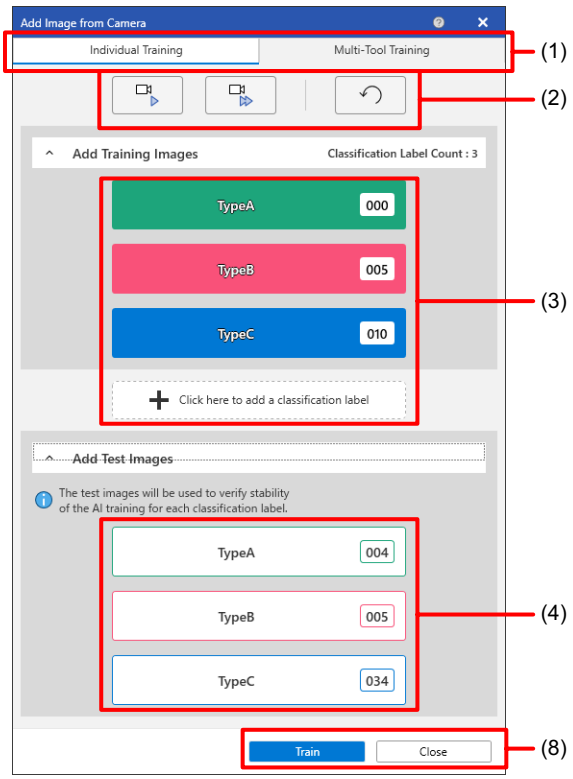
Set the font size for the result classification label to be displayed.

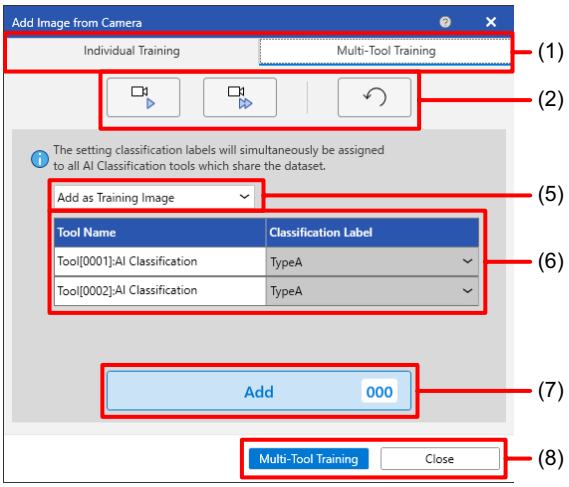
Reset

Restores the display options to their default settings.

[Add Image from Camera] dialog box

This dialog box enables images captured by the camera and displayed in the [Image Viewer] to be imported into the dataset and simultaneously assigned to the desired classification label and added as a training image. You can also run training using the added images.
In the [Add Image from Camera] dialog box, you can not only set classification labels and import images for each AI Inspection tool, but also set classification labels and import images for AI Classifications that share the same dataset in batches.





(1) Tabs for switching between individual training and multi-tool training

Switches between importing captured images with the classification label set by tool, or importing images with the classification label set for each AI Classification that shares the same dataset.

Reference Switching to the [Multi-Tool Training] tab changes [Train] to [Multi-Tool Training].

(2) Trigger/Cancel

(Trigger)

Click to input a trigger and capture an image. The captured image is displayed in [Image Viewer].

Reference This is the same function as the trigger on the [Image Viewer] toolbar.

(Continuous Trigger)

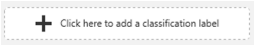
Click to repeatedly input a trigger. The image in [Image Viewer] changes continuously.

(Cancel)

Deletes the previously added image.

(3) Add Training Images

Add the image displayed in [Image Viewer] to the selected classification label as a training image. The number displayed indicates the number of images added.
The imported images can be viewed in the [Thumbnail Section] in the [Edit Dataset / Display Results] dialog box.

Click 

to add a classification label, and the classification label name (up to UTF-8 128 bytes) can be entered. Up to 32 classification labels can be added.

- Forbidden characters: \ / : * ? ” < > |
- The following names cannot be used: NA NL

Reference
- When the mouse cursor is hovering over a classification label, the following icons appear enabling you to change the color of the classification label, edit the classification label name, and delete the classification label.
- : Click to display the list of colors. Select a color to change the color of the classification label.
- : Click to edit the classification label name. You cannot add an empty classification label name.
- : Click to delete the classification label. If there are only two classification labels, they cannot be deleted.
- To reflect changes in the classification label color and label name in the test result, a test must be performed again.

(4) Add Test Images

Add the image displayed in [Image Viewer] to the selected classification label as a test image. The number displayed indicates the number of images added.
The imported images can be viewed in the [Thumbnail Section] in the [Edit Dataset / Display Results] dialog box.

(5) Add as Training Image

Select whether to add an image as a training image or a test image from the drop-down menu.

(6) Multi-Tool Training

The AI Classifications which use the same dataset are displayed in a list. Select a classification label for the image displayed in [Image Viewer] from the drop-down menu for each AI Classification.

(7) Add

Click this button to add the image displayed in [Image Viewer] by the classification label set in [Multi-Tool Training].
If [Add as Training Image] is selected when [Add] is clicked, it is added as a training image.
The imported images can be viewed in the [Thumbnail Section] in the [Edit Dataset / Display Results] dialog box.

Point If [None] is selected in [Multi-Tool Training], the image will not be added as a training image when [Add] is clicked, even if [Add as Training Image] is selected.

(8) Train / Multi-Tool Training / Close

Train

Closes the [Add Image from Camera] dialog box to run the training, and then performs a test. The test results of the AI Inspection tool can be viewed in [Summary] and [Degree of Separation Graph] in the [Edit Dataset / Display Results] dialog box.

Reference The [Result Classification Label] and [Match Degree] of the [AI Classification] tool can also be viewed on the image in [Image Viewer].

Multi-Tool Training

Click this button to open the [Multi-Tool Training] dialog box, and display the images in the dataset for which multi-tool training is to be executed and the classification labels (depending on the tool settings) and training flags (Train/Test) for each AI Classification tool set for those images. After checking and editing the classification label and training flag for each image, click the [Multi-Tool Training] button in the lower right corner of the [Multi-Tool Training] dialog box to execute multi-tool training.

Close

Closes the [Add Image from Camera] dialog box.

[Edit Dataset / Display Results] dialog box

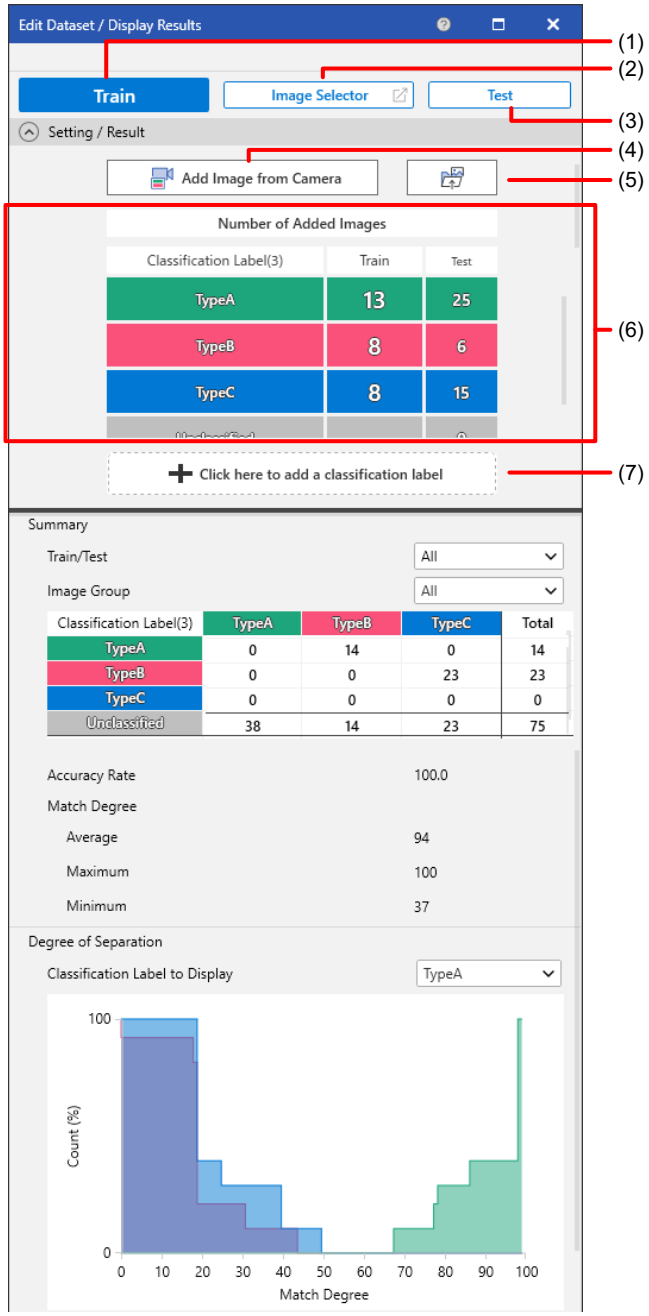
This dialog box enables you to import captured images, sort them into the desired classification and add them as training images. You can also run training using the added images.

Point If a measurement tool other than an AI Inspection tool is selected while the [Edit Dataset / Display Results] dialog is displayed, operations that make changes to the dataset image and the information associated with it cannot be performed.

Labeling Section

This area is used to check the classification label settings for imported images and the training image settings. Also, the execution result of AI Classification (summary, degree of separation graph) can be checked.

Reference When a measurement tool other than an AI Inspection tool is selected while the [Edit Dataset / Display Results] dialog box is displayed, the tool ID and tool name of the AI Inspection tool which displayed the dialog appears below the dialog title. This enables the user to know to which AI Inspection tool the images displayed in the [Edit Dataset / Display Results] dialog box belongs.



(1) Train

Click this button to perform training based on the classification labels set for the training images, and to test all images in the dataset based on the training results. The AI Classification test results can be viewed on the [Thumbnail Image] in the [Thumbnail Section] and on [Summary] and [Degree of Separation Graph] in the labeling section.

Point [Train] is performed on the training images. Training images are those which have the icon that signifies a training image displayed on the [Thumbnail Image] in the [Thumbnail Section].

(2) Image Selector

Click this button to open the [Auto Image Selector] dialog box. Execute the auto image selector to automatically set the training flag and perform training for the images added to the dataset.
→[Auto Image Selector] Dialog

(3) Test

Click this button to test all imported images. The AI Classification test results can be viewed on the [Thumbnail Image] in the [Thumbnail Section] and on [Summary] and [Degree of Separation Graph] in the labeling section.

Point Meaning of the display of Train Test

This icon is displayed when some parameters were changed after training.

In the AI Inspection tool, if some parameters are changed, the changes will not be reflected unless you train and test again. The result displayed on the screen may not reflect the parameter change made after training.

This icon indicates that the change made after training has been performed is not reflected, and that training and testing are required again. The icon disappears after training and testing again.

If Train is displayed, Test cannot be clicked.

If re-training and re-testing became necessary because the settings were changed accidentally, select [Edit] - [Undo] from the menu bar to cancel the changes.

Reference When [Test] is clicked, the target images are automatically updated before testing is executed.

(4) Add Image from Camera

Click this button to display the [Add Image from Camera] dialog box. Capture and add images, and add and set classification labels for the images from this dialog.

(5) (Add Image from Computer)

Click this button to display a menu that allows you to specify an image file, a folder containing images, images from the Filmstrip, or simulation images to load into the dataset.

- **Import from File**: Displays the [Import from File] dialog to specify an image file and load it into the dataset.
- **Import from Folder**: Displays the [Import from Folder] dialog to specify a folder containing image files and load them into the dataset.
- **Import from Archived Images**: Displays the [Import from Archived Images] dialog to specify a condition (All/Pass/Fail) for the image file to be imported and load it into the dataset.
- **Import from Simulation Images**: Displays the [Import from Simulation Images] dialog to load the images in the simulation images loading folder into the dataset.

(6) Number of Added Images

The classification labels set by the [AI Classification] tool and the number of images added to each classification label are displayed in a list.

Reference When the mouse cursor is hovering over a classification label, the following icons appear enabling you to change the color of the classification label, edit the classification label name, and delete the classification label.

- : Click to display the list of colors. Select a color to change the color of the classification label.
- : Click to edit the classification label name. You cannot add an empty classification label name.
- : Click to delete the classification label. If there are only two classification labels, they cannot be deleted.
- To reflect changes in the classification label color and label name in the test result, a test must be performed again.

Number of Added Images Layout

Example: If the added classification labels are TypeA and TypeB

Number of Added Images

Classification Label(2)	Train	Test
TypeA	1 A	8 C
TypeB	1 B	8 D
Unclassified	-	0 E

- **A**: Number of training images classified as TypeA
- **B**: Number of training images classified as TypeB
- **C**: Number of test images classified as TypeA
- **D**: Number of test images classified as TypeB
- **E**: Number of images that do not fall into any of the categories A-D

(7) + Click here to add a classification label

Click to add a classification label row. A classification label can be added by entering a classification label name. Up to 32 classification labels can be added.

Summary

This table is for checking whether the resulting classification labels are as expected after a test has been performed on the images for which classification labels have been set.

Summary Layout

Classification Label(2)	TypeA	TypeB	Total
TypeA	7 A	2 B	9
TypeB	1	8	9
Unclassified	0	0	0
Total	8	10	18

– The rows of the table represent the set classification labels and the columns represent the classification labels resulted from AI Classification.
– When you look at the row of “Type A”, you can see that cell A indicates the number of images that the AI Classification also judged to be "Type A" for the images set as "Type A", indicating that they were classified as expected. Cell B indicates that images that were set to be as "Type A" were judged as "Type B" by AI Classification, which lets us know that it was not able to classify according to expectations. If the classification is not as expected, the number is displayed in red.
– You can examine the row of "Type B" in the same manner.
– The row of "Unclassified” shows the result classification label by AI Classification for the images for which no classification label has been set.
– Check the image in the [Thumbnail Section] and look into the cause.

Point
- Click on the summary cell to narrow down the images to be displayed in the [Thumbnail Section]. The next narrowing down cannot be performed until the narrowed down results are displayed.
- If the classification label name is changed and the summary cell is clicked before the change is reflected in the summary, the setting filter will be disabled. After training or testing is performed, the change to the classification label name will be reflected in the summary and the setting filter will be enabled.

Filter

– **Train/Test**: Narrow down the summary and the degree of separation graph to that of training or test images.
– **Image Group**: Narrow down the summary and the degree of separation graph by Image Group.

Point
Train/test and image group filters are not saved in the program setting and are only retained while VS Creator is running.

Accuracy Rate

Displays the ratio of images for which the set classification labels match the result classification labels determined by AI Classification out of the images for which classification labels have been set.

Match Degree

Displays the statistical values (average, maximum, minimum) of match degree measured by performing AI Classification.

Point
Match degree is an index that shows how similar an input image is to the training images for each classification label. The larger the value (maximum 100), the more similar the image is to the training image.

Degree of Separation

The degree of separation represents the difference between the match degree of the correct classification labels and the match degree of the other classification labels for the images for which the classification labels have been set.
The higher the value of the degree of separation, the more correctly classification has been done.

Point
This degree of separation uses the normalized match degree for each image, calculated from the match degree of the measured values.

Classification Label to Display

Select the classification label to display in the degree of separation graph.

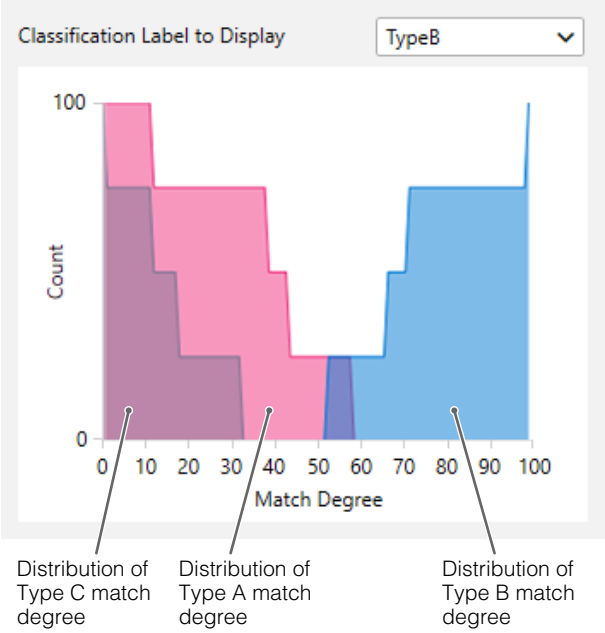
Degree of Separation Graph

Displays a cumulative histogram of the match degree for the classification label selected in [Classification Label to Display]. The vertical axis represents the number of images and the horizontal axis represents the match degree. The degree of separation graph shows how well the image is differentiated between the classification label set for the image (the correct classification label) and the other classification labels.

Point This graph uses the normalized match degree for each image, calculated from the match degree of the measured values.

Degree of Separation Graph Layout

Example: If the three classifications Type A (display color: Red), Type B (display color: Blue), and Type C (display color: Green) are set



When AI Classification is performed, a match degree will be output as the result for the image for each classification label. In this example, three match degrees (e.g. Type A: 80, Type B: 99, Type C: 10) are output for one image.

This degree of separation graph is a graph of the match degree for images for which a classification label of [Type B] is set since [Type B] has been selected in [Classification Label to Display].

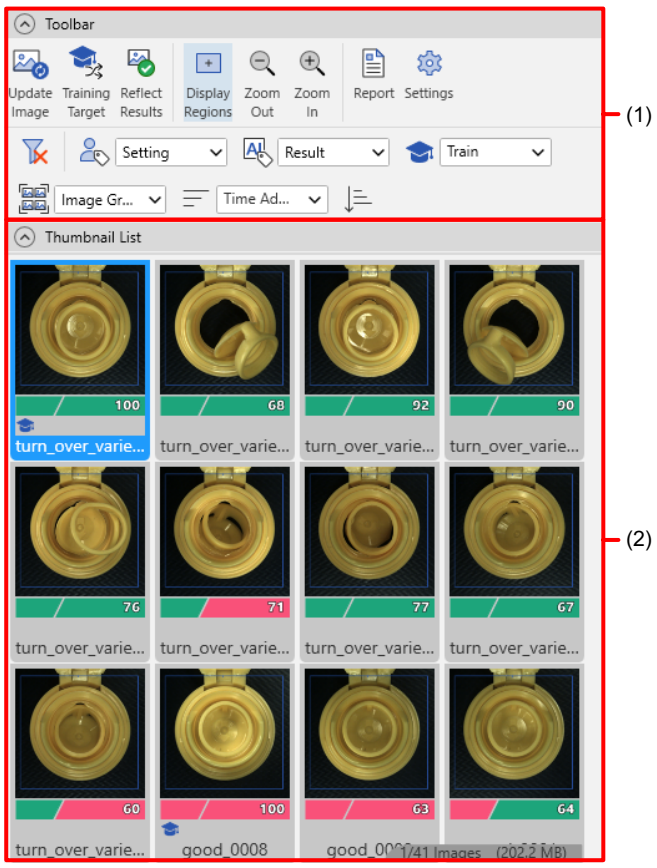
Since the images are those for which Type B is set, the blue graph (Type B) is distributed to a position close to a match degree of 100. The red and green graphs (Type A and Type C) are distributed more to the positions with a low match degree.

The blue and green graphs (Type B and Type C) are distributed separately to the right and to the left, indicating that the classification labels can be differentiated.

On the other hand, the blue and red graphs (Type B and Type A) partially overlap. This indicates that the match degree for Type B and the match degree for Type A overlap or are reversed, indicating that they may not be correctly differentiated.

In order for the [AI Classification] tool to classify correctly, the accuracy of AI Classification must be improved, for example by adding training images and re-training.

Thumbnail Section



(1) Toolbar

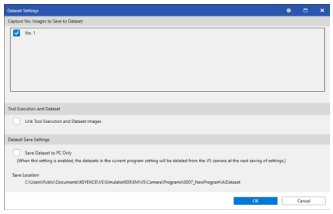
Point If the toolbar cannot be displayed in a single row, for example if the width of the [Edit Dataset / Display Results] dialog box is too narrow, ▼ (option) will be displayed to store the tools that could not be displayed in the row. Click the arrow icon to display the stored tools.

- Update Image **(Update Thumbnail Image Display)**: If the input image displayed in [Image Viewer] is a processed image from another tool, click this icon to update the processed image through execution of the tool and import the updated image.
- Training Target **(Random Training Image Setting)**: Selects images at random from among the images for which classification labels are set in the dataset and adds them as training images. Click this icon to open the [Random Training Image Setting] dialog box. Set the proportion of images in the dataset to be added as training images. Click [OK] to add images in the dataset as training images according to the set proportion.
- Reflect Results **(Reflect Test Result as Settings)**: Set the test result of the [AI Classification] tool as the classification label.
- Display Regions **(Switch Graphics Display ON)**/ Display Regions **(Switch Graphics Display OFF)**: Show or hide the information (inspection region, etc.) displayed on the image in the [Thumbnail Section].
- Zoom Out Zoom In **(Zoom Out/Zoom In)**: Click the icon to reduce/enlarge the thumbnail image.

- **(Output Report)**: A report that puts together the results of training and testing and the images can be created. Click the icon to display the dialog for specifying the save destination of the report. Enter a folder name and select the save destination to start creating the report (HTML file). Once the report creation is complete, the completed report is displayed.

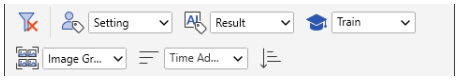
  Reference
  - To create a report, the AI tool training must have been completed.
  - The image displayed in the thumbnail section is output to the report. If a report is created with no image in the thumbnail section due to a filter, a report with no images is created.
  - The report display can be selected from the drop-down menu as [Standard Display] or [Simple Display]. In [Simple Display], detailed information such as the program setting name and camera model will be omitted.
  - The graphics on the thumbnail can be displayed or hidden.

- **(Dataset Settings)**: Click to display the [Dataset Settings] dialog box.



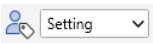
  - **Capture No. Images to Save to Dataset**: Select which capture number's images to import when Multi-Capture is enabled and images captured by the camera or images from the Filmstrip are imported into the dataset.
  - **Tool Execution and Dataset**: If the [Link Tool Execution and Dataset Images] check box is selected, images that are not executed under the execution conditions on the General tab will not be trained or tested in the [Edit Dataset / Display Results] dialog, and their thumbnails will also be hidden. Even if you change the execution conditions on the General tab, they will not be reflected immediately in the thumbnail section, but will be reflected by updating the image.
  - **Dataset Save Settings**: Select the [Save Dataset to PC Only] check box to save the dataset only to the PC and delete it from the device when the program setting is saved.

  Reference
  - The program setting volume in the device can be reduced.
  - When connecting to the device from a different PC than the one in which the dataset is stored while this setting is enabled, no dataset image will exist.

- 

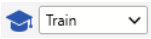
(Filter/Sort): Enables you to filter and sort the images displayed in the [Thumbnail Section].

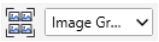
  Point
  The [Thumbnail Section] filters are not saved in the program setting and are only retained while VS Creator is running.

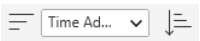
  - **(Clear Filter Conditions)**: Removes filtering and displays all images.
  - 

(Filter by Setting Classification Label): Narrows down the thumbnail images displayed in the [Thumbnail Section] by the classification label selected from the drop-down menu (None, set classification label).

– **(Filter by Result Classification Label)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the test result selected from the drop-down menu (No Result, set classification label).

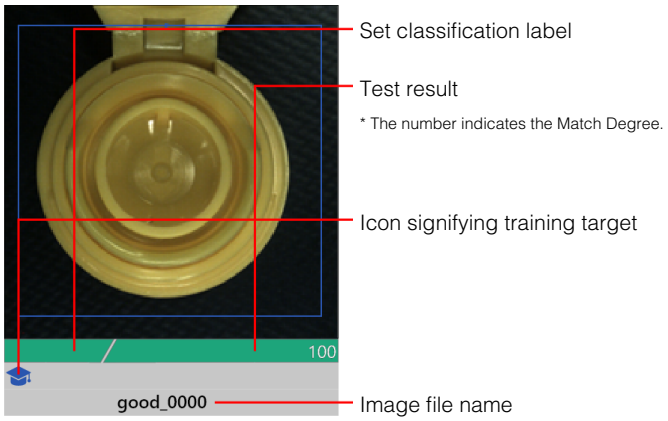
–  **(Filter by Training Image)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the selection from the pull-down menu, training target or not (All, Target, Non-target).

–  **(Filter by Image Group)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the Image Group selected from the drop-down menu.

–  **(Sort by)**: Sorts the display order of the thumbnail images according to the sorting criteria (Time Added, Match Degree, File Name) selected from the drop-down menu. Click to switch between sorting in ascending or descending order.

(2) Thumbnail Image

Thumbnail images of imported images are displayed.



Reference

- The number displayed at the bottom right of the [Thumbnail Section] is the number of imported images.
  - –When a thumbnail is selected, "the number of the selected image when counting from the top" is displayed.
    [Number of the image from the top]/[Total number of images] Images
  - –The number displayed to the right of the number of images is the total size of the images included in the thumbnail list.

- You can also right-click an image and set the image as a training image, set a classification label, and perform other operations from the context menu.
  - –**Use as Training Image**: Toggles between using or not using the image as a training image.
  - –**Classification Label**: Set to the selected classification label or leave the classification label unset.
  - –Image Group: Adds the image to an image group. You can add the image to multiple image groups.
  - –**Delete**: Deletes the currently selected image from the dataset.

You can move the mouse cursor over the thumbnail image to see the below information.

- **Name**: Image file name
- **Time Added**: The time when the image was added to the dataset
- **Train**: Whether the image is subject to training (Target/Non-target)
- **Setting**: The set classification label. Blank if not set
- **Result**: Classification label judged by AI Classification. This is blank if the tool has not been run
- **Match Degree**: The degree of match as a result of running AI Classification. The more similar the current image is to the training image, the higher the value. This is blank if the tool has not been run

– **Image Group**: The group to which the image belongs. This is blank if the image does not belong to any image group

Image Group

Images imported into the dataset can be added in any image group. By adding images in image groups, you can filter the thumbnail images displayed in the [Thumbnail Section] by any image group.

- Creating a New Image Group
- Adding an image to a particular image group
- Adding an image to multiple image groups
- Deleting an image group
- Renaming an image group

Reference If images are added by specifying a folder in [Import from Folder] in [Add Image from Computer], the specified folder name is set as the image group name.

Creating a New Image Group

Up to 64 image groups can be created.

1 Right-click a thumbnail image and select [Image Group] - [Image Group Detailed Settings] from the context menu.
The [Detailed Settings] dialog box appears showing the image groups that have been created in a list.

2 Click [+ Create New].
A new image group row is added to the list.

3 Enter the image group name (max. utf-8 1024 bytes) into the added line.
– Forbidden characters: \ / : * ? ” < > |
An image group is added.

Adding an image to a particular image group

1 Select an image to add to an image group.

Point You can also select and add multiple images at the same time.

2 Right-click the selected image and select [Image Group] - [(Image Group Name)] from the context menu.
The image is added to the selected image group.

Adding an image to multiple image groups

1 Select an image to add to an image group.

2 Right-click the selected image and select [Image Group] - [Image Group Detailed Settings] from the context menu.
The [Detailed Settings] dialog box appears showing the image groups that have been created in a list.

3 Select the check boxes for the image groups to which the image will be added.

Point If multiple images are selected and the added image group is different for each image, the check box for the image group will be displayed as ☐ (settings retained).

4 Click [OK].
The image is added to the image group with the selected check box.

Deleting an image group

Delete image groups on the [Detailed Settings] dialog box.

1 Right-click a thumbnail image and select [Image Group] - [Image Group Detailed Settings] from the context menu.
The [Detailed Settings] dialog box appears showing the image groups that have been created in a list.

2 Move the mouse cursor over the row of the image group to be deleted and click 🗑, which appears on the right side of the row.
A message to confirm deletion appears.

3 Click [OK].
The image group is deleted and any images added to the deleted image group are de-registered.

Renaming an image group

Rename an image group on the [Detailed Settings] dialog box.

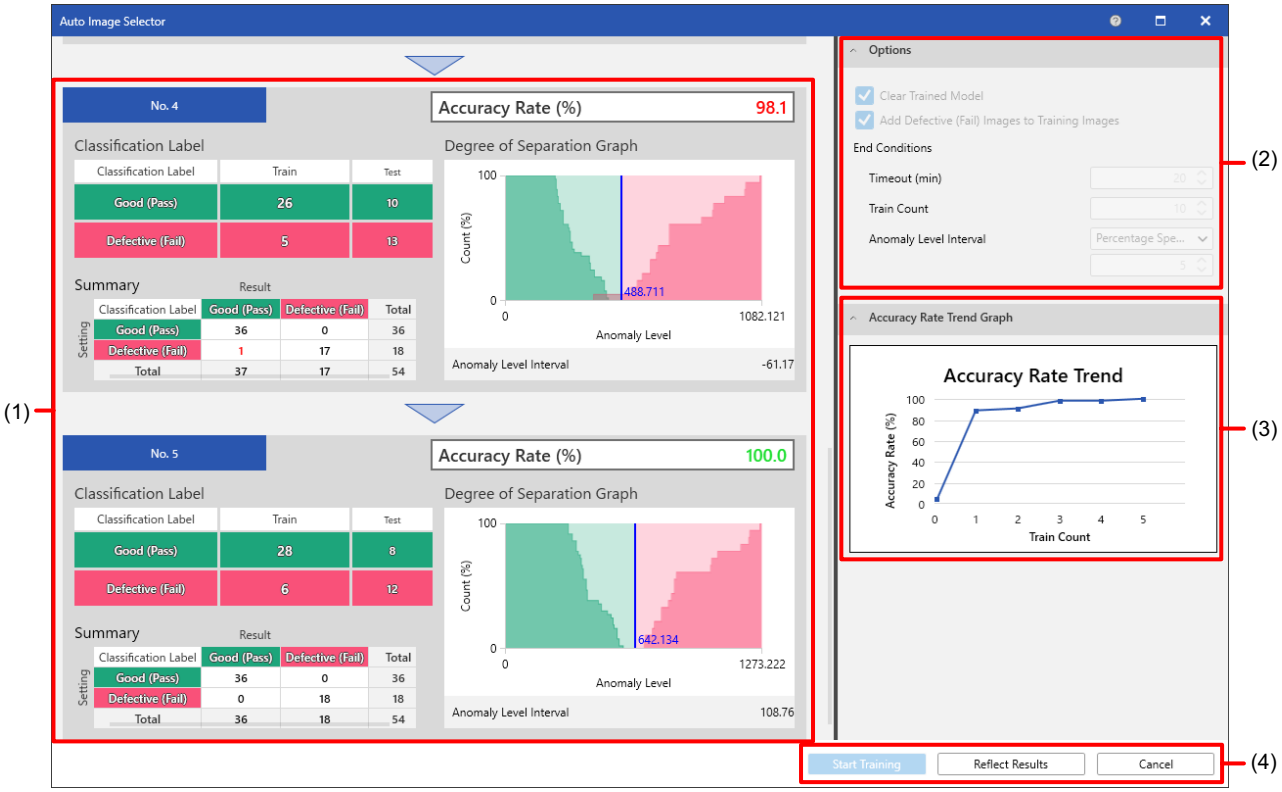
1 Right-click a thumbnail image and select [Image Group] - [Image Group Detailed Settings] from the context menu.
The [Detailed Settings] dialog box appears showing the image groups that have been created in a list.

2 Move the mouse cursor over the row of the image group to be renamed and click ✎, which appears on the right side of the row.

3 Rename the image group.

[Auto Image Selector] Dialog

Automatically sets the training flag for the images added to the dataset and performs training for AI tool training. Training is optimized by performing training repeatedly.



(1) Result Display Section

Displays the result for each training session. The display is updated after each training session is completed.

Train Count

Displays the number of the performed trainings on the upper-left corner of each result.

Classification Label

Displays the number of training images and the number of test images for each classification label of the performed training. The number of images with the unclassified label is not displayed.

Summary

Displays the result of the training performed. Whether the resulting classification labels are as expected can be checked.

Accuracy Rate

Displays the percentage of correct outcome of the training performed (0.0 to 100.0). The percentage of correct outcome is displayed in green if it is 100.0%, and if otherwise, it is displayed in red.

Degree of Separation Graph (AI Detection / AI Segmentation tools only)

Displays the cumulative histogram of the anomaly level for images determined as good/defective by the training performed. Also, the difference between the minimum anomaly level of defective

(fail) images and the maximum anomaly level of good (pass) images is displayed as the [Anomaly Level Interval]. From these results, whether the AI Detection and AI Segmentation are correctly identifying good/defective images can be checked. Refer to [AI Detection]/[AI Segmentation] - [Train] - [Edit Dataset] - [Degree of Separation] for details.

(2) Options

Configure the settings of the auto image selector.

Clear Trained Model

Select this check box to execute the Auto Image Selector with the training flag for all images in the dataset removed (default: enabled). Uncheck this check box to treat the images with the training flag set as training images. The training flag is removed for images that have the training flag set but have no classification label set.

Add Defective (Fail) Images to Training Images (AI Detection tool only)

Select this check box to add defective (fail) images to training images (default: enabled). Specify defective (fail) parts in the [Defective (Fail) Part Specification] dialog displayed while Auto Image Selector is running to improve AI accuracy.

Reference
- If the training images are not cleared and defective (fail) images are not added to the training image, none of the flags already set for good (pass) and defective (fail) training images will be removed.
- This function can also be used with the program setting created with the previous versions of VS Creator.

End Conditions

Set the conditions for ending the Auto Image Selector. The Auto Image Selector ends if any of the conditions are met.

Timeout (min)

Set the timeout time (min) for the Auto Image Selector (1 to 999, default for AI Classification / AI Detection: 20; default for AI Segmentation: 60). If the specified timeout time is exceeded after clicking the [Start Training] button and starting the Auto Image Selector, the Auto Image Selector will end at that training session.

Reference In the case of the AI Detection and AI Segmentation tools, the [Defective (Fail) Part Specification] dialog box may be displayed during the auto image selection. The period of time when this dialog box is displayed does not count towards the timeout time.

Train Count

Specify the number of trainings to be performed (1 to 999, default: 10). The Auto Image Selector ends when the number of training sessions reaches the specified number.

Anomaly Level Interval (AI Detection / AI Segmentation tools only)

Specify the anomaly level interval between good and defective images (default: Percentage Specification (%)). The Auto Image Selector ends when the interval exceeds the specified value.

– **Percentage Specification (%)**: The proportion can be specified in terms of the anomaly level interval relative to the maximum anomaly level of the defective image (0 to 99, default for AI Detection: 5; default for AI Segmentation: 30).

Reference When using the program setting created with the previous versions of VS Creator, the default values will be the values specified in the previous versions or the default values of the previous versions.

– **Value Specification**: A value can be specified in terms of the anomaly level interval (1 to 9999 for AI Detection; default: 100. 1 to 99 for AI Segmentation; default: 30).

(3) Accuracy Rate Trend Graph

Displays the percentage of correct outcome for each training session in a graph. The horizontal axis represents the number of training sessions, and the vertical axis represents the percentage of correct outcome.

(4) Start Training / Reflect Results / Cancel

Start Training

Click this button to start the Auto Image Selector. When the training starts, the [Execute] dialog is displayed. Click the [Stop Training] button in the [Execute] dialog to suspend the Auto Image Selector. When the training is completed, the [Confirm] dialog appears. Click the [OK] button to complete the training.

Reference The Auto Image Selector can be executed if the following conditions are met.
- AI Classification tool: There are two or more classification labels, and one or more images are added to each classification label.
- AI Detection / AI Segmentation tools: There are one or more images added to both good and defective images.

Reflect Results

When the Auto Image Selector completes processing, this button is enabled. Clicking this button closes the [Auto Image Selector] dialog, and the [Processing...] message appears. When the process is complete, the result of the Auto Image Selector is reflected to the AI tool properties and dataset.

Cancel

Clicking this button closes the [Auto Image Selector] dialog. If the [Cancel] button is clicked to close the dialog after the Auto Image Selector is run, the result of the Auto Image Selector is discarded and is not reflected to the AI tool.

Shared AI Training

For classification and detection in AI Inspection, judgments are performed based on inference models. Inference models are generated when the training of AI Inspection tools is executed. Referencing generated inference models from other tools enables shared AI training across multiple tools with different datasets.

Point

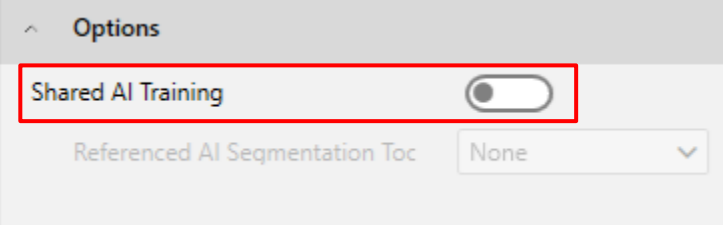
- The AI Classification / AI Detection / AI Segmentation tools support the shared AI training function.
- The inference model can only be referenced between the same type of inspection tools.
- When training/testing/image updates are performed in an AI Inspection tool that is set for shared AI training, they will be performed in all the tools that reference the same inference model.
- The maximum of 1000 dataset images and the maximum of 100 images per classification label are counted by the total values of all tools that are set for shared AI training.

Configuring Shared AI Training

A shared AI training across multiple tools is performed in the following steps.

1 Perform training on the reference source (parent) tool side to generate an inference model.

2 Turn on [Train] - [Options] - [Shared AI Training] in the reference destination (child) tool.



3 Select the parent tool from the drop-down menu.

Point

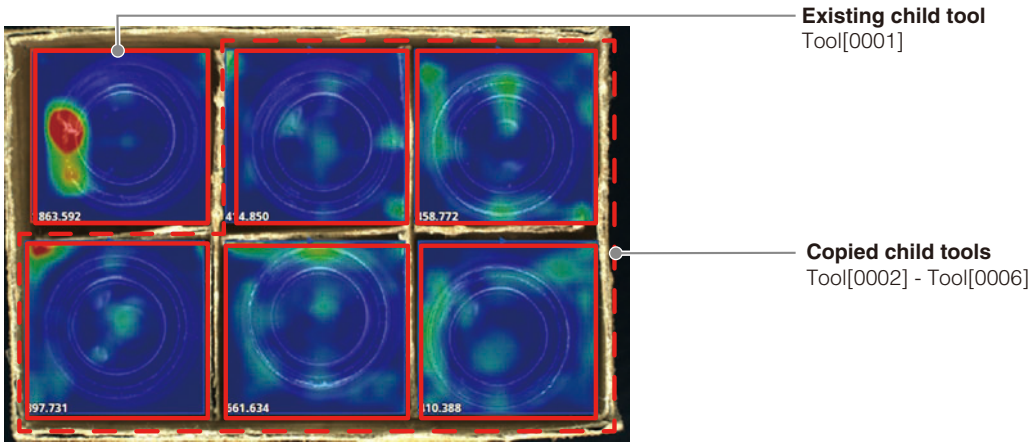
- The shared AI training function of the AI Inspection tools is available in Program Setting version 1.6 and later.
- Tools set as parent tools cannot reference other tools.
- When a parent tool is selected, child tools will reference the following items in addition to the inference model.
  - –[General]: Current image
  - –[Region]: Shape and size related items in [Region Settings]
  - –[Image Enhance]: Color extraction
  - –[Train]: The dataset to be referenced, training condition, testing condition
  - –[Edit Dataset] dialog: Label Name, Color, Add, and Delete for AI Classification, and Good (Pass) and Defective (Fail) threshold for AI Detection/AI Segmentation
- In principle, child tools cannot change the settings of referenced items or paste them partially. However, only some items can have independent settings on the child tool side.
- While Shared AI Training is set, the functions of the Auto Image Selector, oval/arc/polygon (inspection region), mask, shared region, and multi-tool training cannot be used.

Reference

- If an inference model was generated on the child tool side before referencing, the original file will be retained even if referencing is started. Disable referencing to revert to the original inference model.
- If a child tool is added or removed, training/testing will be needed again in all tools that are sharing the inference model.

Copying/Pasting Child Tools

When an existing child tool is copied, the reference settings are copied as well. Pasting the copied tool allows you to add child tools that reference the same inference model. This is useful, for example, if you want to perform inspections based on the same inference model at multiple locations within a single image and continue to perform additional training.



Reference
- When a parent tool and a child tool are copied and pasted at the same time, they are copied while retaining their parent-child reference relationship.
- If only the parent tool is copied, it will be copied in the same way as a normal copy. The pasted tool will be a normal tool with no child tools.

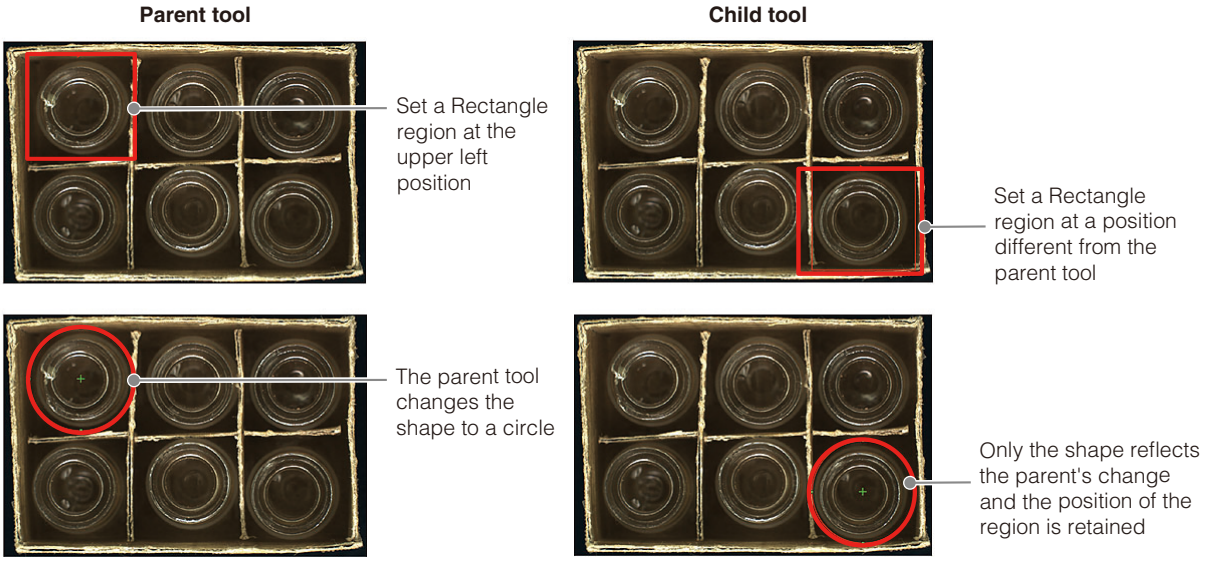
Items That Can Have Independent Settings on the Child Tool Side

Among the items that reference the parent tool, the following items can be changed independently on the child tool side, and can be pasted partially.

- Name of the dataset (the dataset can also be deleted)
- Center X/Center Y of the inspection region
- Rotation angle of inspection region [Rectangle]

Point
Items related to the size of the inspection region (width/height/radius, and rotation angle for shapes other than rectangle) cannot be set independently on the child tool side.

Reference
Changes to the region size/shape made on the parent tool side will be reflected in the child tool, but the position of the region will be retained as an independent setting for the child tool.


Parent tool
Child tool
Set a Rectangle region at the upper left position
Set a Rectangle region at a position different from the parent tool
The parent tool changes the shape to a circle
Only the shape reflects the parent's change and the position of the region is retained

AI Detection

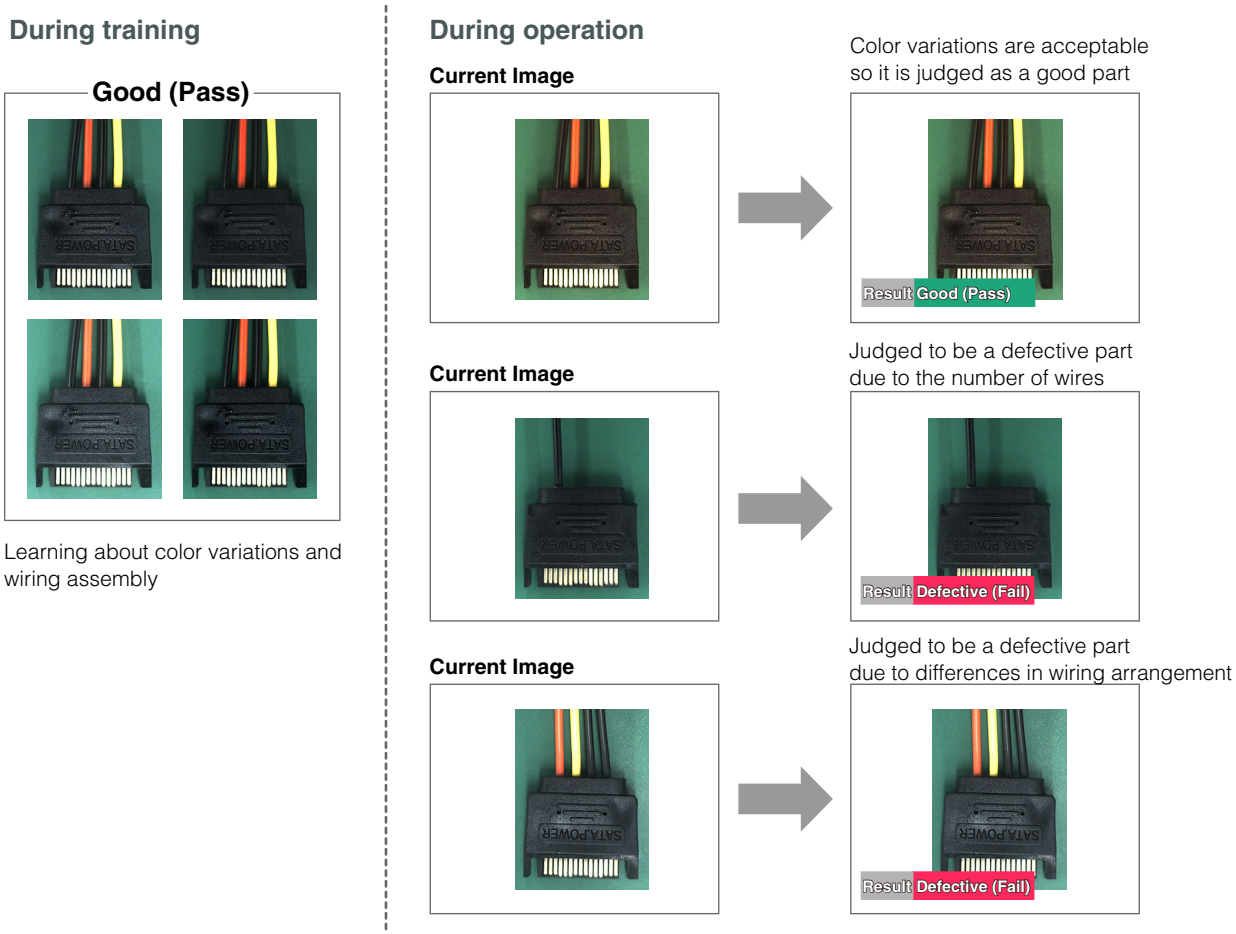
#E047

The AI is trained on images of good (pass) and defective (fail) products to detect defective areas in the captured image.

Overview of functions

Image of the Measurement

It trains on images of good (pass) parts with variations and determines good/defective parts by identifying the features of the input image.



Measurement Results Output

The measurement results output by the [AI Detection] tool are as follows.

Measurement result	Description of output
Anomaly Level	Outputs the [Anomaly Level] for the current image. The larger the value of [Anomaly Level] is from 0, the further the part is from the trained good parts.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper limit), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass".

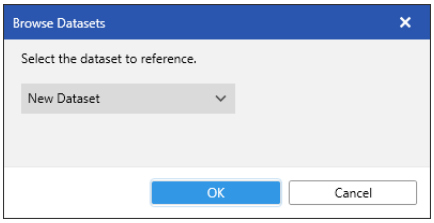
Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement workflow

The setup workflow, from adding the [AI Detection] tool to the [Task] view and setting the inspection region up to measurement, is as follows.

1 Add the [AI Detection] tool to the [Task] view.

Point If another AI Inspection tool has already been added and a dataset created when the tool is added, the [Browse Datasets] dialog box appears.



- To create a new dataset for the AI Inspection tool to be added, select [New Dataset] and then click [OK].
- If you want to use an existing dataset, select the dataset to be referenced and then click [OK].
  Images in the shared dataset can be viewed in the [Thumbnail Section] on the [Edit Dataset / Display Results] dialog box.
  →[Thumbnail Section] on the [Edit Dataset / Display Results] dialog box

2 Set the inspection region to be a target for training on [Image Viewer].
→Drawing a Region

3 Perform training from the [Train] tab on the [Properties] view.
The following two training methods are available.

Training by Capturing Images

This method is used to train by capturing images of good and defective parts with a camera and setting classification labels, Good (Pass)/Defective (Fail), for each captured image.
The [Add Image from Camera] dialog box that appears when you click [Add Image from Camera] enables you to perform operations from image capture to setting classification labels and training.
→[Add Image from Camera] dialog box

Training with Captured Images

This method is used to train by adding existing images, such as recorded images, simulation images, and output images from other inspections, in a dataset and setting classification labels, Good (Pass)/Defective (Fail), for each image.
The [Edit Dataset / Display Results] dialog box that appears when you click [Edit Dataset] enables you to import images, set classification labels, and train.
→[Edit Dataset / Display Results] dialog box

Once training is complete, the [AI Detection] tool is subsequently run on images in the dataset.

4 View the test results in [Summary] and [Degree of Separation Graph] of [Edit Dataset / Display Results] to check whether the dataset images are correctly judged into Good (Pass) or Defective (Fail).
→[Summary] and [Degree of Separation Graph] in the [Edit Dataset / Display Results]
If the judgment is incorrect, you can adjust them by re-importing, re-setting classification labels, and re-training images. If they are judged correctly, setup is complete.
Switch to Run Mode and start measurement.
→Change Mode

Properties

The [Properties] view for the [AI Detection] tool is made up of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	Displays the tool information. You can also enter the tool name and comments. Additionally, set a captured image to use for measurement and the execution conditions for the tool.
Region	Set the reference position for the tool's coordinate system. Additionally, specify the area on the captured image to be used for measurement.
Train	Add images to the dataset, set their classification label, run training, and display the test result of the tool that was based on the training.
Judgment	Set the tolerance (upper limit) setting for the measured value.
Display	Set the display methods for things such as the inspection and mask regions.

Region

Set the reference position for the tool's coordinate system. Additionally, specify the area on the captured image to be used for measurement.

Point

- Re-training is necessary when the inspection region is edited.
- The Shared Region tool with position adjustment or image region set cannot be referenced.

Reference For details about how to set regions, see “Tool Common Setting Items” - "Region".

Train

Add images to the dataset, set their classification label, run training, and display the test result of the tool that was based on the training.

- Dataset
- Train
- Test Result
- Options

Dataset

Add Image from Camera

Click to open the [Add Image from Camera] dialog box. In the [Add Image from Camera] dialog box, you can set classification labels for and train images captured by the camera.
→[Add Image from Camera] dialog box

Dataset Name

The name of the dataset used by the [AI Detection] tool is displayed.

··· (Settings Menu)

Click to display the dataset settings menu.

- **Browse Dataset**: Selecting this menu item displays the [Browse Dataset] dialog box, which lists the names of existing datasets and the number of AI Inspection tools that reference them. Selecting a dataset name other than the one in use and clicking [OK] switches the datasets.

  Point
  When the dataset is changed, the following information associated with the images in the dataset in use is deleted:
  - Training settings
  - Setting classification labels
  - Test results

- **Edit Dataset Name**: Selecting this menu item displays the [Edit Dataset Name] dialog box. Edit the dataset name and click [OK] to change the name (up to 64 characters).
  – Prohibited characters: \ / : * ? ” < > |
- **Create New Dataset**: Selecting this menu item displays the [Create New Dataset] dialog box. Edit the dataset name and click [OK] to create an empty dataset with no imported images.

  Point
  A maximum of 100 datasets can be created. However, this number varies depending on the free space available on the device and computer.

- **Delete Dataset**: Selecting this menu item displays the [Delete Dataset] dialog box. Select a dataset and click [OK] to delete the selected dataset.

  Point
  - The datasets that are already being referenced by an AI Inspection tool cannot be deleted.
  - When a dataset is deleted, the following information associated with the images in the dataset is deleted:
    –Images
    –Training settings
    –Setting classification labels
    –Test results
    –Image group settings
  - For an AI Inspection tool without a dataset referenced, a referencing error will occur and the name of the dataset will be displayed in red text.

- **Export Dataset**: Selecting this menu item displays a dialog box for selecting the output destination for the dataset. When the output destination is selected, a folder containing the dataset images is created.

Edit Dataset

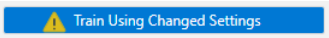
Click this button to open the [Edit Dataset / Display Results] dialog box. In the [Edit Dataset / Display Results] dialog box, you can set classification labels and perform training for imported existing image files. Also, the test result can be checked.
→[Edit Dataset / Display Results] dialog box

Train

Train

Click this button to perform training based on the Good (Pass)/Defective (Fail) classification labels set for the training images, and to test all images in the dataset based on the training results. The AI Detection test results can be viewed on [Summary] and [Degree of Separation Graph] in the [Edit Dataset / Display Results] dialog box.

Point

Meaning of the display of 

This icon is displayed when some parameters were changed after training.
In the AI Inspection tool, if some parameters are changed, the changes will not be reflected unless you train and test again. The result displayed on the screen may not reflect the parameter change made after training.
This icon indicates that the change made after training has been performed is not reflected, and that training and testing are required again. The icon disappears after training and testing again.

Reference

- [Train] is performed on the training images. is shown for training images on the bottom-left of the [Thumbnail Image] on the [Edit Dataset / Display Results] dialog box.
- The [AI Detection] tool's [Anomaly Level] can also be viewed on the image in [Image Viewer].

Multi-Tool Training

Click this button to open the [Multi-Tool Training] dialog box, and display the images in the dataset for which multi-tool training is to be executed and the classification labels and training flags (Train/Test) for each AI Detection tool set for those images. After checking and editing the classification label and training flag for each image, click the [Multi-Tool Training] button in the lower right corner of the [Multi-Tool Training] dialog box to execute multi-tool training.

Point

When the classification label is “Defective (Fail)” and the defective (fail) part has not been specified, only Test can be selected.

Reference

- The display images can be switched with the ◄ ► button in the lower right corner of the dialog.

Training Condition

Configure the settings such as the size of the anomaly to be detected and the method of displaying the anomaly.

Select Mode

Select the method of specifying the defective (fail) part.

– **Standard** (default): Specify the range of the defective (fail) parts using rectangles.

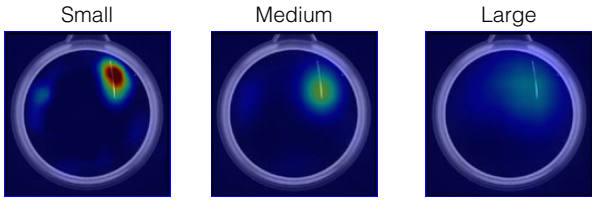
– **Fine**: Specify the defective (fail) parts in detail using paint or polygons.

Point
- Available only on devices where AI activation has been performed.
- [Fine] can be selected if the VS camera model is 3.2M or higher.
- When the mode is changed, the regions of defective (fail) parts that have been set will be deleted and re-training will be necessary.

Anomaly Size

Select the size of the anomaly to be detected (default: Medium). Displayed when [Select Mode] is set to [Standard].

– **Large:** Select this option when you want to detect anomalies of relatively large size.
– **Medium**: Select this option when you want to detect anomalies of relatively medium size.
– **Small**: Select this option when you want to detect anomalies of relatively small size.



Selecting [Small] makes it easier to handle small anomalies, while selecting [Large] results in a more stable response with less noise.

Reference A detectable anomaly size guide is displayed as a red circle in the Image Viewer in accordance with the item selected in Anomaly Size and the size of the inspection region set.

Training Image Data Augmentation

Based on the images set as training images, new training images are generated and used for training.

– **ON**: Adds images generated during training as new training images.
– **OFF** (default): No training image is augmented.
– **Number of Training Images**: Displays the number of training images.
– **Number of Data Augmentation Images**: Displays the number of images to be generated and added during training.

Point If the Image Selector is used with [Training Image Data Augmentation] set to ON, the training will be performed with augmentation applied for each training session.

Detection Conditions

Heat Map Range

Set the range of the heat map display for when an anomaly is detected.

– **Value Specification**: Displays the heat map with the range values set manually. Set the threshold values to be displayed in red and blue for [Upper Limit Value (Red)] and [Lower Limit Value (Blue)]. The threshold values can also be set by dragging the color bar. If the upper limit value or lower limit value refers to a formula cell, the threshold values cannot be set by dragging the color bar.
– **Set Automatically** (default): Displays the heat map with the automatically calculated range values.

Important
- Anomaly levels above [Upper Limit Value (Red)] are displayed in red, while those below [Lower Limit Value (Blue)] are displayed in blue.
- The range between [Upper Limit Value (Red)] and [Lower Limit Value (Blue)] is displayed in a gradation of [Red - Yellow - Green - Blue] according to the value of the anomaly level.
- Changes to the heat map range values are reflected immediately for images in [Image Viewer], but they are reflected when [Test] is performed for thumbnail images.

Test Result

Display the test result of the AI Detection for the images in the dataset.

Display Results

Click this button to open the [Edit Dataset / Display Results] dialog box and display the [Summary] section. If the [Edit Dataset / Display Results] dialog box is already open, clicking the button will make it scroll to the [Summary] position.

Options

Shared AI Training

Enable this to select a shared AI training tool from the drop-down menu of [Referenced AI Detection Tool] (default: OFF).
→Shared AI Training

Judgment

Set the tolerance (upper limit) setting for the measured value. When the measurement result is outside of the set tolerance range, it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the [Upper Limit] check box, and then enter the tolerance.

Point
- If the check box is not selected, tolerance judgment is not performed and it will always be judged as “Pass”.
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Anomaly Level

Set the tolerance (upper limit) for the measured anomaly level.
- Unit: Number
- Range: 0.000 to 9999.999

Reference Click [Reflect to Judgment] in the [Edit Dataset / Display Results] dialog box - [Degree of Separation Graph] to reflect the [Good (Pass) and Defective (Fail) Threshold] to the [Upper Limit]. It cannot be reflected when the judgment condition is in linked state.

Display

Set the display method for the inspection region, mask region, and test result. The display color can be changed based on the judgment result for the tool. Also, use the toggle switch to show or hide the display.

Display Settings

Inspection Region

Select whether to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Result Display

Use the toggle switch to show or hide the result, and set the text size for when the result is displayed.

Display Anomaly Level

Select whether to display the anomaly level.

Font Size

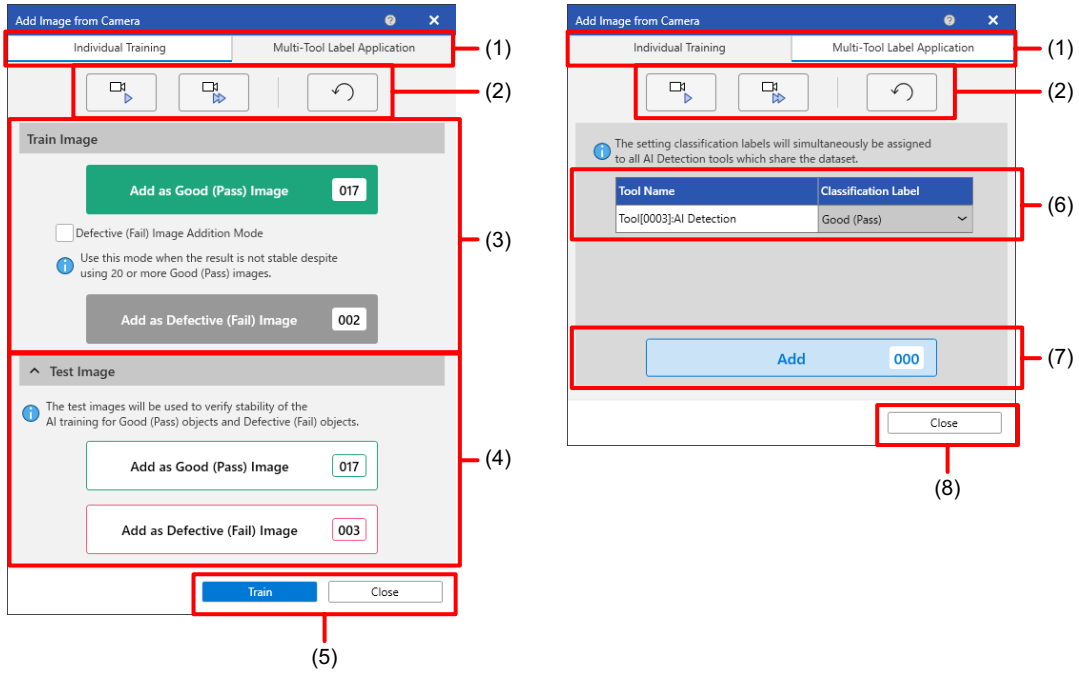
Set the font size for the detection result to be displayed.

Reset

Restores the display options to their default settings.

[Add Image from Camera] dialog box

This dialog box enables images captured by the camera and displayed in the [Image Viewer] to be imported into the dataset and simultaneously be set with a classification label, Good (Pass) or Defective (Fail), and added as training images. You can also run training using the added images.



(1) Tabs for switching between Individual Training and Multi-Tool Label Application

Switches between importing captured images with the classification label set by tool, or importing images with the classification label set for each AI Detection that shares the same dataset.

(2) Trigger/Cancel

(Trigger)

Click to input a trigger and capture an image. The captured image is displayed in [Image Viewer].

Reference This is the same function as the trigger on the [Image Viewer] toolbar.

(Continuous Trigger)

Click to repeatedly input a trigger. The image in [Image Viewer] changes continuously.

(Cancel)

Deletes the previously added image.

(3) Train Image

Add the image displayed in [Image Viewer] as a good (pass) or defective (fail) training image. Added images can be viewed in the [Thumbnail Section] on the [Edit Dataset / Display Results] dialog box.

Add as Good (Pass) Image

Click to add the image displayed in [Image Viewer] as a good (pass) training image. The number in the white box is the number of images added as training images of good parts.

Defective (Fail) Image Addition Mode

When enabled (default: disabled), training images of defective parts can be added in [Add as Defective (Fail) Image].

Add as Defective (Fail) Image

Click to add the image displayed in [Image Viewer] as a defective (fail) training image. The number in the white box is the number of images added as training images of defective parts.

Point Training images of defective parts can only be added if [Defective (Fail) Image Addition Mode] is enabled. Use this option if the good/defective judgment is not stable after 20 or more images of good parts have been added.

(4) Test Image

Add the image displayed in [Image Viewer] as a good (pass) or defective (fail) test image. Added images can be viewed in the [Thumbnail Section] on the [Edit Dataset / Display Results] dialog box.

Add as Good (Pass) Image

Click to add the image displayed in [Image Viewer] as a good (pass) test image. The number in the white box is the number of images added as test images of good parts.

Add as Defective (Fail) Image

Click to display the image displayed in [Image Viewer] in the [Defective (Fail) Part Specification] dialog box. Specify the defective (fail) part and click [OK] to add the image as a defective (fail) test image. The number in the white box is the number of images added as test images of defective parts.

(5) Train/Close

Train

Closes the [Add Image from Camera] dialog box, executes the training, and then runs a test. The test results of the AI Inspection tool can be viewed on [Summary] and [Degree of Separation Graph] in the [Edit Dataset / Display Results] dialog box.

Reference The [AI Detection] tool's [Anomaly Level] can also be viewed on the image in the [Image Viewer].

Close

Closes the [Add Image from Camera] dialog box.

(6) Multi-Tool Label Application

The AI Detections which use the same dataset are displayed in a list. Select a classification label for the image displayed in [Image Viewer] from the drop-down menu for each AI Detection.

(7) Add

Click this button to add the image displayed in [Image Viewer] as a test image by the classification label set in [Multi-Tool Label Application].
The imported images can be viewed in the [Thumbnail Section] in the [Edit Dataset / Display Results] dialog box.

(8) Close

Closes the [Add Image from Camera] dialog box.

[Edit Dataset / Display Results] dialog box

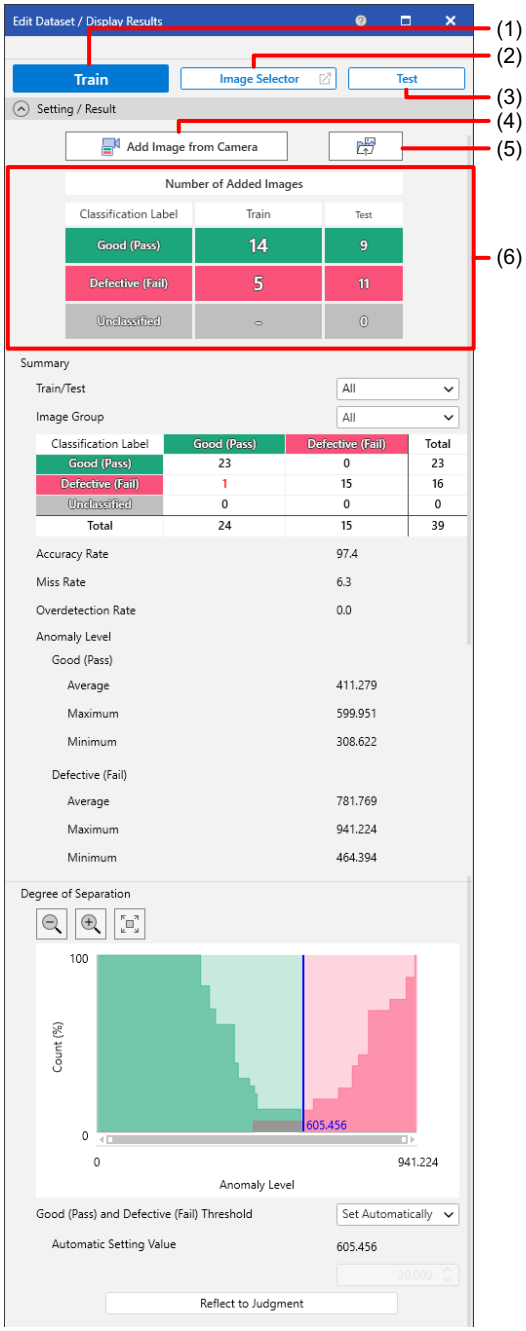
This dialog box enables you to import captured images, sort them into good/defective images, and add them as training images. You can also run training using the added images. Also, the judgment result after training can be checked.

Point If a measurement tool other than an AI Inspection tool is selected while the [Edit Dataset / Display Results] dialog is displayed, operations that make changes to the dataset image and the information associated with it cannot be performed.

Labeling Section

This area is used to check classification label settings (good (pass)/defective (fail)) for imported images and training image settings.

Reference If a measurement tool other than an AI Inspection tool is selected with the [Edit Dataset / Display Results] dialog box displayed, the AI Inspection tool ID and name for which the dialog box was displayed are shown below the dialog box title. This enables the user to know to which AI Inspection tool the images displayed in the [Edit Dataset / Display Results] dialog box belongs.



(1) Train

Click this button to perform training based on the good/defective classification labels set for training images and specified defective parts, and to perform a test for all images in the dataset based on the training results. AI Detection test results are displayed on the thumbnail image in the [Thumbnail Section].

Point [Train] is performed on the training images. The training image is indicated by in the lower left of the [Thumbnail Image] in the [Thumbnail Section].

(2) Image Selector

Click this button to open the [Auto Image Selector] dialog. Execute the Auto Image Selector to automatically set the training flag and perform training for the images added to the dataset.
→[Auto Image Selector] Dialog

(3) Test

Click this button to perform an AI Detection test for all imported images. The AI Detection test results are displayed on the [Thumbnail Image] in the [Thumbnail Section].

Point Meaning of the display of ⚠ Train ⚠ Test

This icon is displayed when some parameters were changed after training.
In the AI Inspection tool, if some parameters are changed, the changes will not be reflected unless you train and test again. The result displayed on the screen may not reflect the parameter change made after training.
This icon indicates that the change made after training has been performed is not reflected, and that training and testing are required again. The icon disappears after training and testing again.

If ⚠ Train is displayed, ⚠ Test cannot be clicked.

If re-training and re-testing became necessary because the settings were changed accidentally, select [Edit] - [Undo] from the menu bar to cancel the changes.

Reference When [Test] is clicked, the target images are automatically updated before testing is executed.

(4) Add Image from Camera

Click this button to display the [Add Image from Camera] dialog box for capturing images and adding them as a Good (Pass) or Defective (Fail) image.

(5) (Add Image from Computer)

Click this button to display a menu that allows you to specify an image file, a folder containing images, images from the Filmstrip, or simulation images to load into the dataset.

- **Import from File**: Displays the [Import from File] dialog to specify an image file and load it into the dataset.
- **Import from Folder**: Displays the [Import from Folder] dialog to specify a folder containing image files and load them into the dataset.
- **Import from Archived Images**: Displays the [Import from Archived Images] dialog to specify a condition (All/Pass/Fail) for the image file to be imported and load it into the dataset.
- **Import from Simulation Images**: Displays the [Import from Simulation Images] dialog to load the images in the simulation images loading folder into the dataset.

(6) Number of Added Images

The classification labels for good/defective parts set by the [AI Detection] tool and the number of images added to each classification label are displayed in a list.

Number of Added Images Layout

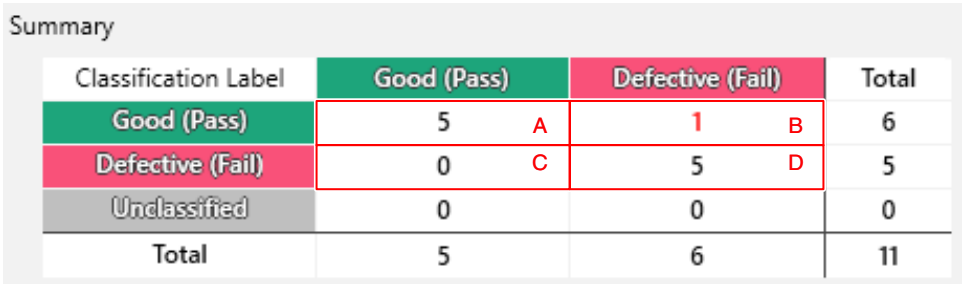
– **A**: Number of training images classified as good
– **B**: Number of training images classified as defective
– **C**: Number of test images classified as good
– **D**: Number of test images classified as defective
– **E**: Number of images that do not fall into any of the categories A-D

Summary

This table is for checking whether the results of the judgment by the tool are as expected after a test has been performed on the images set as good/defective.

Summary Layout

The rows in the table show the set classification labels and the columns show the judgment results from AI Detection.


Summary

Classification Label	Good (Pass)	Defective (Fail)	Total
Good (Pass)	5 A	1 B	6
Defective (Fail)	0 C	5 D	5
Unclassified	0	0	0
Total	5	6	11

– **A**: Number of images judged as good (pass) that are set as good (pass)
– **B**: Number of images judged as defective (fail) that are set as good (pass)
– **C**: Number of images judged as good (pass) that are set as defective (fail)
– **D**: Number of images judged as defective (fail) that are set as defective (fail)

Cells B and C represent the number of images that have not been judged as expected. Check the image in the [Thumbnail Section] and look into the cause.

Point Click on the summary cell to narrow down the images to be displayed in the [Thumbnail Section]. The next narrowing down cannot be performed until the narrowed down results are displayed.

Filter

– **Train/Test**: Narrow down the summary and the degree of separation graph to that of training or test images.
– **Image Group**: Narrow down the summary and the degree of separation graph by Image Group.

Point Train/test and image group filters are not saved in the program setting and are only retained while VS Creator is running.

Accuracy Rate

Displays the percentage of the images set with classification labels in which the set classification labels and the results judged by AI Detection match.

Miss Rate

Displays the percentage of the images set as defective that are judged as good by AI Detection.

Overdetection Rate

Displays the percentage of the images set as good that are judged as defective by AI Detection.

Anomaly Level

Displays the anomaly level statistics measured by running AI Detection.

Point The anomaly level is an index that indicates how different the current image is from the learned good image. The higher the number, the more different the image is from the learned good image.

Good (Pass)

Displays the Average, Maximum, and Minimum values of the anomaly level of the images set as good.

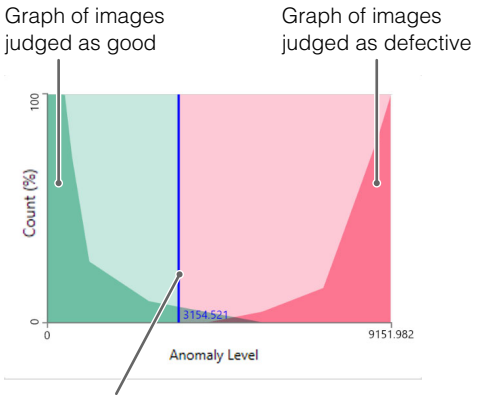
Defective (Fail)

Displays the Average, Maximum, and Minimum values of the anomaly level of the images set as defective.

Degree of Separation Graph

Displays a cumulative histogram of the anomaly level for images of parts that have been judged as good or defective. The vertical axis represents the image count (%) and the horizontal axis represents the anomaly level. The degree of separation graph shows whether AI Detection correctly judges good and bad parts.

Degree of Separation Graph Layout



[Good (Pass) and Defective (Fail) Threshold]

Areas where the graphs of images of good and defective parts overlap indicate that the anomaly level of “Images set as good” and “Images set as defective” overlap or are reversed. As the [AI Detection] tool judges the right side of the blue line on the graph ([Good (Pass) and Defective (Fail) Threshold]) as defective parts and the left side as good parts, the green graph on the right side of the blue line and the red graph on the left side are where the classification labels set during training and the result classification labels do not match, indicating that correct judgment according to the expected classification labels may not have been done.
In order for the [AI Detection] tool to judge correctly, the accuracy of the AI Detection must be improved, for example by adding training images and re-training.

Scale

The horizontal magnification of the degree of separation graph (Anomaly Level) can be changed.

– (Zoom out): Each time the button is clicked, the degree of separation graph is zoomed out horizontally by 10% around the threshold value. The default display is the minimum value. You can also zoom out by rotating the mouse wheel toward you.
– (Zoom in): Each time the button is clicked, the degree of separation graph is zoomed in horizontally by 10% around the threshold value. You can also zoom in by rotating the mouse wheel away from you.
– (Fit): Click the button to fit the degree of separation graph in the available width.
– Scroll bar: When the degree of separation graph is zoomed in, drag it horizontally to scroll the display. Double-click it to fit the degree of separation graph in the available width.

Good (Pass) and Defective (Fail) Threshold

Displays the anomaly level threshold for determining whether the image in the dataset is good or defective. The threshold can also be specified numerically by selecting [Value Specification] from the drop-down menu.

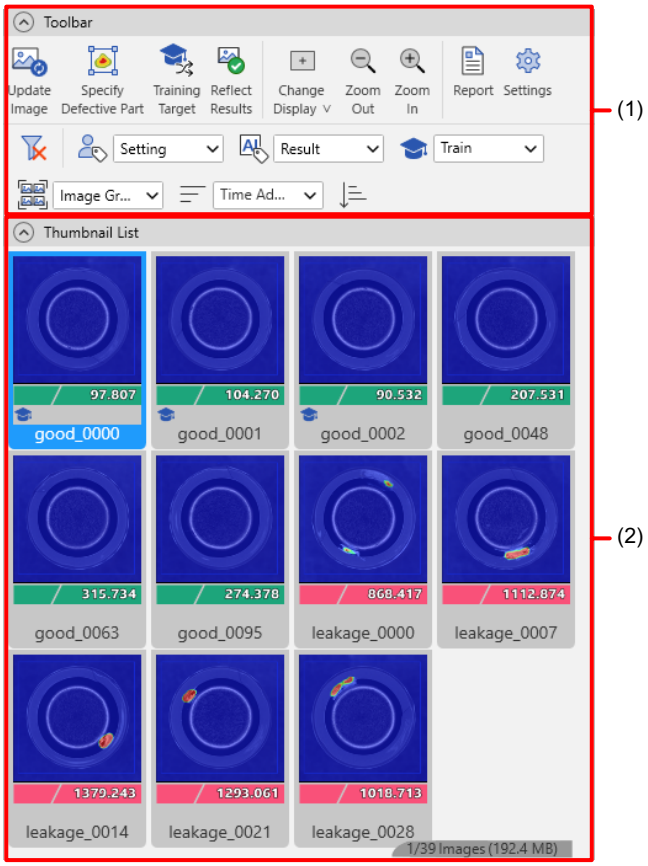
– Set Automatically (default): A threshold calculated from the training result is set and displayed.
– Value Specification: Specify the threshold with a numerical value.

Reflect to Judgment

Click to reflect [Good (Pass) and Defective (Fail) Threshold] to the upper limit for [Anomaly Level] in [Judgment Conditions].

Point It cannot be reflected if judgment condition is in linked state.

Thumbnail Section



(1) Toolbar

Point If the toolbar cannot be displayed in a single row, for example if the width of the [Edit Dataset / Display Results] dialog box is too narrow, ▼ (option) will be displayed to store the tools that could not be displayed in the row. Click the arrow icon to display the stored tools.

-

(Update Thumbnail Image Display): If the input image displayed in [Image Viewer] is a processed image from another tool, click this icon to update the processed image through execution of the tool and import the updated image.
-

(Defective (Fail) Part Specification): Training with the defective part specified increases the accuracy of defective part detection and AI Detection. Click the icon to open the [Defective (Fail) Part Specification] dialog.
→[Defective (Fail) Part Specification] dialog box
-

(Random Training Image Setting): Selects images at random from among the images for which classification labels are set in the dataset and adds them as training images. Click this icon to open the [Random Training Image Setting] dialog box. Set the proportion of images in the dataset to be added as training images. Click [OK] to add images in the dataset as training images according to the set proportion.
-

(Reflect Test Result as Settings): Set the test result of the [AI Detection] tool as the classification label.
-

(Switch Graphics Display): Switch the image display in the [Thumbnail Section].
  - **Raw Image**: Displays raw images.
  - **Heat Map**: Displays the heat map.
  - **Graphics**: Displays graphics overlaid on top of the raw image.
-

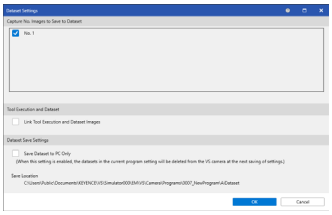
(Zoom Out/Zoom In): Click the icon to reduce/enlarge the thumbnail image.
-

(Output Report): A report that puts together the results of training and testing and the images can be created. Click the icon to display the dialog for specifying the save destination of the report. Enter a folder name and select the save destination to start creating the report (HTML file). Once the report creation is complete, the completed report is displayed.

Reference
  - To create a report, the AI tool training must have been completed.
  - The image displayed in the thumbnail section is output to the report. If a report is created with no image in the thumbnail section due to a filter, a report with no images is created.
  - The report display can be selected from the drop-down menu as [Standard Display] or [Simple Display]. In [Simple Display], detailed information such as the program setting name and camera model will be omitted.
  - In the AI Detection report, the defective (fail) part region will be displayed on the thumbnail.
  - The graphics on the thumbnail can be displayed or hidden.

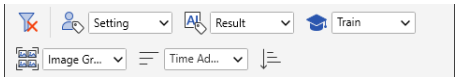
-

(Dataset Settings): Click to display the [Dataset Settings] dialog box.



– **Capture No. Images to Save to Dataset**: Select which capture number's images to import when Multi-Capture is enabled and images captured by the camera or images from the Filmstrip are imported into the dataset.
– **Tool Execution and Dataset**: If the [Link Tool Execution and Dataset Images] check box is selected, images that are not executed under the execution conditions on the General tab will not be trained or tested in the [Edit Dataset / Display Results] dialog, and their thumbnails will also be hidden. Even if you change the execution conditions on the General tab, they will not be reflected immediately in the thumbnail section, but will be reflected by updating the image.
– **Dataset Save Settings**: Select the [Save Dataset to PC Only] check box to save the dataset only to the PC and delete it from the device when the program setting is saved.

Reference
- The program setting volume in the device can be reduced.
- When connecting to the device from a different PC than the one in which the dataset is stored while this setting is enabled, no dataset image will exist.

- 

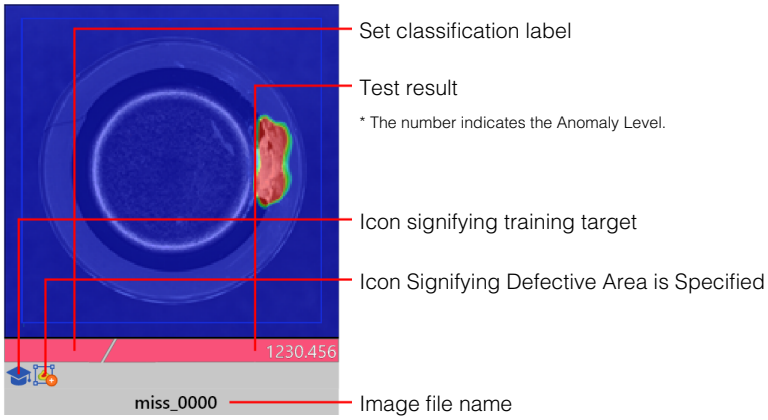
(Filter/Sort): Enables you to filter and sort the images displayed in the [Thumbnail Section].

Point
The [Thumbnail Section] filters are not saved in the program setting and are only retained while VS Creator is running.

– **(Clear Filter Conditions)**: Removes filtering and displays all images.
– Setting **(Filter by Setting Classification Label)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the classification label selected from the drop-down menu (None, Good (Pass), Defective (Fail)).
– Result **(Filter by Result Classification Label)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the test result selected from the drop-down menu (No Result, Good (Pass), Defective (Fail)).
– Train **(Filter by Training Image)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the selection from the pull-down menu, training target or not (All, Target, Non-target).
– Image Gr... **(Filter by Image Group)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the Image Group selected from the drop-down menu.
– Time Ad... **(Sort by)**: Sorts the display order of the thumbnail images according to the sorting criteria (Time Added, Anomaly Level, File Name) selected from the drop-down menu. Click to switch between sorting in ascending or descending order.

(2) Thumbnail Image

Thumbnail images of imported images are displayed.



Reference

- The number displayed at the bottom right of the [Thumbnail Section] is the number of imported images.
  - –When a thumbnail is selected, "the number of the selected image when counting from the top" is displayed.
    [Number of the image from the top]/[Total number of images] Images
  - –The number displayed to the right of the number of images is the total size of the images included in the thumbnail list.

- The selected thumbnail image is displayed in [Image Viewer]. The anomaly level is displayed on the image in [Image Viewer]. If a defective (fail) part is specified, the defective (fail) part region will be also displayed on the image in [Image Viewer].
- You can also right-click an image and set the image as a training image, set the classification label, and perform other operations from the context menu.
  - –**Use as Training Image**: Toggles between using or not using an image as a training image.
  - –**Classification Label**: Set to the selected classification label (Good (Pass)/ Defective (Fail)) or leave the classification label unset.
  - –Image Group: Adds the image to an image group. You can add the image to multiple image groups.
  - –**Defective (Fail) Part Specification**: Specify the defective (fail) part by using a region.
  - –**Delete**: Deletes the currently selected image from the dataset.

You can move the mouse cursor over the thumbnail image to see the below information.

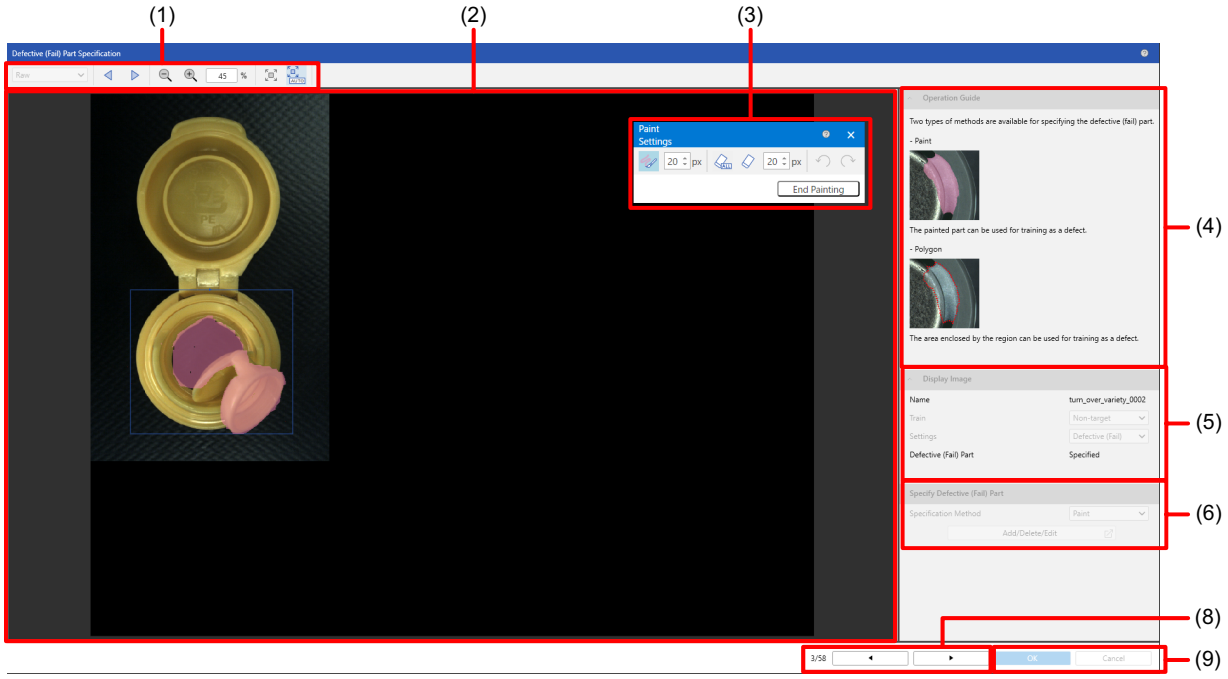
- **Name**: Image file name
- **Time Added**: The time when the image was added to the dataset
- **Train**: Whether the image is subject to training (Target/Non-target)
- **Setting**: The set classification label (Good (Pass)/Defective (Fail)). Blank if not set
- **Result**: The result classification label (Good (Pass)/Defective (Fail)) as determined by the [AI Detection] tool execution results. This is blank if the tool has not been run
- **Anomaly Level**: The anomaly level resulting from running AI Detection. The larger the difference from the trained good features, the higher the value. This is blank if the tool has not been run
- **Image Group**: The group to which the image belongs. This is blank if the image does not belong to any image group

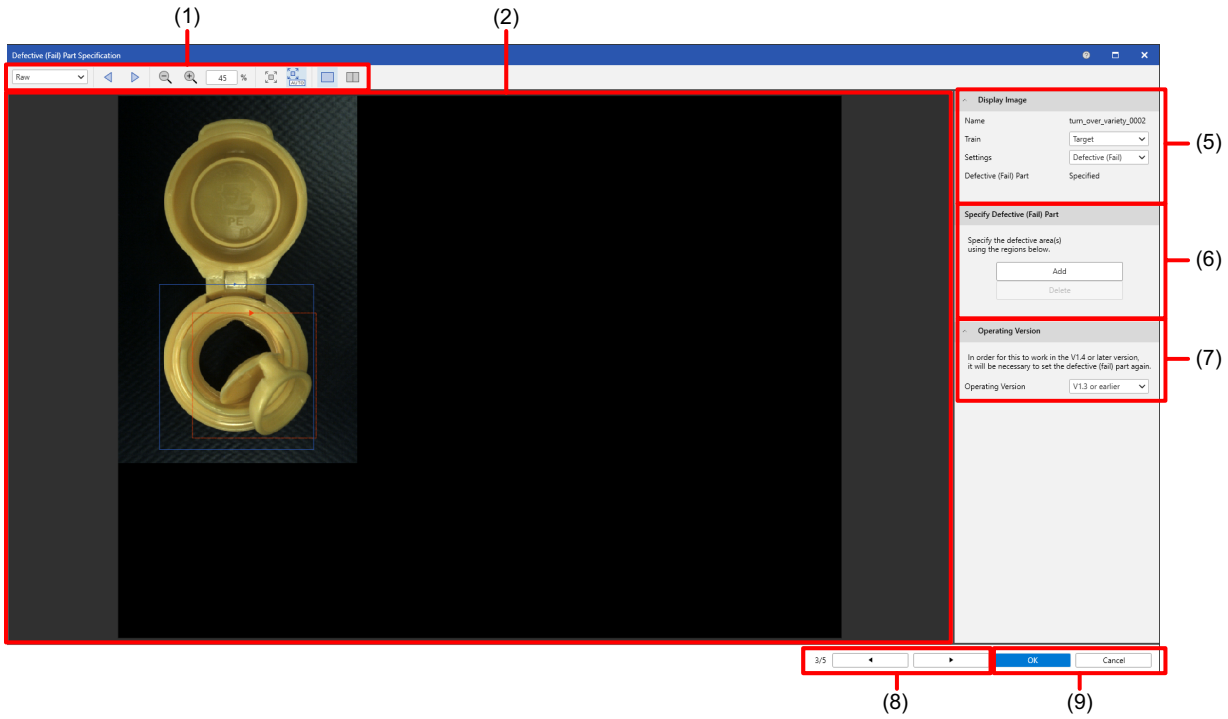
[Defective (Fail) Part Specification] dialog box

For training images that are to be judged as defective (fail), the AI must be trained to recognize the defective part in the image.
Defective parts can be set in the [Defective (Fail) Part Specification] dialog box.
The [Defective (Fail) Part Specification] dialog box can be displayed in one of the following ways:

- Importing a Defective (Fail) training image in the [Add Image from Camera] dialog box.
- Selecting a training image to set the defective part for in the [Thumbnail Section] in the [Edit Dataset / Display Results] dialog box and then clicking (Defective (Fail) Part Specification) on the toolbar.
- Clicking [Defective (Fail) Part Specification] in the context menu displayed by right-clicking the thumbnail image in the [Thumbnail Section] in the [Edit Dataset / Display Results] dialog box.

Point The items displayed in the [Defective (Fail) Part Specification] dialog box vary depending on the method used to specify the defective area.





(1) Toolbar

Raw **(Image Type)**

Switches the display type of the image displayed on the camera image. The selection is retained even if the image is changed.

- **Raw**: Display the camera image as it is.
- **Filtered**: Displays the filtered image of the selected dataset image. If you have set color extraction or image enhancement, only the part of the image that is within the region will be displayed as a filtered image.
- **Contrast**: Displays the distribution of anomaly levels by a heat map (blue to red gradation). Blue areas indicate normal, the closer to red the higher the anomaly level.

(Previous Image/Next Image)
Click to toggle the camera image.

(Zoom Out/Zoom In/Zoom Setting)
Click to change the zoom rate. You can also set the zoom rate by specifying a number.

(Fit/Auto Fit)
Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.

(Switch Screen)
Displayed when [Select Mode] is set to [Standard]. Toggles the number of images displayed on the camera image (1 screen/2 screens).

(2) Camera Image
Displays the image selected in [Image Type]. When [Select Mode] is set to [Standard], the defective (fail) parts are displayed as a red frame and the inspection region is displayed as a blue frame.

Point
The inspection region cannot be edited on the [Defective (Fail) Part Specification] dialog box. Edit the inspection region from the [Region] tab on the [Properties] view.

(3) Paint Settings Dialog (Displayed when [Select Mode] is set to [Fine])
Add/Delete/Edit the painting.

(Brush)
The number of pixels for painting can be configured.

(Clear)
Clears all of the paint.

(Eraser)
The number of pixels of the eraser can be configured.

(Undo)
Undoes the previous edit operation.

(Redo)
Redoes the previously undone edit operation.

End Painting
Ends the add/delete/edit operation for painting.

(4) Operation Guide
Displays a guide regarding the methods for specifying the defective (fail) part.

(5) Image Information
Displays information about the display image.

Name
Displays the name of the image.

Train
– **Target** (default): Sets the image as a target for training.
– **Non-target**: Sets the image as a non-target for training.

Settings
– **Good (Pass)** (default): Sets the image as good (pass).
– **Defective (Fail)**: Sets the image as defective (fail).
– **-**: Does not set the image as good (pass) or defective (fail).

Defective (Fail) Part
Displays whether or not the defective (fail) part has already been specified. If the defective (fail) part has not been specified, it will be displayed in red.

(6) Specify Defective (Fail) Part

Specify the defective part on the camera image.

Reference
- Regions specified as defective (fail) parts are also displayed in the Image Viewer.
- For images with specified defective (fail) parts, an icon ( ) will be displayed at the bottom of the thumbnail. In addition, when the Graphics display is set for the thumbnail, the defective (fail) parts are also displayed on the thumbnail.

Add (Displayed when [Select Mode] is set to [Standard])
Add the defective part. Up to eight regions can be set for a single image.

Delete (Displayed when [Select Mode] is set to [Standard])
Deletes the selected defective part.

Specification Method (Displayed when [Select Mode] is set to [Fine])
Select the specification method of the defective (fail) part.
– **Paint**: The painted part can be used for training as a defect.
  –Add/Delete/Edit
  Displays the [Paint Settings] dialog. Perform addition/deletion/editing of painting.
– **Polygon**: The area enclosed by the region can be used for training as a defect.
  –
  Switches the order of the selected defective (fail) part/vertex.
  –Add
  Adds defective (fail) parts/vertices.
  –Defective (Fail) Part n
  Set the vertices of the defective (fail) part.
  – ✕
  Deletes the selected defective (fail) part/vertex. When a defective (fail) part/vertex is deleted, the defective (fail) part/vertex number (n) after it move up in order.

(7) Operating Version

Displayed when the version of the program setting is converted from version 1.3 or earlier to version 1.4 or later and the AI Detection tool of version 1.3 is selected. The operating version of AI Detection can be selected.

– **V1.3 or earlier** (default): The tool can be used as per the previous settings. However, the defective (fail) parts cannot be partially pasted with the AI Detection tool added in version 1.4 or later.
– **V1.4 or later**: The defective (fail) parts can be partially pasted with the AI Detection tool added in version 1.4 or later.

Point
- When switching [Operating Version] to [V1.4 or later], check the defective (fail) parts set on each image in version 1.3 and configure the settings again as needed.
- Once switched to [V1.4 or later], [Operating Version] will be hidden thereafter.

(8) Number of Images/ ◂ ▸ (Previous Image/Next Image)

Number of Images
Displays the number of images imported and the position of the currently displayed image from the top.
[The position of the currently displayed image from the top] / [Total Number]

◂ ▸(Previous Image/Next Image)
Click to toggle the camera image.

(9) OK/Cancel

- **OK**: Saves the edited setting, and closes the dialog.
- **Cancel**: Cancels the edited setting, and closes the dialog.

AI Segmentation

#E101

AI Segmentation allows AI to learn the defective parts of defective (fail) objects and to detect defective areas that are finer than what AI Detection can detect.

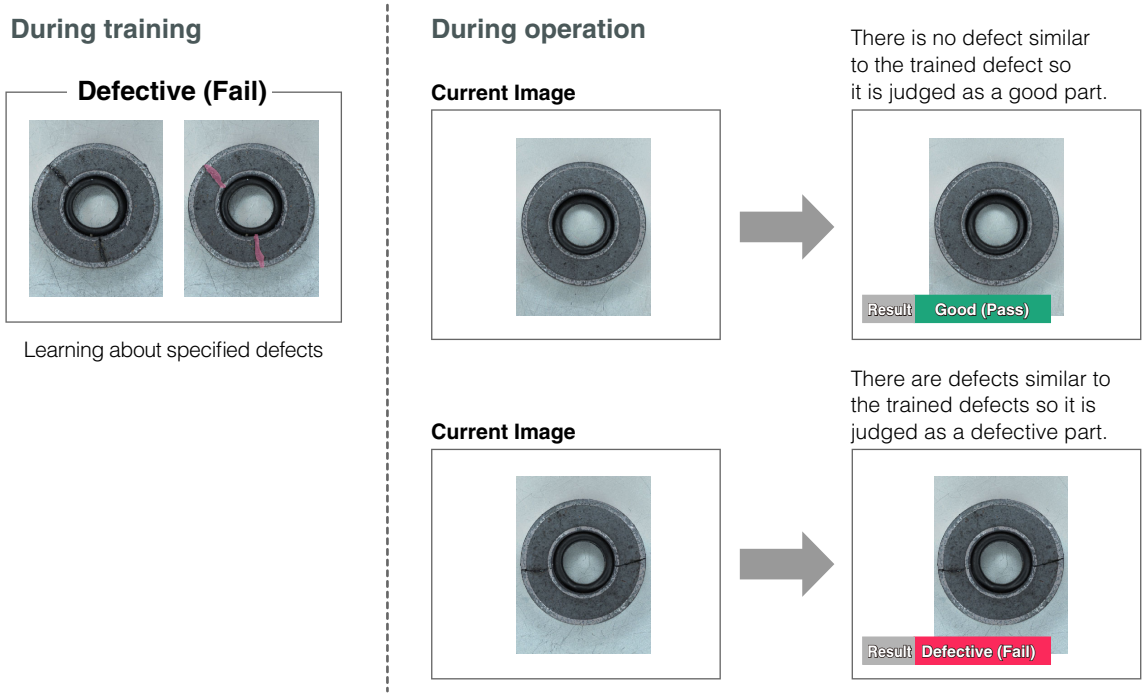
Point

- The [AI Segmentation] tool can be used if the VS camera model is 3.2M or higher.
- Available only on devices where AI activation has been performed.

Overview of functions

Image of the Measurement

It trains on fine defects with defective (fail) images and determines whether a part is good or defective by extracting similar defects from the input image.



Measurement Results Output

The measurement results output by the [AI Segmentation] tool are as follows.

Measurement result	Description of output
Anomaly Level	Outputs the [Anomaly Level] for the current image. The larger the value of [Anomaly Level] is from 0, the further the part is from the trained good parts.
Tool judgment value	When the measurement result is outside of the set tolerance range (upper limit), it is judged as [Fail]. When the result is within the tolerance range, it is judged as [Pass].

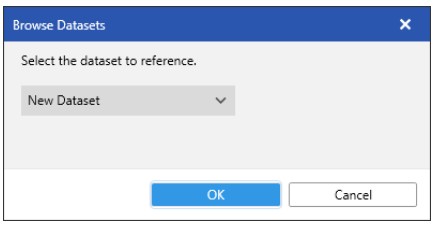
Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement workflow

The setup workflow, from adding the [AI Segmentation] tool to the [Task] view and setting the inspection region up to measurement, is as follows.

1 Add the [AI Segmentation] tool to the [Task] view.

Point If another AI Inspection tool has already been added and a dataset created when the tool is added, the [Browse Datasets] dialog box appears.



- To create a new dataset for the AI Inspection tool to be added, select [New Dataset] and then click [OK].
- If you want to use an existing dataset, select the dataset to be referenced and then click [OK].
  Images in the shared dataset can be viewed in the [Thumbnail Section] on the [Edit Dataset / Display Results] dialog box.
  →[Thumbnail Section] on the [Edit Dataset / Display Results] dialog box

2 Set the inspection region to be a target for training on [Image Viewer].
→Drawing a Region

3 Perform training from the [Train] tab on the [Properties] view.
The following two training methods are available.

Training by Capturing Images

This method is used to train by capturing images of defective and good parts with a camera and setting classification labels, Defective (Fail)/Good (Pass), for each captured image.
The [Add Image from Camera] dialog box that appears when you click [Add Image from Camera] enables you to perform operations from image capture to setting classification labels and training.
→[Add Image from Camera] dialog box

Training with Captured Images

This method is used to train by adding existing images, such as recorded images, simulation images, and output images from other inspections, in a dataset and setting classification labels, Defective (Fail)/Good (Pass), for each image.
The [Edit Dataset / Display Results] dialog box that appears when you click [Edit Dataset] enables you to import images, set classification labels, and train.
→[Edit Dataset / Display Results] dialog box

Once training is complete, the [AI Segmentation] tool is subsequently run on images in the dataset.

4 View the test results in [Summary] and [Degree of Separation Graph] of [Edit Dataset / Display Results] to check whether the dataset images are correctly judged into Good (Pass) or Defective (Fail).
→[Summary] and [Degree of Separation Graph] in the [Edit Dataset / Display Results]
If the judgment is incorrect, you can adjust them by re-importing, re-setting classification labels, and re-training images. If they are judged correctly, setup is complete.
Switch to Run Mode and start measurement.
→Change Mode

Reference If you want to make judgments based on the area and length of defects and stains, turn on [Generate Contrast Image] in the [General] tab and use the generated contrast image as the input image of other tools.

Properties

The [Properties] view for the [AI Segmentation] tool is made up of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	Displays the tool information. You can also enter the tool name and comments. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Region	Set the reference position for the tool's coordinate system. Additionally, specify the area on the captured image to be used for measurement.
Train	Add images to the dataset, set their classification label, run training, and display the test result of the tool that was based on the training.
Judgment	Set the tolerance (upper limit) setting for the measured value.
Display	Set the display methods for things such as the inspection and mask regions.

Region

Set the reference position for the tool's coordinate system. Additionally, specify the area on the captured image to be used for measurement.

Point
- Re-training is necessary when the inspection region is edited.
- The Shared Region tool with position adjustment or image region set cannot be referenced.

Reference For details about how to set regions, see “Tool Common Setting Items” - "Region".

Train

Add images to the dataset, set their classification label, run training, and display the test result of the tool that was based on the training.

- Dataset
- Train
- Test Result

- Options

Dataset

Add Image from Camera

Click to open the [Add Image from Camera] dialog box. In the [Add Image from Camera] dialog box, you can set classification labels for and train images captured by the camera.
→[Add Image from Camera] dialog box

Dataset Name

The name of the dataset used by the [AI Segmentation] tool is displayed.

··· (Settings Menu)

Click to display the dataset settings menu.

- **Browse Dataset**: Selecting this menu item displays the [Browse Dataset] dialog box, which lists the names of existing datasets and the number of AI Inspection tools that reference them. Selecting a dataset name other than the one in use and clicking [OK] switches the datasets.

  Point: When the dataset is changed, the following information associated with the images in the dataset in use is deleted:
  - Training settings
  - Setting classification labels
  - Test results

- **Edit Dataset Name**: Selecting this menu item displays the [Edit Dataset Name] dialog box. Edit the dataset name and click [OK] to change the name (up to 64 characters).
  – Prohibited characters: \ / : * ? ” < > ¦
- **Create New Dataset**: Selecting this menu item displays the [Create New Dataset] dialog box. Edit the dataset name and click [OK] to create an empty dataset with no imported images.

  Point: A maximum of 100 datasets can be created. However, this number varies depending on the free space available on the device and computer.

- **Delete Dataset**: Selecting this menu item displays the [Delete Dataset] dialog box. Select a dataset and click [OK] to delete the selected dataset.

  Point:
  - The datasets that are already being referenced by an AI Inspection tool cannot be deleted.
  - When a dataset is deleted, the following information associated with the images in the dataset is deleted:
    –Images
    –Training settings
    –Setting classification labels
    –Test results
    –Image group settings
  - For an AI Inspection tool without a dataset referenced, a referencing error will occur and the name of the dataset will be displayed in red text.

- **Export Dataset**: Selecting this menu item displays a dialog box for selecting the output destination for the dataset. When the output destination is selected, a folder containing the dataset images is created.

Edit Dataset

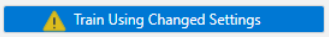
Click this button to open the [Edit Dataset / Display Results] dialog box. In the [Edit Dataset / Display Results] dialog box, you can set classification labels and perform training for imported existing image files. Also, the test result can be checked.
→[Edit Dataset / Display Results] dialog box

Train

Train

Click this button to perform training based on the Good (Pass)/Defective (Fail) classification labels set for the training images, and to test all images in the dataset based on the training results. The test results of the AI segmentation tool can be viewed on [Summary] and [Degree of Separation Graph] in the [Edit Dataset / Display Results] dialog box.

Point

Meaning of the display of 

This icon is displayed when some parameters were changed after training.
In the AI Inspection tool, if some parameters are changed, the changes will not be reflected unless you train and test again. The result displayed on the screen may not reflect the parameter change made after training.
This icon indicates that the change made after training has been performed is not reflected, and that training and testing are required again. The icon disappears after training and testing again.

Reference

- [Train] is performed on the training images. is shown for training images on the bottom-left of the [Thumbnail Image] on the [Edit Dataset / Display Results] dialog box.
- The [AI Segmentation] tool's [Anomaly Level] can also be viewed on the image in [Image Viewer].

Training Condition

Configure the settings such as the size of the anomaly to be detected and the method of displaying the anomaly.

Anomaly Size

Enter the size of the anomaly as a numerical value (default: 20). The smaller the size, the easier it is to react to small anomalies, and the larger the size, the more stable the response becomes with less noise. If the Anomaly Size is too small in relation to the size of the specified defective (fail) part, the accuracy of the training decreases. Click [Execute Tuning] to automatically enter the optimal anomaly size value calculated by the AI.

High-Sensitivity Mode

Set the detection sensitivity.

- **ON** (default): Sets the detection sensitivity to high. A wide range of defects can be detected even with a small number of training images.
- **OFF**: Sets the detection sensitivity to low. Select this to suppress overdetection.

Detection Conditions

Heat Map Range

Set the range of the heat map display for when an anomaly is detected. The heat map will be displayed by the set range values. Set the threshold values for displaying in red and blue in [Upper Limit Value (Red)] and [Lower Limit Value (Blue)]. The threshold values can also be set by dragging them on the color bar. If the upper limit value or lower limit value refers to a formula cell, the threshold values cannot be set by dragging them on the color bar.

Important

- The parts with anomaly levels above [Upper Limit Value (Red)] are displayed in red, while those below [Lower Limit Value (Blue)] are displayed in blue.
- The range between [Upper Limit Value (Red)] and [Lower Limit Value (Blue)] is displayed in a gradation of [Red - Yellow - Green - Blue] according to the value of the anomaly level.
- Changes to the heat map range values are reflected immediately for images in [Image Viewer], but they are reflected when [Test] is performed for thumbnail images.

Test Result

Display the test result of the AI Segmentation for the images in the dataset.

Display Results

Click this button to open the [Edit Dataset / Display Results] dialog box and display the [Summary] section. If the [Edit Dataset / Display Results] dialog box is already open, clicking the button will make it scroll to the [Summary] position.

Options

Shared AI Training

Enable this to select a shared AI training tool from the drop-down menu of [Referenced AI Segmentation Tool] (default: OFF).
→Shared AI Training

Judgment

Set the tolerance (upper limit) setting for the measured value. When the measurement result is outside of the set tolerance range (upper limit), it is judged as "Fail". When the result is within the tolerance range, it is judged as "Pass". The latest measurement results are displayed for [Current Value]. Select the [Upper Limit] check box, and then enter the tolerance.

Point

- If the check box is not selected, tolerance judgment is not performed and it will always be judged as "Pass".
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see “Appendix” - "Settings Parameters List".

Judgment Conditions

Anomaly Level

Set the tolerance (upper limit) for the measured anomaly level.

- Unit: Number
- Range: 0.000 to 9999.999

Reference Click [Reflect to Judgment] in the [Edit Dataset / Display Results] dialog box - [Degree of Separation Graph] to reflect the [Good (Pass) and Defective (Fail) Threshold] to the [Upper Limit]. It cannot be reflected when the judgment condition is in linked state.

Display

Set the display method for the inspection region, mask region, and test result. The display color can be changed based on the judgment result for the tool. Also, use the toggle switch to show or hide the display.

Display Settings

Inspection Region

Select whether to display the inspection region.

- **ON** (default): Displays the inspection region. Set the line thickness and display color of the inspection region.
- **OFF**: Does not display the inspection region.

Mask Region

Select whether to display the mask region.

- **ON** (default): Displays the mask region. Set the line thickness and display color of the mask region.
- **OFF**: Does not display the mask region.

Result Display

Use the toggle switch to show or hide the result, and set the text size for when the result is displayed.

Display Anomaly Level

Select whether to display the anomaly level.

Font Size

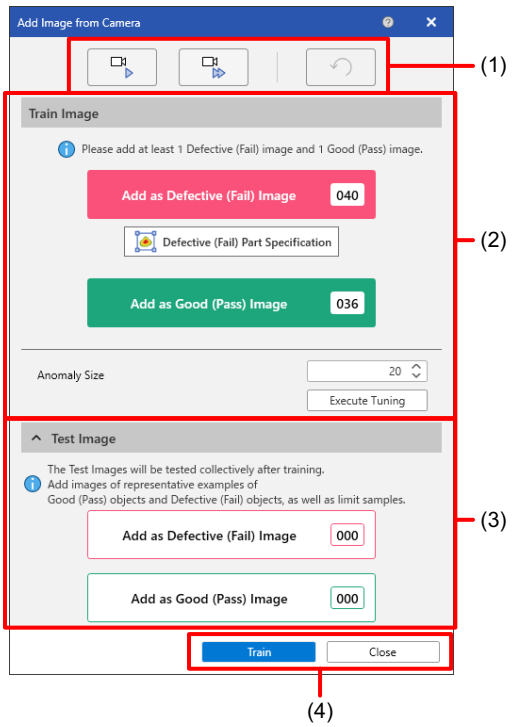
Set the font size for the detection result to be displayed.

Reset

Restores the display options to their default settings.

[Add Image from Camera] dialog box

This dialog box enables images captured by the camera and displayed in the [Image Viewer] to be imported into the dataset and simultaneously be set with a classification label, Defective (Fail) or Good (Pass), and added as training images. You can also run training using the added images.



(1) Trigger/Cancel

(Trigger)

Click to input a trigger and capture an image. The captured image is displayed in [Image Viewer].

Reference This is the same function as the trigger on the [Image Viewer] toolbar.

(Continuous Trigger)

Click to repeatedly input a trigger. The image in [Image Viewer] changes continuously.

(Cancel)

Deletes the previously added image.

(2) Train Image

Add the image displayed in [Image Viewer] as a Good (Pass) or Defective (Fail) training image. Added images can be viewed in the [Thumbnail Section] on the [Edit Dataset / Display Results] dialog box.

Add as Defective (Fail) Image

Click to add the image displayed in [Image Viewer] as a training image for defective parts. The number in the white box is the number of images added as training images of defective parts.

- **Defective (Fail) Part Specification**: Click to display the [Defective (Fail) Part Specification] dialog box. Specify the defective areas in the image added as a Defective (Fail) image.
  →[Defective (Fail) Part Specification] dialog box

Add as Good (Pass) Image

Click to add the image displayed in [Image Viewer] as a Good (Pass) training image. The number in the white box is the number of images added as training images of good parts.

Anomaly Size

Enter the size of the anomaly as a numerical value (default: 20). The smaller the size, the easier it is to react to small anomalies, and the larger the size, the more stable the response becomes with less noise. If the Anomaly Size is too small in relation to the size of the specified defective (fail) part, the accuracy of the training decreases. Click [Execute Tuning] to automatically enter the optimal anomaly size value calculated by the AI.

(3) Test Image

Add the image displayed in [Image Viewer] as a Good (Pass) or Defective (Fail) test image. Added images can be viewed in the [Thumbnail Section] on the [Edit Dataset / Display Results] dialog box.

Add as Defective (Fail) Image

Click to add the image displayed in [Image Viewer] as a Defective (Fail) test image. The number in the white box is the number of images added as a Defective (Fail) test image.

Add as Good (Pass) Image

Click to add the image displayed in [Image Viewer] as a Good (Pass) test image. The number in the white box is the number of images added as a Good (Pass) test image.

(4) Train/Close

Train

Closes the [Add Image from Camera] dialog box to run the training, and then performs a test. The test results of the AI Inspection tool can be viewed on [Summary] and [Degree of Separation Graph] in the [Edit Dataset / Display Results] dialog box.

Reference The [AI Segmentation] tool's [Anomaly Level] can also be viewed on the image in [Image Viewer].

Close

Closes the [Add Image from Camera] dialog box.

[Edit Dataset / Display Results] dialog box

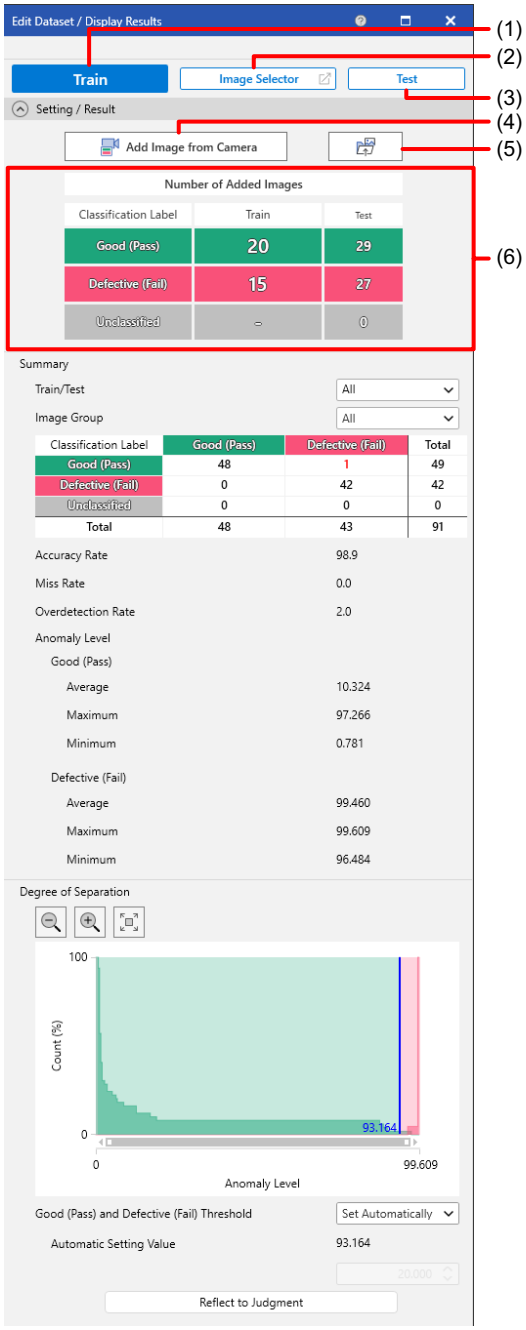
This dialog box enables you to import captured images, sort them into good/defective images, and add them as training images. You can also run training using the added images. Also, the judgment result after training can be checked.

Point If a measurement tool other than an AI Inspection tool is selected while the [Edit Dataset / Display Results] dialog is displayed, operations that make changes to the dataset image and the information associated with it cannot be performed.

Labeling Section

This area is used to check classification label settings (good (pass)/defective (fail)) for imported images and training image settings.

Reference If a measurement tool other than an AI Inspection tool is selected with the [Edit Dataset / Display Results] dialog box displayed, the AI Inspection tool ID and name for which the dialog box was displayed are shown below the dialog box title. This enables the user to know to which AI Inspection tool the images displayed in the [Edit Dataset / Display Results] dialog box belongs.



(1) Train

Click this button to perform training based on the good/defective classification labels set for training images and specified defective parts, and to perform a test for all images in the dataset based on the training results. AI Segmentation test results are displayed on the thumbnail image in the [Thumbnail Section].

Point [Train] is performed on the training images. The training image is indicated by in the lower left of the [Thumbnail Image] in the [Thumbnail Section].

(2) Image Selector

Click this button to open the [Auto Image Selector] dialog. Execute the Auto Image Selector to automatically set the training flag and perform training for the images added to the dataset.
→[Auto Image Selector] Dialog

(3) Test

Click this button to perform an AI Segmentation test for all imported images. The AI Segmentation test results are displayed on the [Thumbnail Image] in the [Thumbnail Section].

Point Meaning of the display of ⚠ Train ⚠ Test

This icon is displayed when some parameters were changed after training.
In the AI Inspection tool, if some parameters are changed, the changes will not be reflected unless you train and test again. The result displayed on the screen may not reflect the parameter change made after training.
This icon indicates that the change made after training has been performed is not reflected, and that training and testing are required again. The icon disappears after training and testing again.

If ⚠ Train is displayed, ⚠ Test cannot be clicked.

If re-training and re-testing became necessary because the settings were changed accidentally, select [Edit] - [Undo] from the menu bar to cancel the changes.

Reference When [Test] is clicked, the target images are automatically updated before testing is executed.

(4) Add Image from Camera

Click this button to display the [Add Image from Camera] dialog box for capturing images and adding them as a Defective (Fail) or Good (Pass) image.

(5) (Add Image from Computer)

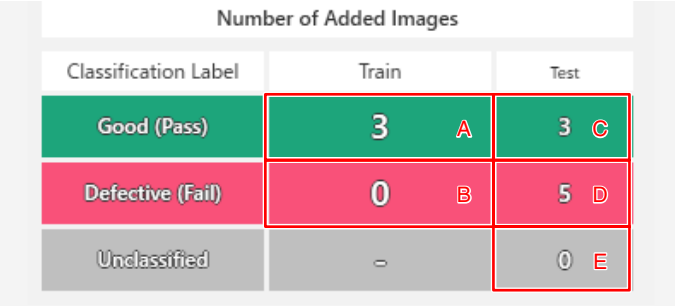
Click this button to display a menu that allows you to specify an image file, a folder containing images, images from the Filmstrip, or simulation images to load into the dataset.

- **Import from File**: Displays the [Import from File] dialog to specify an image file and load it into the dataset.
- **Import from Folder**: Displays the [Import from Folder] dialog to specify a folder containing image files and load them into the dataset.
- **Import from Archived Images**: Displays the [Import from Archived Images] dialog to specify a condition (All/Pass/Fail) for the image file to be imported and load it into the dataset.
- **Import from Simulation Images**: Displays the [Import from Simulation Images] dialog to load the images in the simulation images loading folder into the dataset.

(6) Number of Added Images

The classification labels for good/defective parts set by the [AI Segmentation] tool and the number of images added to each classification label are displayed in a list.

Number of Added Images Layout



– **A**: Number of training images classified as good
– **B**: Number of training images classified as defective
– **C**: Number of test images classified as good
– **D**: Number of test images classified as defective
– **E**: Number of images that do not fall into any of the categories A-D

Summary

This table is for checking whether the results of the judgment by the tool are as expected after a test has been performed on the images set as good/defective.

Summary Layout

The rows in the table show the set classification labels and the columns show the judgment results from AI Segmentation.

Summary

Classification Label	Good (Pass)		Defective (Fail)		Total
Good (Pass)	5	A	1	B	6
Defective (Fail)	0	C	5	D	5
Unclassified	0		0		0
Total	5		6		11

– **A**: Number of images judged as good (pass) that are set as good (pass)
– **B**: Number of images judged as defective (fail) that are set as good (pass)
– **C**: Number of images judged as good (pass) that are set as defective (fail)
– **D**: Number of images judged as defective (fail) that are set as defective (fail)

Cells B and C represent the number of images that have not been judged as expected. Check the image in [Thumbnail Section] and look into the cause.

Point Click on the summary cell to narrow down the images to be displayed in the [Thumbnail Section]. The next narrowing down cannot be performed until the narrowed down results are displayed.

Filter

– **Train/Test**: Narrow down the summary and the degree of separation graph to that of training or test images.
– **Image Group**: Narrow down the summary and the degree of separation graph by Image Group.

Point Train/test and image group filters are not saved in the program setting and are only retained while VS Creator is running.

Accuracy Rate

Displays the percentage of the images set with classification labels in which the set classification labels and the results judged by AI Segmentation match.

Miss Rate

Displays the percentage of the images set as defective that are judged as good by AI Segmentation.

Overdetection Rate

Displays the percentage of the images set as good that are judged as defective by AI Segmentation.

Anomaly Level

Displays the anomaly level statistics measured by running AI Segmentation.

Point The anomaly level is an index that indicates how different the current image is from the learned good image. The higher the number, the more different the image is from the learned good image.

Good (Pass)

Displays the Average, Maximum, and Minimum values of the anomaly level of the images set as good.

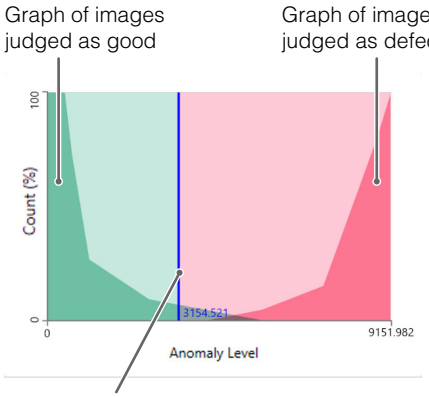
Defective (Fail)

Displays the Average, Maximum, and Minimum values of the anomaly level of the images set as defective.

Degree of Separation Graph

Displays a cumulative histogram of the anomaly level for images of parts that have been judged as good or defective. The vertical axis represents the image count (%) and the horizontal axis represents the anomaly level. The degree of separation graph shows whether AI Segmentation correctly judges good and bad parts.

Degree of Separation Graph Layout



[Good (Pass) and Defective (Fail) Threshold]

Areas where the graphs of images of good and defective parts overlap indicate that the anomaly level of “Images set as good” and “Images set as defective” overlap or are reversed. As the [AI Segmentation] tool judges the right side of the blue line on the graph ([Good (Pass) and Defective (Fail) Threshold]) as defective parts and the left side as good parts, the green graph on the right side of the blue line and the red graph on the left side are where the classification labels set during training and the result classification labels do not match, indicating that correct judgment according to the expected classification labels may not have been done.
In order for the [AI Segmentation] tool to judge correctly, the accuracy of the AI Segmentation must be improved, for example by adding training images and re-training.

Scale

The horizontal magnification of the degree of separation graph (Anomaly Level) can be changed.

- (Zoom out): Each time the button is clicked, the degree of separation graph is zoomed out horizontally by 10% around the threshold value. The default display is the minimum value. You can also zoom out by rotating the mouse wheel toward you.
- (Zoom in): Each time the button is clicked, the degree of separation graph is zoomed in horizontally by 10% around the threshold value. You can also zoom in by rotating the mouse wheel away from you.
- (Fit): Click the button to fit the degree of separation graph in the available width.
- Scroll bar: When the degree of separation graph is zoomed in, drag it horizontally to scroll the display. Double-click it to fit the degree of separation graph in the available width.

Good (Pass) and Defective (Fail) Threshold

Displays the anomaly level threshold for determining whether the image in the dataset is good or defective. The threshold can also be specified numerically by selecting [Value Specification] from the drop-down menu.

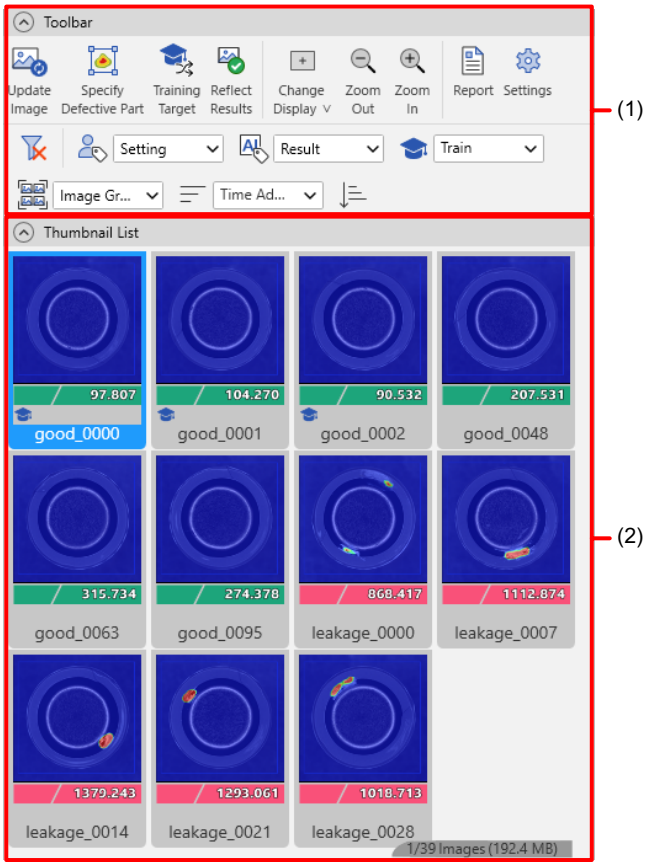
- **Set Automatically** (default): A threshold calculated from the training result is set and displayed.
- **Value Specification**: Specify the threshold with a numerical value.

Reflect to Judgment

Click to reflect [Good (Pass) and Defective (Fail) Threshold] to the upper limit for [Anomaly Level] in [Judgment Conditions].

Point	It cannot be reflected if judgment condition is in linked state.

Thumbnail Section



(1) Toolbar

Point If the toolbar cannot be displayed in a single row, for example if the width of the [Edit Dataset / Display Results] dialog box is too narrow, ▼ (option) will be displayed to store the tools that could not be displayed in the row. Click the arrow icon to display the stored tools.

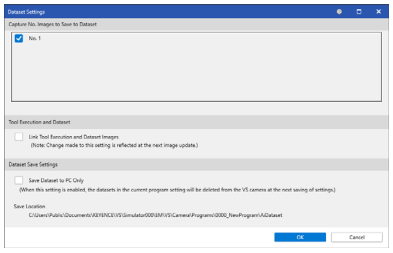
- Update Image **(Update Thumbnail Image Display)**: If the input image displayed in [Image Viewer] is a processed image from another tool, click this icon to update the processed image through execution of the tool and import the updated image.
- Specify Defective Part **(Defective (Fail) Part Specification)**: Click the icon to open the [Defective (Fail) Part Specification] dialog.
  →[Defective (Fail) Part Specification] dialog box
- Training Target **(Random Training Image Setting)**: Selects images at random from among the images for which classification labels are set in the dataset and adds them as training images. Click this icon to open the [Random Training Image Setting] dialog box. Set the proportion of images in the dataset to be added as training images. Click [OK] to add images in the dataset as training images according to the set proportion.
- Reflect Results **(Reflect Test Result as Settings)**: Set the test result of the [AI Segmentation] tool as the classification label.
- Change Display **(Switch Graphics Display)**: Switch the image display in the [Thumbnail Section].
  – **Raw Image**: Displays raw images.
  – **Heat Map**: Displays the heat map.

– **Graphics**: Displays graphics overlaid on top of the raw image.

- **(Zoom Out/Zoom In)**: Click the icon to reduce/enlarge the thumbnail image.
- **(Output Report)**: A report that puts together the results of training and testing and the images can be created. Click the icon to display the dialog for specifying the save destination of the report. Enter a folder name and select the save destination to start creating the report (HTML file). Once the report creation is complete, the completed report is displayed.

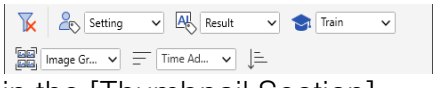
Reference
- To create a report, the AI tool training must have been completed.
- The image displayed in the thumbnail section is output to the report. If a report is created with no image in the thumbnail section due to a filter, a report with no images is created.
- The report display can be selected from the drop-down menu as [Standard Display] or [Simple Display]. In [Simple Display], detailed information such as the program setting name and camera model will be omitted.
- In the AI Segmentation report, the defective (fail) part region (red) will be displayed on the thumbnail.
- The graphics on the thumbnail can be displayed or hidden.

- **(Dataset Settings)**: Click to display the [Dataset Settings] dialog box.



– **Capture No. Images to Save to Dataset**: Select which capture number's images to import when Multi-Capture is enabled and images captured by the camera or images from the Filmstrip are imported into the dataset.
– **Tool Execution and Dataset**: If the [Link Tool Execution and Dataset Images] check box is selected, images that are not executed under the execution conditions on the General tab will not be trained or tested in the [Edit Dataset / Display Results] dialog, and their thumbnails will also be hidden. Even if you change the execution conditions on the General tab, they will not be reflected immediately in the thumbnail section, but will be reflected by updating the image.
– **Dataset Save Settings**: Select the [Save Dataset to PC Only] check box to save the dataset only to the PC and delete it from the device when the program setting is saved.

Reference
- The program setting volume in the device can be reduced.
- When connecting to the device from a different PC than the one in which the dataset is stored while this setting is enabled, no dataset image will exist.

- 

(Filter/Sort): Enables you to filter and sort the images displayed in the [Thumbnail Section].

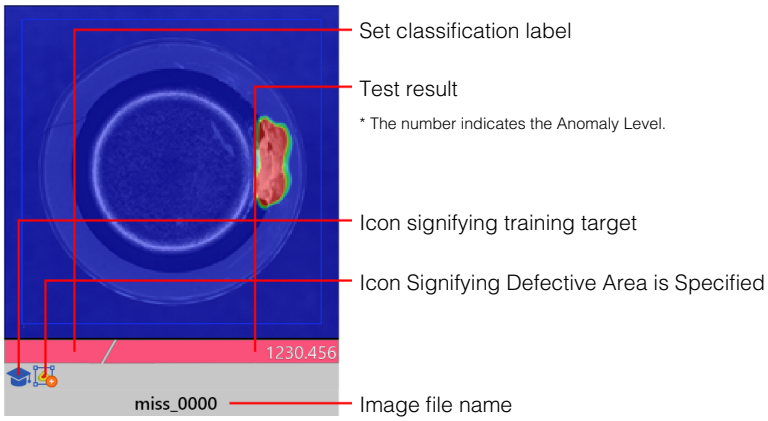
Point
The [Thumbnail Section] filters are not saved in the program setting and are only retained while VS Creator is running.

– **(Clear Filter Conditions)**: Removes filtering and displays all images.

- Setting **(Filter by Setting Classification Label)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the classification label selected from the drop-down menu (None, Good (Pass), Defective (Fail)).
- Result **(Filter by Result Classification Label)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the test result selected from the drop-down menu (No Result, Good (Pass), Defective (Fail)).
- Train **(Filter by Training Image)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the selection from the pull-down menu, training target or not (All, Target, Non-target).
- Image Gr... **(Filter by Image Group)**: Narrows down the thumbnail images displayed in the [Thumbnail Section] by the Image Group selected from the drop-down menu.
- Time Ad... **(Sort by)**: Sorts the display order of the thumbnail images according to the sorting criteria (Time Added, Anomaly Level, File Name) selected from the drop-down menu. Click to sort in ascending or descending order.

(2) Thumbnail Image

Thumbnail images of imported images are displayed.



Reference

- The number displayed at the bottom right of the [Thumbnail Section] is the number of imported images.
  - –When a thumbnail is selected, "the number of the selected image when counting from the top" is displayed.
    [Number of the image from the top]/[Total number of images] Images
  - –The number displayed to the right of the number of images is the total size of the images included in the thumbnail list.

- The selected thumbnail image is displayed in [Image Viewer]. The anomaly level is displayed on the image in [Image Viewer]. If a defective (fail) part is specified, the defective (fail) part region will be also displayed on the image in [Image Viewer].
- You can also right-click an image and set the image as a training image, set a classification label, and perform other operations from the context menu.
  - –**Use as Training Image**: Toggles between using or not using an image as a training image.
  - –**Classification Label**: Set to the selected classification label (Good (Pass)/ Defective (Fail)) or leave the classification label unset.
  - –Image Group: Adds the image to an image group. You can add the image to multiple image groups.
  - –**Defective (Fail) Part Specification**: Specify the defective (fail) part by using a region.
  - –**Delete**: Deletes the currently selected image from the dataset.

You can move the mouse cursor over the thumbnail image to see the below information.

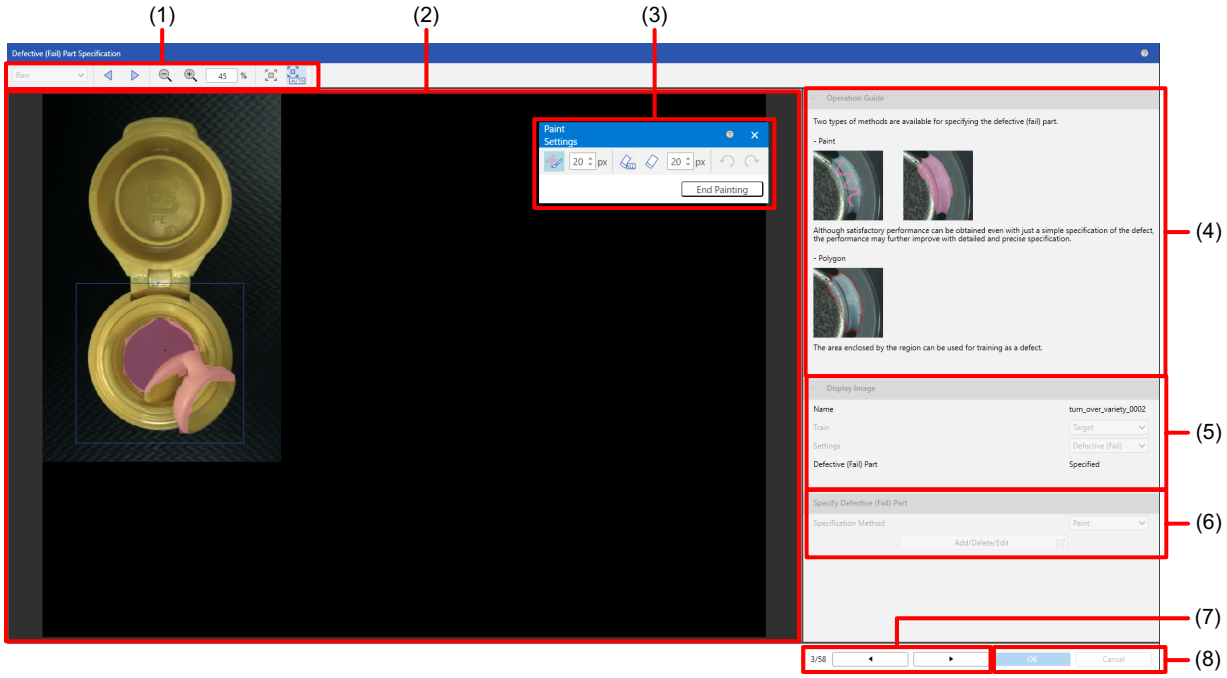
- **Name**: Image file name
- **Time Added**: The time when the image was added to the dataset
- **Train**: Whether the image is subject to training (Target/Non-target)
- **Setting**: The set classification label (Good (Pass)/Defective (Fail)). Blank if not set
- **Result**: The result classification label (Good (Pass)/Defective (Fail)) as determined by the [AI Segmentation] tool execution results. This is blank if the tool has not been run
- **Anomaly Level**: The anomaly level resulting from running AI Segmentation. The larger the difference from the trained good features, the higher the value. This is blank if the tool has not been run
- **Image Group**: The group to which the image belongs. This is blank if the image does not belong to any image group

[Defective (Fail) Part Specification] dialog box

For training images that are to be judged as defective (fail), the AI must be trained to recognize the defective part in the image.
Defective parts can be set in the [Defective (Fail) Part Specification] dialog box.
The [Defective (Fail) Part Specification] dialog box can be displayed in one of the following ways:

- Clicking [Defective (Fail) Part Specification] in the [Add Image from Camera] dialog box.
- Selecting a training image to set the defective part for in the [Thumbnail Section] in the [Edit Dataset / Display Results] dialog box and then clicking

(Defective (Fail) Part Specification) on the toolbar.
- Clicking [Defective (Fail) Part Specification] in the context menu displayed by right-clicking the thumbnail image in the [Thumbnail Section] in the [Edit Dataset / Display Results] dialog box.



(1) Toolbar

(Image Type)

Switches the display type of the image displayed on the camera image. The selection is retained even if the image is changed.

- **Raw**: Display the camera image as it is.
- **Filtered**: Displays the filtered image of the selected dataset image. If you have set color extraction or image enhancement, only the part of the image that is within the region will be displayed as a filtered image.
- **Contrast**: Displays the distribution of anomaly levels by a heat map (blue to red gradation). Blue areas indicate normal, the closer to red the higher the anomaly level.

(Previous Image/Next Image)

Click to toggle the camera image.

(Zoom Out/Zoom In/Zoom Setting)

Click to change the zoom rate. You can also set the zoom rate by specifying a number.

(Fit/Auto Fit)

Click this button to always adjust the zoom rate so that the whole image fits in the camera image. With Auto Fit enabled, the zoom rate of the display image automatically changes in accordance with changes of the camera image size.

(2) Camera Image

Displays the image selected in [Image Type]. The inspection region is indicated by a blue frame.

> **Point** The inspection region cannot be edited on the [Defective (Fail) Part Specification] dialog box. Edit the inspection region from the [Region] tab on the [Properties] view.

(3) Paint Settings Dialog

Add/Delete/Edit the painting.

(Brush)

The number of pixels for painting can be configured.

(Clear)

Clears all of the paint.

(Eraser)

The number of pixels of the eraser can be configured.

(Undo)

Undoes the previous edit operation.

(Redo)

Redoes the previously undone edit operation.

End Painting

Ends the add/delete/edit operation for painting.

(4) Operation Guide

Displays a guide regarding the methods for specifying the defective (fail) part.

(5) Image Information

Displays information about the display image.

Name

Displays the name of the image.

Train

- **Target**: Sets the image as a target for training.
- **Non-target**: Sets the image as a non-target for training.

Settings

- **Good (Pass)**: Sets the image as good (pass).
- **Defective (Fail)**: Set the image as defective (fail).

– **-**: Does not set the image as good (pass) or defective (fail).

Defective (Fail) Part

Displays whether or not the defective (fail) part has already been specified. If the defective (fail) part has not been specified, it will be displayed in red.

(6) Specify Defective (Fail) Part

Specify the defective part on the camera image.

Reference
- Regions specified as defective (fail) parts are also displayed in the Image Viewer.
- For images with specified defective (fail) parts, an icon ( ) will be displayed at the bottom of the thumbnail. In addition, when the Graphics display is set for the thumbnail, the defective (fail) parts are also displayed on the thumbnail.

Specification Method

Select the specification method of the defective (fail) part.

– **Paint**: The painted part can be used for training as a defect.

–Add/Delete/Edit

Displays the [Paint Settings] dialog. Perform addition/deletion/editing of painting.

Reference In the case of the [AI Segmentation] tool, it is also possible to specify the defective (fail) part in a simple way, such as by drawing a rough wavy line over the defective (fail) part. Fill in the defective (fail) part to allow the system to train the defective (fail) part more precisely.

– **Polygon**: The area enclosed by the region can be used for training as a defect.

– ↑ ↓

Switches the order of the selected defective (fail) part/vertex.

–Add

Adds defective (fail) parts/vertices.

–Defective (Fail) Part n

Set the vertices of the defective (fail) part.

– ✕

Deletes the selected defective (fail) part/vertex. When a defective (fail) part/vertex is deleted, the defective (fail) part/vertex number (n) after it move up in order.

(7) Number of Images/ ◂ ▸ (Previous Image/Next Image)

Number of Images

Displays the number of images imported and the position of the currently displayed image from the top.

[The position of the currently displayed image from the top] / [Total Number]

◂ ▸ (Previous Image/Next Image)

Click to toggle the camera image.

(8) OK/Cancel

- **OK**: Saves the edited setting, and closes the dialog.
- **Cancel**: Cancels the edited setting, and closes the dialog.

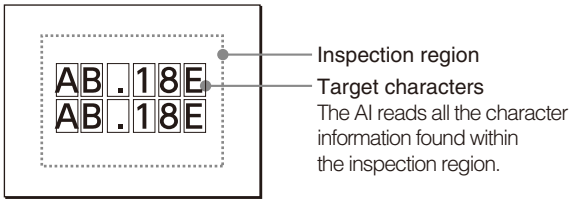
AI OCR

#E102

The AI reads all the character information found within the inspection region, sorts and edits it based on the settings, and outputs it as a string.

Overview of functions

Image of the Measurement



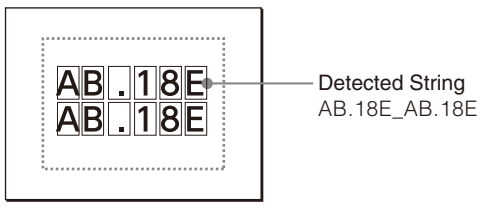
Measurement Results Output

The measurement results output by the [AI OCR] tool are as follows.

Measurement result	Description of output
Detected String	Outputs the recognized string.
Registered String	Outputs the string that is used as judgment criteria.
Number of Characters	Outputs the total number of recognized characters.
Character n Recognized Character	Outputs the recognized nth character.
Character n Judgment Character	Outputs the character that is used as judgment criteria for the nth character.
Character n Library Registration No.	Outputs the library registration number of the nth character.
Character n Match Degree	Outputs the nth character match degree.
nth Character Match Degree	Output the nth character match degree.

Reference For details of the measurement results that can be output, see “Appendix” - "Results Data List".

Measurement Example



Properties

When setting the [AI OCR] tool, use the [Properties] view. The [Properties] view for the [AI OCR] tool is made up of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	Displays information about the tool. You can also enter the tool name and comments. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Specify the area on the captured image to be used for measurement and the size of the characters to be measured.
Image Enhance	Displayed when the current image is captured in MultiSpectrum Mode. The MultiSpectrum Color Extraction can be performed.
Character Recognition	Train character recognition and change settings.
Judgment	Set the registered string, the number of characters, and the match degree.
Display	Set the display methods for things such as the inspection and mask regions.

Region

Specify the area on the captured image to be used for measurement and the size of the characters to be measured.

Point

- If the width and height of the inspection region exceed 10 characters in character size, the processing time may become longer.
- Only the [Rectangle] or [Arc] inspection regions are available with the AI OCR tool.
- The consumption of the program memory increases if the camera images contain images with large pixel sizes. Note that the resource memory may overflow if the camera is changed to a high resolution camera when multiple AI OCR tools are added to the task.

Image Enhance

Color Extraction

Displayed when the current image is captured in MultiSpectrum Mode. [MultiSpectrum Color Extraction] can be performed.

Character Recognition

Train character recognition and change settings.

Train

Additionally train characters and edit the library.

Additional Training

Additionally train recognized characters. Click to display the “[Additional Training] dialog”. For details, see the "[Additional Training] Dialog".

Library Name

Displays the name of the referenced library file. Click [...] to display the menu of file operations from which you can change the referenced library file, rename a library, or create a new library.

Reference
- When a new AI OCR tool is added, the existing library file is automatically referenced. If no library file exists, a library file (Library0) is automatically created and the library is referenced.
- The automatically created library file contains preset characters for each character.

Browse Libraries

You can check the saved date & time and file size of the referenced library.

Edit Library Name

You can change the name of the referenced library file. You can enter characters that can be used in Windows file names.

Create New Library

Click this to display the [New Library Creation] dialog box. Enter the library file name and click the [OK] button to create a new library file.

Edit Library

Click this to display the [Edit Library] dialog box.

Reference Click [Additional Training] in the [Edit Library] dialog to display the [Additional Training] Dialog.

[Default] Tab

The types of characters that can be detected without additional training. For details on each item, see [Edit Library].

Reference
- The AI OCR tool also includes "年 (year)" and "月 (month)" as symbols by default.
- Place the mouse cursor over the thumbnail in the AI OCR tool's registered character list to display a tooltip and check the character size ratio.

[User-registered] Tab

When an unregistered character is trained, it will be registered in the [User-registered] tab. The trained contents of [Overdetection Suppression] will also be registered in this tab as the character name "--".

Character Recognition Settings

Configure settings such as the character size and character detection restriction.

Character Size Settings

Click this to display the [Character Size Settings] dialog box.

Character Size Height
Enter the character size height. (The default setting varies depending on the image resolution.) The value of [Detectable Character Line Thickness] is determined according to the height value.

Character Size Width
Enter the character size width. (The default setting varies depending on the image resolution.)

Point If the width and height of the inspection region exceed 10 characters in character size, the processing time may become longer.

Detectable Character Line Thickness
The line width is displayed according to the set value of the character height.

Character Detection Restriction
Click this to display the [Character Detection Restriction] dialog box.

Letter Reading
Select the target for reading letters from [Upper/Lower Case] (default), [Upper Case], [Lower Case], or [Disable].

Number Reading
Select whether or not to read numbers (default: Enabled).

Symbol Reading
Select whether or not to read symbols (default: Enabled).

Reference The AI OCR tool detects the following characters as symbols.
. / - ( ) # * : + 年(year) 月(month)

Output Line Delimiter
Set whether to output the line delimiter (default: OFF). The AI OCR tool outputs multiple detected lines connected in a single line, so enable this if you want to recognize where the lines are separated.

Line Delimiter
Enter the character to be used as the line delimiter (default: "_"). Only one character can be entered.

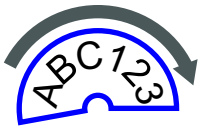
Point Double-byte characters and half-width spaces cannot be used as line delimiters.

Output Match Degree
Set whether to output the match degree (default: OFF).

Match Degree Settings
This is enabled when [Output Match Degree] is turned ON. Click this to display the [Match Degree Settings] dialog box. For details, see "[Match Degree Settings] Dialog".

String Direction
If the inspection region is set to [Arc], select the direction in which the string is to be read.

- **Clockwise** (default): Select this option if the characters in the upper arch are to be read from the left.



Detected String: ABC123

- **Counterclockwise**: Select this option if the characters in the lower arch are to be read from the left.

Detected String: ABC123

Options

Set options for the AI OCR tool.

Symbol Reading Settings

Click this to display the [Symbol Reading Settings] dialog box. Select whether to read each of the following symbols (default: ON for all).
. / - ( ) # * : + 年(year) 月(month)

Recognized Character Width (Character Size Setting Ratio)

Upper Limit

Specify the upper limit of the character width to be detected as a character as a ratio of the width of the character size setting as 1 (default: 2.000).

Lower Limit

Specify the lower limit of the character width to be detected as a character as a ratio of the width of the character size setting as 1 (default: 0.100).

Recognized Character Height (Character Size Setting Ratio)

Upper Limit

Specify the upper limit of the character height to be detected as a character as a ratio of the height of the character size setting as 1 (default: 2.000).

Lower Limit

Specify the lower limit of the character height to be detected as a character as a ratio of the height of the character size setting as 1 (default: 0.100).

Timeout (sec)

Set the upper limit to the processing time. When the processing time for a given single tool exceeds the limit set for it (0.5 to 60.0 seconds, default: 5.0 seconds) due to the state of the current image, the tool processing will return a timeout error, and all outputs will be set to 0.

Point The setting value is an approximation. For AI OCR tools, an error occurs when a timeout is predicted, even if the set time has not been reached.

Detailed Settings

You can set the other conditions that can be set for the AI OCR tool as necessary.

Reference For details, see “Tool Common Setting Items” - "Detailed Settings".

Judgment

Registered String

Compares the detected string with the registered string to determine a match or mismatch. Up to 128 characters can be entered for the registered string.

Wildcard characters that can be used in the registered string

The following wildcard characters can be used in the registered string.

- **$**: All letters (one character) are judged as Pass.
- **%**: All numbers (one character) are judged as Pass.
- **@**: All symbols (one character) are judged as Pass.
- **!** : All upper case letters (one character) are judged as Pass.
- **&**: All lower case letters (one character) are judged as Pass.
- **?**: If there is a character (one character) present, it is judged as Pass.
- **"**: 0 or more arbitrary characters are always judged as Pass without collating one character.

Point Wildcard characters cannot be trained because they are reserved characters.

Reflect Detected String

Click this to enter the current value of the detected string as the registered string. If a registered string has been entered, it will be cleared.

Number of Characters

Set the upper limit and the lower limit for the number of detected characters.

Upper Limit

Set the upper limit for the number of detected characters.

- **Unit**: Number of Characters
- **Range**: 0 to 128

Current Value

Displays the number of characters contained in the detected line.

Lower Limit

Set the lower limit for the number of detected characters.

- **Unit**: Number of Characters
- **Range**: 0 to 128

Match Degree

Set the lower limit for the match degree.

Maximum

Displays the maximum value of the match degree in the detected line.

Minimum

Displays the minimum value of the match degree in the detected line.

Lower Limit

Set the lower limit for the match degree of detected characters.

- **Unit**: Number
- **Range**: 0 to 99

Display/Hide Judgment Conditions

Clicking this button displays the list of measurements that can be used as judgment conditions. Select the check box to display the measured value on the [Properties] view.

Point The [Display/Hide Judgment Conditions] setting shows or hides each item on the [Properties] view. Even if the item is not displayed, if the [Upper Limit] or [Lower Limit] check box is selected, it is used as a judgment condition.

Display

Set the display methods for things such as the inspection and mask regions. The display color can be changed based on the judgment result for the tool. Also, use the toggle switch to show or hide the display.

Display Settings

Set the display settings for each item. For details, see "Display Settings" in the OCR2 tool.

Point The AI OCR tool does not have settings for [Line Block Region], [Fixed Cutout Block], or [Fixed Cutout Block (Fitted Rectangle Line)].

Result Display

Use the toggle switch to show or hide the result, and set the text size for when the result is displayed.

Display Recognized Characters

Display Match Degree

Font Size

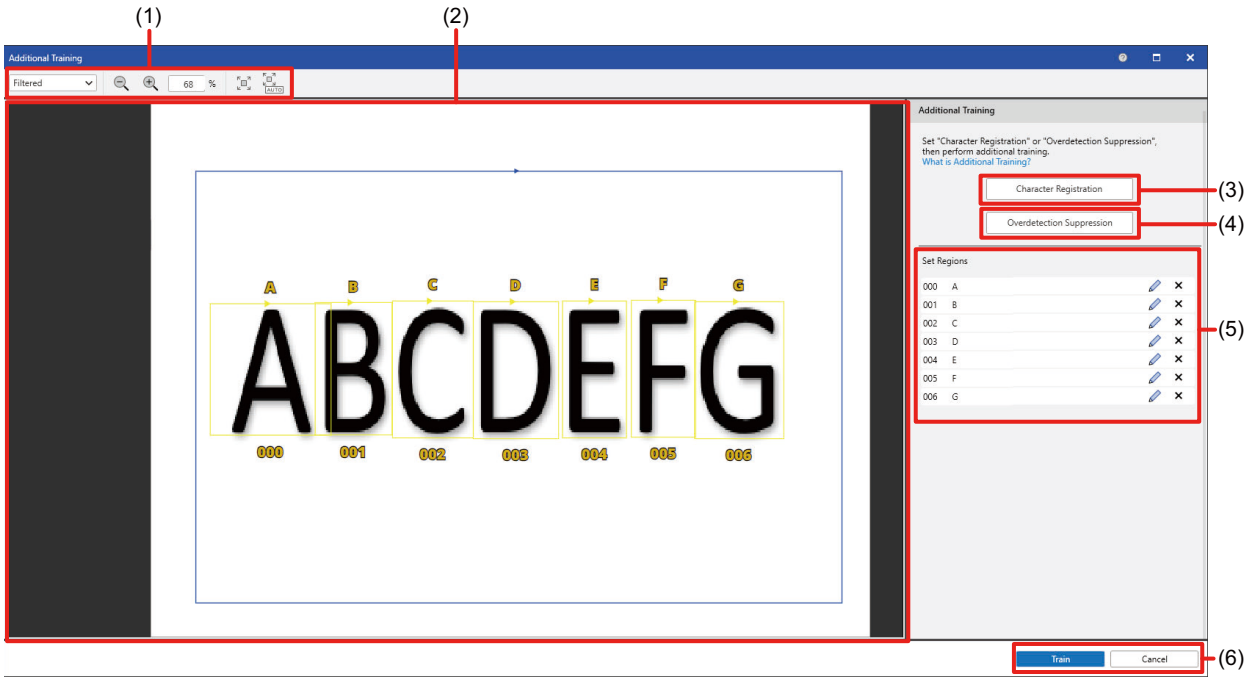
Set the font size for the detection result to be displayed. The font size is the same for all results.

Reset

Restores the display options to their default settings.

[Additional Training] Dialog

Set the region of the characters to be trained in the Image Viewer and enter the correct character name to train additional characters and expand the range of characters that can be detected.



(1) Toolbar

For more information on the toolbar in the [Additional Training] dialog, see "Screen Layout" of the Image Viewer.

(2) Camera Image

Displays the captured image and the region that serves as a reference for character recognition (reference region). Drag the reference region to change the size of the region.

(3) Character Registration

Click this to display the [Character Registration] dialog box. Set the region for the character in the Image Viewer and enter the character to be registered in the text box of the [Character Registration] dialog box.

- **OK**: Saves the set content, and closes the dialog.
- **Cancel**: Cancels the set content, and closes the dialog.

Point

- The maximum number of characters that can be registered is 600.
- The maximum number of characters that can be registered per character is 200.
- The following characters cannot be registered:
  ?, $, %, @, !, &, ", single-byte space, double-byte space, advanced characters (such as pictograms)
- When registering alphanumeric characters, be aware of the difference between single-byte and double-byte characters. Alphanumeric characters in the library data registered in the [Default] tab are all single-byte.

(4) Overdetection Suppression

Click this to display the [Overdetection Suppression] dialog box. Set the region for the background area to suppress detection of in the Image Viewer.

- **OK**: Saves the edited setting, and closes the dialog.
- **Cancel**: Cancels the edited setting, and closes the dialog.

(5) Set Regions

The set character registration or overdetection suppression will be displayed in a list. The region numbers are assigned in the order in which they are set.

Displayed only in the region of character registration. Click this to display the [Character Registration] dialog box to edit the character registration settings.

Deletes the character registration/overdetection suppression settings. When a character registration/
overdetection suppression is deleted, the region numbers (n) after it are advanced up.

Batch Character Registration

Displayed when neither character registration nor overdetection suppression is set. You can register detected characters all at once.

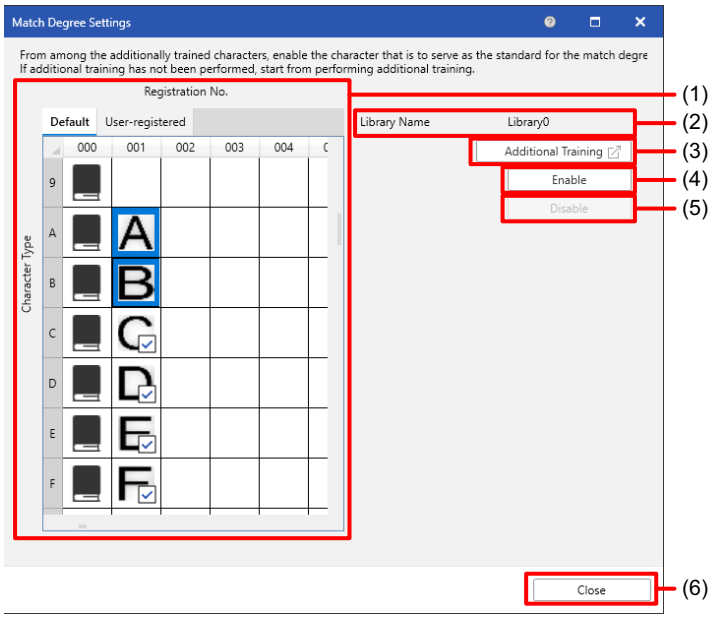
(6) Train/Cancel

- **Train**: Performs training based on the settings made.
- **Cancel**: Cancels the edited setting, and closes the dialog.

[Match Degree Settings] Dialog

Select the reference characters to use in calculating the match degree from the characters that have been additionally trained in the AI OCR tool. By adding the match degree to the judgment conditions, you can use the advanced detection performance of the AI OCR tool while excluding characters with print quality that does not meet the standard from the recognition targets.

Point Only characters that have been additionally trained with the AI OCR tool can be enabled as the reference characters for the match degree. The preset characters cannot be enabled. If there are no valid additionally trained characters, the match degree will be 0.



(1) Registered Character List

A list of registered characters is displayed in a matrix format.

[Default] Tab

The types of characters that can be detected even without additional training. For details on each item, see [Edit Library].

Reference The AI OCR tool also includes "年" (year) and "月" (month) as symbols by default.

[User-registered] Tab

When an unregistered character is trained, it will be registered in the [User-registered] tab. The trained contents of [Overdetection Suppression] are not displayed in this tab.

(2) Library Name

Displays the library name.

(3) Additional Training

Click to display the [Additional Training] Dialog.

(4) Enable

Enables the selected characters as the reference characters for the match degree.

(5) Disable

Excludes the selected characters from being reference characters for the match degree.

(6) Close

Closes the [Match Degree Settings] dialog box.

Region

Each region tool is specialized for a specific function. By referring to a region tool, other measurement tools can share the region of the region tool. For this device, the following region tools are provided.

List of region tools

Tool	Function overview
Shared Region	Tool for setting an inspection region
Image Region (Current Image)	Tool for generating a free-shape inspection region for a given current image
Image Region (Model Image)	Tool for generating a free-shape inspection region for a given model image
Shared Pattern (ShapeTrax3A)	Tool for setting a pattern region for ShapeTrax3A tools

Shared Region

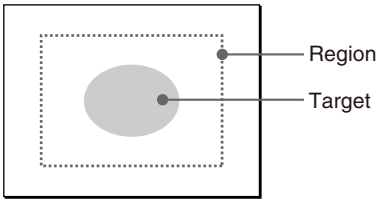
#E049

The shared region tool is the tool specialized for creating a region. The created region can be used for other measurement tools to refer to them or sharing them. The tool is not used independently, but used by referring to it from other tools.

Reference Use image region tools to make a region of a complex shape or to process an image. (→ [Image Region (Current Image)] and [Image Region (Model Image)])

Function overview

Measurement Overview



Measurement Results Output

The following are major measurement results that are output by the shared region tool:

Measurement result	Description of output
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code

Reference For the format and result data of the measurement results that are output, see “Appendix” - "Results Data List".

Properties

Use the [Properties] view to configure the shared region tool. The [Properties] view of the shared region tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure the current image and execution conditions of the tool.
Region	Specify the area on the captured image to be used for measurement.
Display	Configure a graphic that is displayed on the [Image Viewer].

Display

Configure how the inspection region and mask region are displayed. You can hide or show the regions by a toggle switch.

Display Settings

Inspection Region

Select whether to display the inspection region.

- **ON** (default): The inspection region is displayed. Configure the line thickness and display color of the inspection region.
- **OFF**: The inspection region is not displayed.

Mask Region

Select whether to display the mask region.

- **ON** (default): The mask region is displayed. Configure the line thickness and display color of the mask region.
- **OFF**: The mask region is not displayed.

Reset

Restores the display options to their default settings.

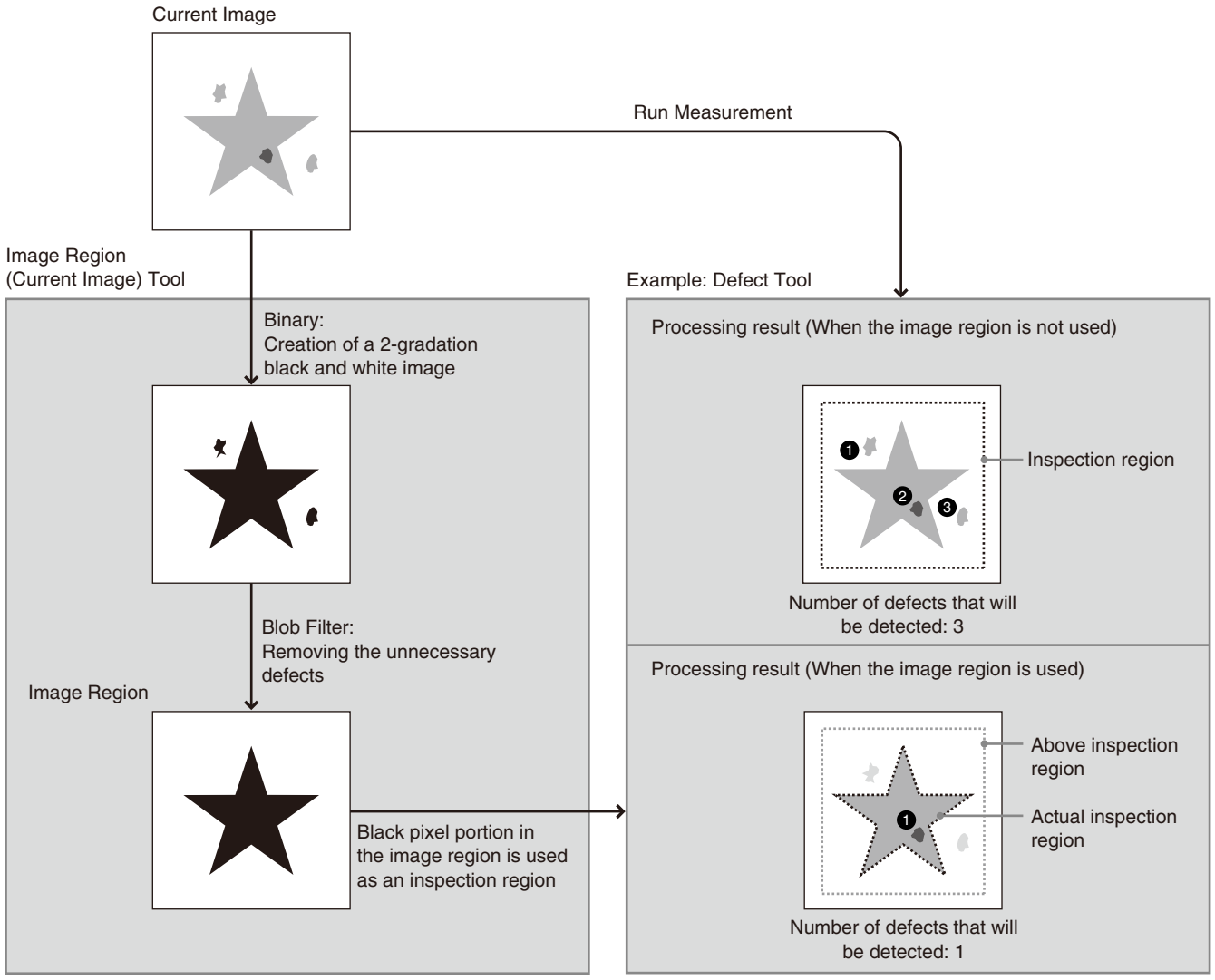
Image Region (Current Image)

#E050

The image region (current image) tool is the tool for generating a free-shape inspection region for a given current image. The created region can be used for other tools to refer to them or sharing them. This tool is useful when you need an inspection region of a complex shape. The tool has functions of color extraction and image enhancement, so that you can process images by the tool. The tool is not used independently, but used by referring it from other tools.

Function overview

Measurement Overview



Measurement Results Output

The following are major measurement results that are output by the image region (current image) tool:

Measurement result	Description of output
Execution Time	Period of time (ms) of measurement by the tool

Measurement result	Description of output
Error Code	The generated error code

Reference For the format and result data of the measurement results that are output, see “Appendix” - "Results Data List".

Properties

Use the [Properties] view to configure the image region (current image) tool. The [Properties] view of the image region (current image) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Also, select a current image to use and configure the execution conditions of the tool.
Region	Within the area of the specified image, specify the area to be used for measurement.
Image Enhance	Configure filter processing to apply to the image. When a color image variable is used for the current image, the image enhancement is applied to the image converted by color extraction.
Display	Configure a graphic that is displayed on the [Image Viewer].

Region

Point If position adjustment is made for the image region (current image) tool, the same position adjustment must be configured for measurement tools that refer to the image region (current image) tool.

For details, see “Measurement” - “Tool Common Setting Items” - "Region".

Display

Configure how the inspection region and mask region are displayed. You can hide or show the regions by a toggle switch.

Display Settings

Inspection Region

Select whether to display the inspection region.

- **ON** (default): The inspection region is displayed. Configure the line thickness and display color of the inspection region.
- **OFF**: The inspection region is not displayed.

Mask Region

Select whether to display the mask region.

- **ON** (default): The mask region is displayed. Configure the line thickness and display color of the mask region.
- **OFF**: The mask region is not displayed.

Reset

Restores the display options to their default settings.

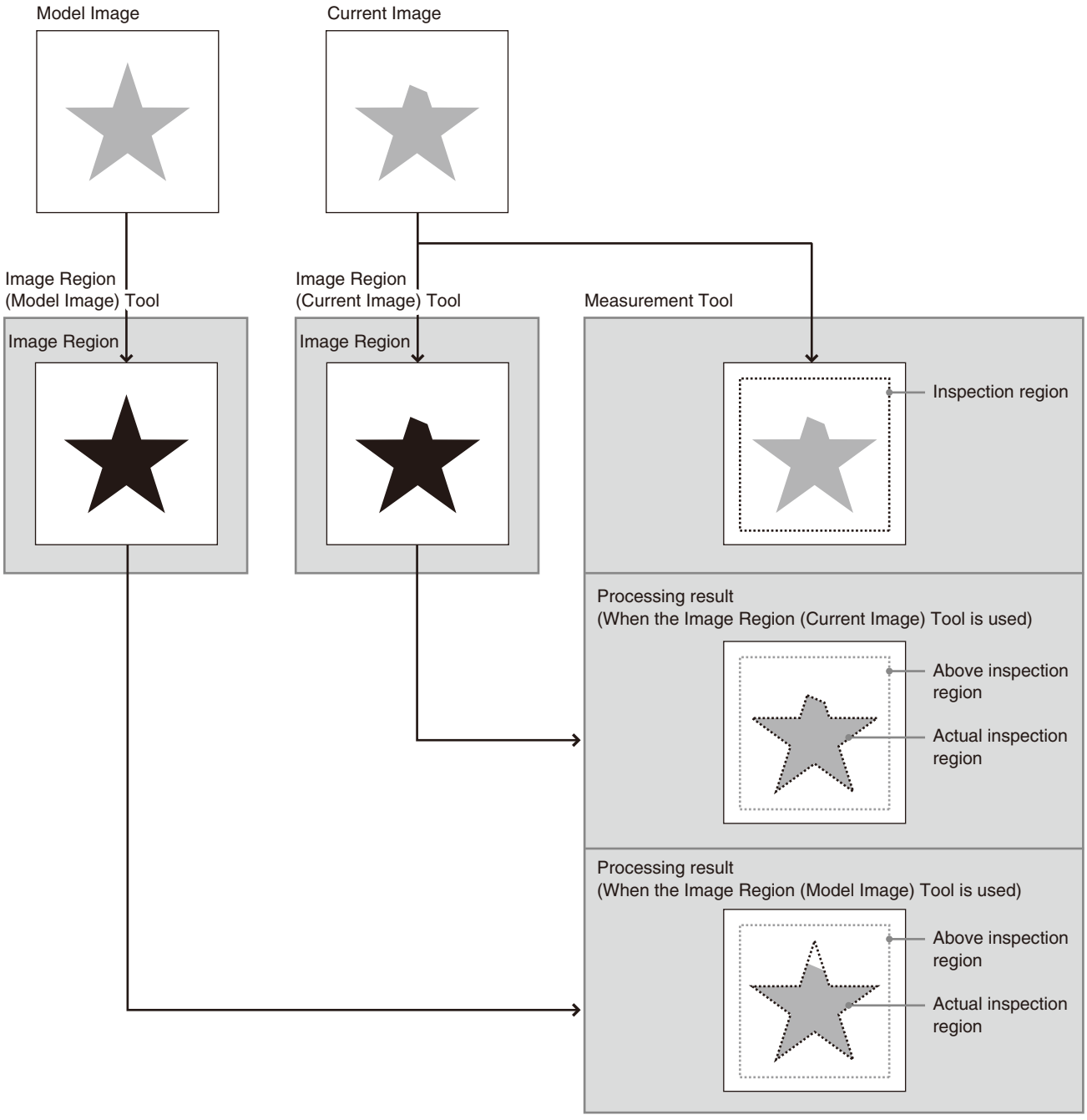
Image Region (Model Image)

#E051

The image region (model image) tool is the tool for generating a free-shape inspection region for a given model image. The created region can be used for other tools to refer to them or sharing them. This tool is useful when you need an inspection region of a complex shape. The tool has functions of color extraction and image enhancement, so that you can process images by the tool. The tool is not used independently, but used by referring it from other tools.

Function overview

Measurement Overview



By using the image region (model image) tool, even if part of the workpiece is missing, the original workpiece shape can be referenced as an image region.

Measurement Results Output

The following are major measurement results that are output by the image region (model image) tool:

Measurement result	Description of output
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code

Reference For the format and result data of the measurement results that are output, see “Appendix” - "Results Data List".

Properties

Use the [Properties] view to configure the image region (model image) tool. The [Properties] view of the image region (model image) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Also, select a model image to use and configure the execution conditions of the tool.
Region	Within the area of the specified image, specify the area to be used for measurement.
Image Enhance	Configure filter processing to apply to the image. When a color image variable is used for the current image, the image enhancement is applied to the image converted by color extraction.
Display	Configure a graphic that is displayed on the [Image Viewer].

General

The name of the model image is displayed in [Image Region Target Image], and the image itself is displayed in the [Image Viewer].
To change the model image, click the [Select] button. Then, the [Select Model Image] dialog is displayed, in which you can select a model image.
To register the current image as a model image, click the [Model Image Registration] button. The current image is displayed in the [Model Image Registration] dialog. Fill out [Registration No.] and [Registered Name], and click the [Register] button. Then, the image is registered as a model image.
For details, see “Measurement” - “Tool Common Setting Items” - "General".

Region

Point If position adjustment is made for the image region (model image) tool, the same position adjustment must be configured for measurement tools that refer to the image region (model image) tool.

For details of [Detection Point] and [Reference Position] of [Position Adjustment], see “Image Conversion” - “Image Position Adjustment” - "Image Correction".

For details on other items, see “Measurement” - “Tool Common Setting Items” - "Region".

Display

Configure how the inspection region and mask region are displayed. You can hide or show the regions by a toggle switch.

Display Settings

Inspection Region

Select whether to display the inspection region.

- **ON** (default): The inspection region is displayed. Configure the line thickness and display color of the inspection region.
- **OFF**: The inspection region is not displayed.

Mask Region

Select whether to display the mask region.

- **ON** (default): The mask region is displayed. Configure the line thickness and display color of the mask region.
- **OFF**: The mask region is not displayed.

Reset

Restores the display options to their default settings.

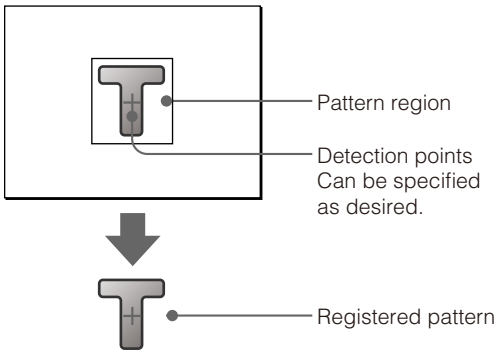
Shared Pattern (ShapeTrax3A)

#E052

The [Shared Pattern (ShapeTrax3A)] tool is a tool that specializes in creating patterns. This tool is not used as a standalone tool, but it is used by referring to it from other [ShapeTrax3A] tools. By using the [Shared Pattern (ShapeTrax3A)] tool, it is possible to share a pattern for multiple [ShapeTrax3A] tools.

Function overview

Measurement Overview



Measurement Results Output

The following are major measurement results that are output by the shared pattern (ShapeTrax3A) tool:

Measurement result	Description of output
Execution Time	Tool measurement time (unit: ms).
Error Code	The generated error code.

Reference For details on the measurement results that can be output, see "Appendix" - "Results Data List".

Properties

When setting the Shared Pattern (ShapeTrax3A) tool, use the [Properties] view. The [Properties] view of the Shared Pattern (ShapeTrax3A) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Region	Set the reference position for the tool's coordinate system. Register the image of the model to be detected as a "Pattern Region".

Properties	Settings
Image Enhance	If a color image is used for the current image, the imported color image is converted to a black and white image using any extraction method. Additionally, set the filter processing to apply to the image.
Detection	Set the conditions to detect the pattern during measurement. You can also set the other conditions that can be set for the Shared Pattern (ShapeTrax3A) tool as necessary.
Feature Extraction	Set the advanced settings to detect the model and current image edges.
Display	Set the display method for the pattern region and the feature points.

Region

Edit Pattern Region

Set the reference position for the tool's coordinate system. Register the image of the model to be detected as a "Pattern Region".

Point Registration is limited by the amount of processing memory remaining. The Shared Pattern (ShapeTrax3A) tool uses processing memory to register image patterns. As processing memory is shared among tools within one setting, the memory usage of all tools, including the Shared Pattern (ShapeTrax3A) tool, must not exceed the device's processing memory. The amount of processing memory used is displayed on the status bar when configuring the region and pre-processing settings. The region and pre-processing settings may not be configurable when the value is close to 100%.

Reference

- For information on how to set pattern regions, see "Tool Common Setting Items" - "Region" - "Editing a Pattern Region".
- The pattern region set with the [Shared Pattern (ShapeTrax3A)] tool can also be referred to. For details, see "Tool Common Setting Items" - "Region" - "Pattern Region".
- Turning on [Enable Eraser Tool] enables the use of the eraser tool which removes unnecessary feature information in the image. Click the [Edit] button to display the [Edit Eraser] dialog box. For details, see "Erasing Unnecessary Feature Information/ Boundary Information (Eraser Tool)".

Detection

Set the conditions to detect the pattern during measurement. You can also set the other conditions that can be set for the Shared Pattern (ShapeTrax3A) tool as necessary.
→Detection Conditions
→Rotation Direction-Added Search
→Detailed Settings

Point Processing times may vary in accordance with changes in the state of the current image. As edge information is detected and processed from the current image, the processing time may vary depending on changes in the amount of edge detections. If processing time fluctuations are a problem, you should check the actual line after setting [Timeout (sec)].

Reference For details on the range of setting values and numerical format for each setting item, see "Appendix" - "Settings Parameters List".

Detection Conditions

Set the conditions to search for a pattern.

Fine Search Accuracy

Set the accuracy of the search.

- **Detailed**: Performing a fine search in greater detail enables higher accuracy.
- **Fast**: Select this setting when processing speed should be prioritized over accuracy.

Point Although increasing fine search accuracy improves detection accuracy, the processing time also increases.

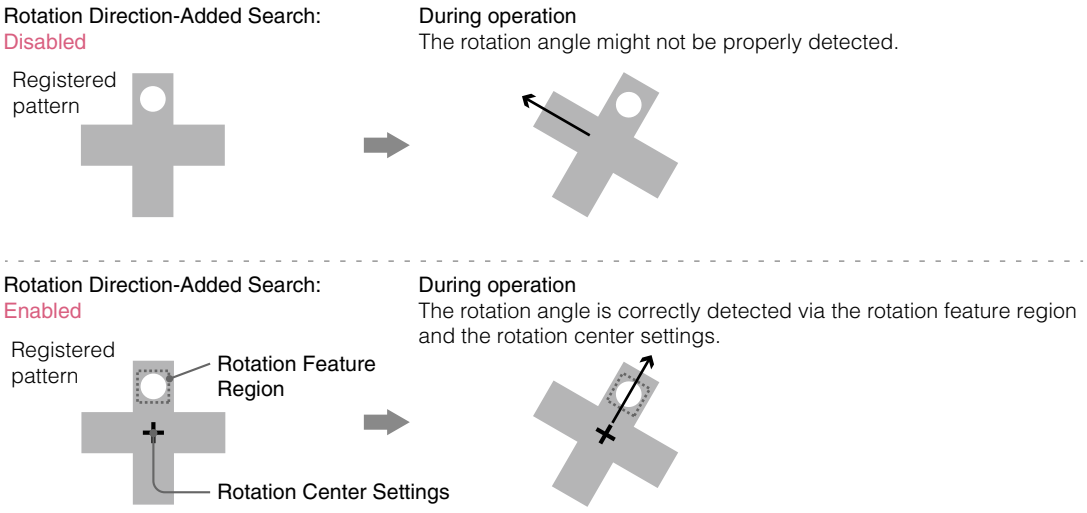
Reverse Detection

Select this option to continue detection even when the image was reversed due to an image capture condition.

- **OFF**: Do not detect if black and white is reversed.
- **ON**: Even if the shading is inverted, it is detected in the same way as before inversion.

Rotation Direction-Added Search

If you want to calculate the rotation angle using a feature with a particular circumferential direction for objects characterized by point symmetry such as circles and regular n-sided polygons, select [Edit] and set the conditions for the Rotation Direction-Added Search. As the search is carried out separately from the features of the entire object, it is effective when the feature point for determining the rotation angle is small. The precise angle is detected by means of a compensatory search using the feature that determines the rotation angle, which is performed after the general positioning is determined using the overall feature and just before the fine search is performed.



Point The Rotation Direction-Added Search may detect an angle that exceeds the angle range set in [Detection Conditions].

Enable Rotation Direction-Added Search

Turn on this item to enable rotation direction-added search.

Rotation Feature Region Settings

Register regions that have the feature for determining the rotation angle from the model that you want to detect with the rotation direction-added search.
Click the [Edit] button to edit the rotation feature region.

Point If the bounding rectangle that encompasses the pattern and rotation feature regions exceeds 2544 pixels in width or 2544 pixels in height, [Large Area Search Mode] needs to be enabled. As the rotation feature region is handled as part of the pattern region, if you place the rotation feature region outside of the pattern region, the pattern region will substantially widen, which may affect the search results.

Add

Every time this button is clicked, a rotation feature region is added.

Shape

Select the shape for the rotation feature region.

Width/Height/Center X/Center Y/Rotation Angle

Set the size and position of the rotation feature region.

Mask

Turning this option on enables you to specify the areas you want to exclude from the rotation feature region.

Rotation Center Settings

Click the [Edit] button to set the position for the center of rotation.

Point Setting the center of rotation accurately stabilizes the Rotation Direction-Added Search.

Reference

- **Specified Point**: Specify any desired coordinate with reference to the center position of the set pattern region as the center of rotation.
- **Center of Gravity**: The center of rotation is the position of the center of gravity where the registered edges to the model image are the point group. As the center of rotation is set with reference to a group of registered edge points in the model image, the positional relationship between the center of rotation and the object is almost constant, irrespective of the setting status of the rotation feature region. This option is useful because as long as the registered edges are extracted properly, the center of the rotation will be in almost the same position regardless of the registered position of the object in the rotation feature region.

Offset X/Offset Y

Specify the coordinates of the center of rotation when [Specified Point] is specified in [Reference]. The coordinates to be specified are specified as a numerical value to be offset with reference to the center position of the set pattern region.

Point The offset origin is the center point of the pattern region.

Rotation Condition

Select the correction range for the rotation direction.

- **Whole Circumference** (default): This setting is effective for objects for which the overall shape is round.
- **180° Rotation**: This setting is effective for objects for which the overall shape is rectangular or elliptical.
- **Polygon**: This setting is effective for objects, such as gears, for which the overall shape is a polygon. Set the number of vertices (3 to 16) in [Polygon Setting].

Point

- When [Whole Circumference] is set, the measurement time may increase greatly. If you want to reduce the measurement time, set [180° Rotation] or [Polygon], or review the settings and reduce the detection count or the like.
  Review the [Timeout] settings at the same time as well.
- The search position for the rotation feature region is displayed in accordance to the rotation condition. This is useful for when checking whether the center of the rotation and the rotation condition are correctly set. Note that when [Polygon] or [180° Rotation] is set, all search positions are displayed, and when [Whole Circumference] is set, only a representative search position is displayed.

Follow Angle Range of Detection Conditions

Enable this setting to limit the angle range of the rotation direction-added search to that in the detection condition settings. If this setting is disabled, the rotation direction-added search is performed at a range of 360° (the setting is disabled when the rotation condition is [180° Rotation]).

Rotation Feature Densification

Enable this setting to capture and search for finer features in the rotation feature region.

Detailed Settings

You can also set the other conditions that can be set for the Shared Pattern (ShapeTrax3A) tool as necessary.

Detection Point Offset

If you want to set an offset to the detection point, click the [Edit] button, and then set the offset value.

- **Specified Point**: Set offset values for X and Y respectively.
- **Center of Gravity**: Displays the position of the center of gravity (offset is inactive).

Point

The offset origin is the center point of the pattern region.

Reference You can also directly configure the setting by clicking on the [Image Viewer].

Feature Extraction

Set the advanced settings to detect the model and current image edges. Setting up the tool to accurately detect edge information from the model and current images enables highly accurate

measurements. The Shared Pattern (ShapeTrax3A) tool runs a coarse search using a reduced image and pattern model to quickly detect the approximate position, and then uses a fine search to detect the precise position. Set the specific feature detection conditions for the coarse and fine search independently here.

Reference For details on the range of setting values and numerical format for each setting item, see "Appendix" - "Settings Parameters List".

Feature Extraction Conditions

Display Feature

Select the features you want to display.

- **Coarse**: Displays the coarse features used for a coarse search.
- **Fine**: Displays the fine features used for a fine search.

Feature Extraction Settings

Set the conditions for detecting the model and current image edges. The Shared Pattern (ShapeTrax3A) tool automatically detects optimal edges based on the model image and the pattern region.
A coarse search is run using a reduced image and pattern model to quickly detect the approximate position, and then a fine search is run to detect the precise position.

- **Automatic** (default): Sets conditions for optimal edge detection based on the model image and pattern region.
- **Automatic (Low Contrast)**: This setting is effective for objects that are prone to changes in appearance during operation, such as blurred outlines or object contrast changes.
- **Custom**: If detection is not stable with the automatic setting, adjust the edge detection sensitivity manually.

Registered Feature Intensity Lower Limits

To allow only special features of the target to be extracted as edges, configure the settings while checking the edge display on the image displayed on the screen. Set values for the coarse features and fine features of the model image respectively.

Search Sensitivity

You can change the amount of image and feature reduction to set the priority of search speed and stability. The image reduction amount is the degree of compression of the image used for the model image and the current image.
Feature reduction is the degree of compression of the features extracted in the model and current images.

- **Fast**: Select this option to prioritize search speed.
- **Standard** (default): Select this option during normal operation.
- **Detailed**: Select this option to prioritize stability.
- **Custom**: If detection is not stable with the above settings, adjust the reduction rate of each item.

Coarse Search Image Reduction

0 (small reduction rate) to 10 (large reduction rate)

Coarse Search Feature Reduction

0 (small reduction rate) to 10 (large reduction rate)

Fine Search Image Reduction

0 (small reduction rate) to 10 (large reduction rate)

Point

- Setting all of the reduction rates to [0 (smallest)] will increase processing time and will not necessarily improve search accuracy.
- If [Fine Search Image Reduction] is set high, the change in match % may also be large.
- If the reduction rate is set high, features within the mask region may be extracted.
- A value greater than [Coarse Search Image Reduction] cannot be set for [Fine Search Image Reduction].
- If the size of the image that is the target of measurement is large, the features may deviate from the actual edge, even if [Large Area Search Mode] is disabled or the degree of reduction is set to a low value, and may be coarsely displayed.

Feature Densification

If you want to capture and search even finer features, select [High] (processing speed decreases). The [Automatic] setting maintains stability while processing speed remains fast.

Large Area Search Mode

If the search or pattern region size exceeds 2544 pixels in width or 2544 pixels in height, this setting needs to be turned on.

Point

When [Large Area Search Mode] is enabled, the reduction rate of [Coarse Search] and [Fine Search] is limited to a minimum of 4.

Eraser Tool

Enable Eraser Tool

Turning on [Enable Eraser Tool] enables the use of the eraser tool which removes unnecessary feature information in the image. Click the [Edit] button to display the [Edit Eraser] dialog box. For details, see "Erasing Unnecessary Feature Information/Boundary Information (Eraser Tool)".

Display

Set the display method for the pattern region and the feature points. You can change the display color. You can also show or hide the display with the toggle switch.

Display Settings

Feature Point Display

Specify how to display the feature points displayed for [Filtered image] and [Contrast image].

Pattern Region Display

To hide the pattern region, turn this setting off (default: ON).

Registered Feature

Select what to display for registered features.

- **None**: Does not display the registered features.
- **Fine Feature** (default): Displays the fine features.
- **Coarse Feature**: Displays the coarse features.

Rotation Feature Region

Set the display details in [Rotation Feature Region Display] for [Feature Point].

Line Thickness

Set the line thickness of the rotation feature region (1 to 64, default: 2).

Color

Set the line color of the rotation feature region.

Reset

Restores the display options to their default settings.

Image Conversion

Each image conversion tool is specialized for a specific function. By referring to an image conversion tool, other measurement tools can share the image of the image conversion tool. For this device, the following image conversion tools are provided.

List of Image Conversion Tools

Tool	Function overview
Shared Image Enhance	Tool for generating an image from a current image by making color extraction and image enhancement
Subtraction Filter	Tool for generating a subtraction image between a model image and a current image
Image Position Adjustment	Tool for generating an image from a current image by calibrating the current image by the amount of misalignment from the position adjustment reference

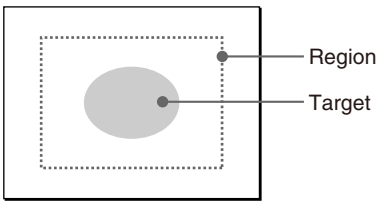
Shared Image Enhance

#E053

The shared image enhance tool is the tool specialized for processing images. A processed image can be used by other tools as a current image. The tool is not used independently, but used by referring it from other tools. For details of image enhancement, see “Measurement” - “Tool Common Setting Items” - "Image Enhance".

Function overview

Measurement Overview



Measurement Results Output

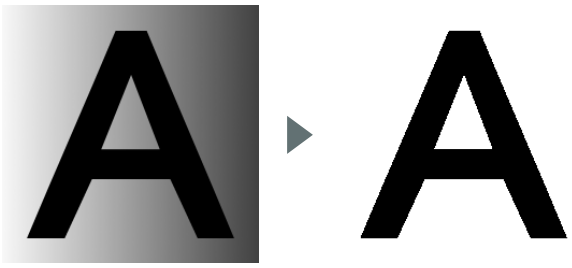
The following are major measurement results that are output by the shared image enhance tool:

Measurement result	Description of output
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code

Reference For the format and result data of the measurement results that are output, see “Appendix” - "Results Data List".

Measurement Sample

Example of binarization



Properties

Use the [Properties] view to configure the shared image enhance tool. The [Properties] view of the shared image enhance tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure a captured image to use for measurement and the execution conditions of the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Configure filter processing to apply to the image. When a color image variable is used for the current image, the image enhancement is applied to the image converted by color extraction.
Detailed Settings	Configure different conditions that can be used for measurement as necessary.
Display	Configure a graphic that is displayed on the [Image Viewer].

Display

Configure how the inspection region and mask region are displayed. You can hide or show the regions by a toggle switch.

Display Settings

Inspection Region

Select whether to display the inspection region.

- **ON** (default): The inspection region is displayed. Configure the line thickness and display color of the inspection region.
- **OFF**: The inspection region is not displayed.

Mask Region

Select whether to display the mask region.

- **ON** (default): The mask region is displayed. Configure the line thickness and display color of the mask region.
- **OFF**: The mask region is not displayed.

Reset

Restores the display options to their default settings.

Subtraction Filter

#E054

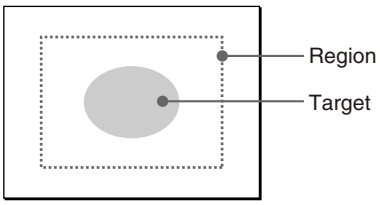
The subtraction filter tool is the tool for generating a subtraction image that represents the difference of gray levels obtained by overlapping a model image and a current image. The tool is useful to extract only the difference from the model image such as dirt, chip, and deformation. The capability of detecting blemish and dirt can be enhanced by the combined use of this tool with the defect tool and image position adjustment tool. The tool is not used independently, but used by referring it from other tools.

Point

- Without the registration of a model image necessary for the subtraction filter, measurement processing and image display cannot be made properly.
- When you add a subtraction filter tool in the [Task] view, the [Edit Inspection Region] dialog is displayed. (→ "[Edit Inspection Region] Dialog ([Subtraction Filter] Tool)")
- Filtered images or contrast images generated by each tool cannot be used as current images for the Subtraction Filter tool.

Function overview

Measurement Overview



Measurement Results Output

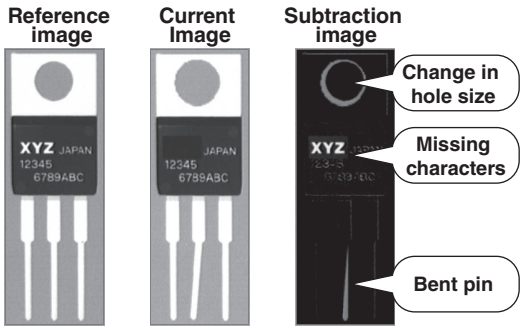
The following are major measurement results that are output by the subtraction filter tool:

Measurement result	Description of output
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code

Reference For the format and result data of the measurement results that are output, see “Appendix” - "Results Data List".

Measurement Sample

The subtraction image is generated within the inspection region configured for the subtraction filter tool. Outside the inspection region is filled with black. The output image can be referenced by other tools.



Properties

Use the [Properties] view to configure the subtraction filter tool. The [Properties] view of the subtraction filter tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure a captured image to use for measurement and the execution conditions of the tool.
Region	Specify the area on the captured image to be used for measurement.
Image Enhance	Configure filter processing to apply to the image. When a color image variable is used for the current image, the image enhancement is applied to the image converted by color extraction.
Detection	Configure the conditions of extracting difference.
Display	Configure a graphic that is displayed on the [Image Viewer].

Detection

Detection

Configure the conditions of extracting difference.

Masking

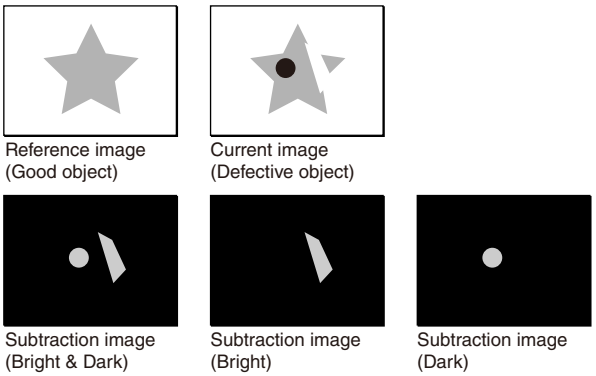
Masking cancels noise-like differences that appear along the contour due to the misalignment between the model image and the current image.
Set the number of times of cancellation (0 to 9, default: 2). A larger value has a greater noise cancellation effect, but has a lower sensitivity for subtle differences.

Extract Tone

Select the direction of intensity difference to be reflected to the subtraction image.

- **Bright & Dark** (default): Differences in both the brighter and darker directions in comparison with the reference image are reflected to the subtraction image.
- **Bright**: Differences only in the brighter direction in comparison with the reference image are reflected to the subtraction image.
- **Dark**: Differences only in the darker direction in comparison with the reference image are reflected to the comparison image.

Changes in the subtraction image based on the extraction setting.



Point

- Select [Dark] for [Extract Tone] if you want to cancel random shines to extract only black dots from the surface of inspection targets. This setting prevents shining points from being extracted as differences.
- You can check the setting result by displaying the current image.

Display

Configure how the inspection region and mask region are displayed. You can hide or show the regions by a toggle switch.

Display Settings

Inspection Region

Select whether to display the inspection region.

- **ON** (default): The inspection region is displayed. Configure the line thickness and display color of the inspection region.
- **OFF**: The inspection region is not displayed.

Mask Region

Select whether to display the mask region.

- **ON** (default): The mask region is displayed. Configure the line thickness and display color of the mask region.
- **OFF**: The mask region is not displayed.

Reset

Restores the display options to their default settings.

Image Position Adjustment

#E055

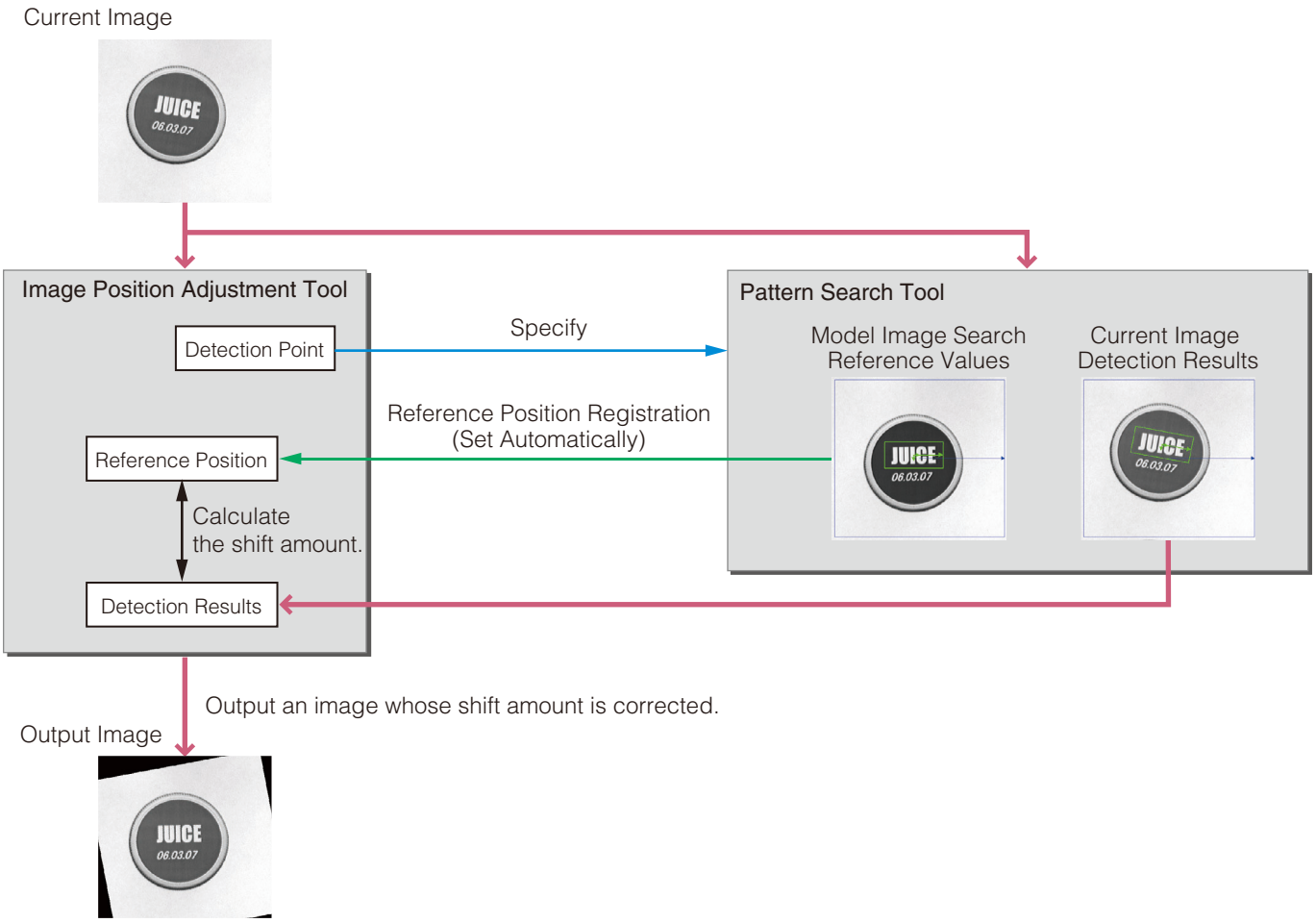
If the inspection region is fixed, the inspection target work may not be inspected properly if its position is shifted. In order to properly inspect the work in such cases, the image position adjustment tool generates an image from the current image with its position and orientation adjusted to the position adjustment reference that has been specified beforehand. When you use a tool that is sensitive to the processing direction (X/Y direction), we recommend that you use the image position adjustment tool instead of the position adjustment functions of individual measurement tools.

Function overview

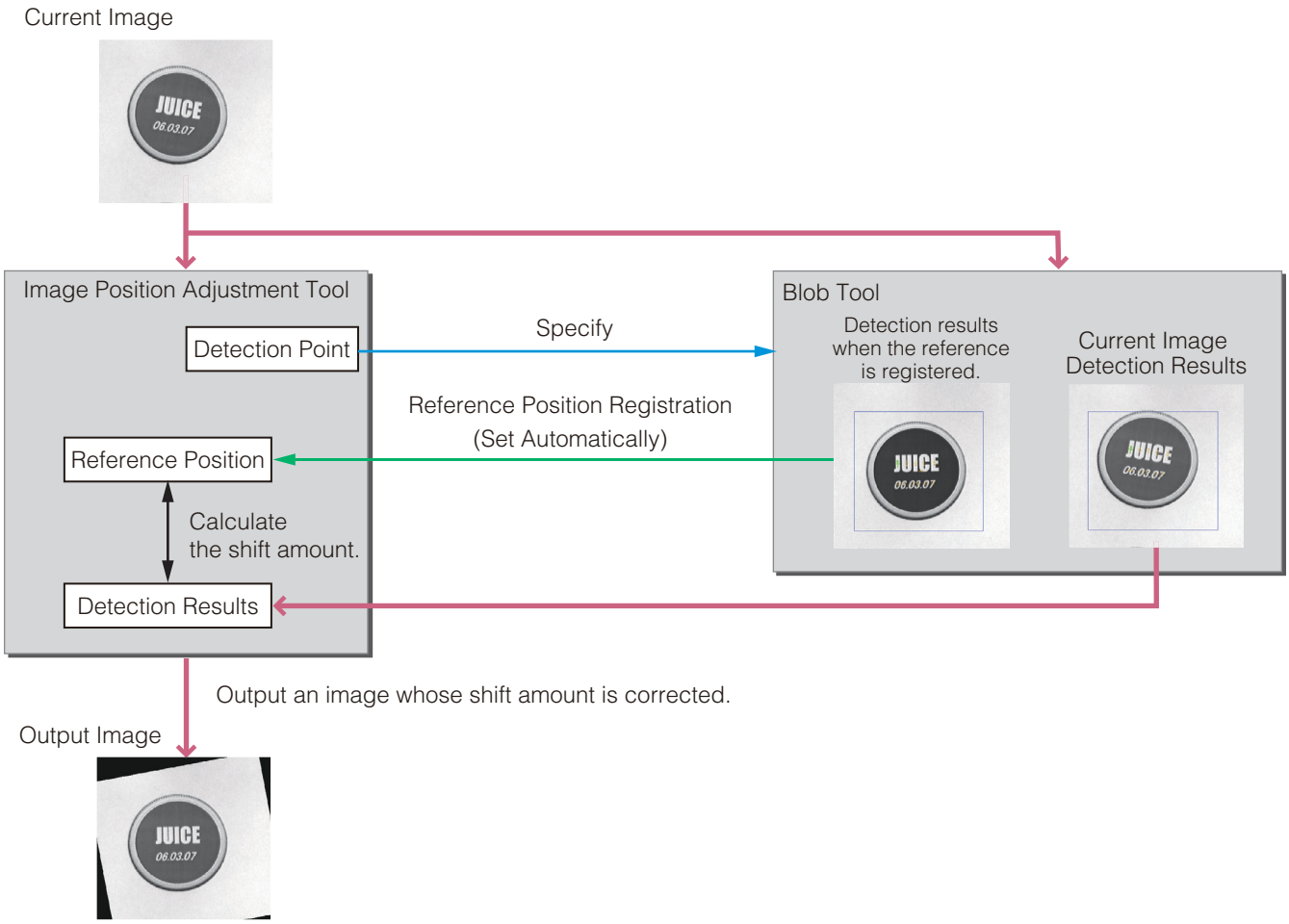
Measurement Overview

The processing flow depends on what you specify as the [Detection Point].

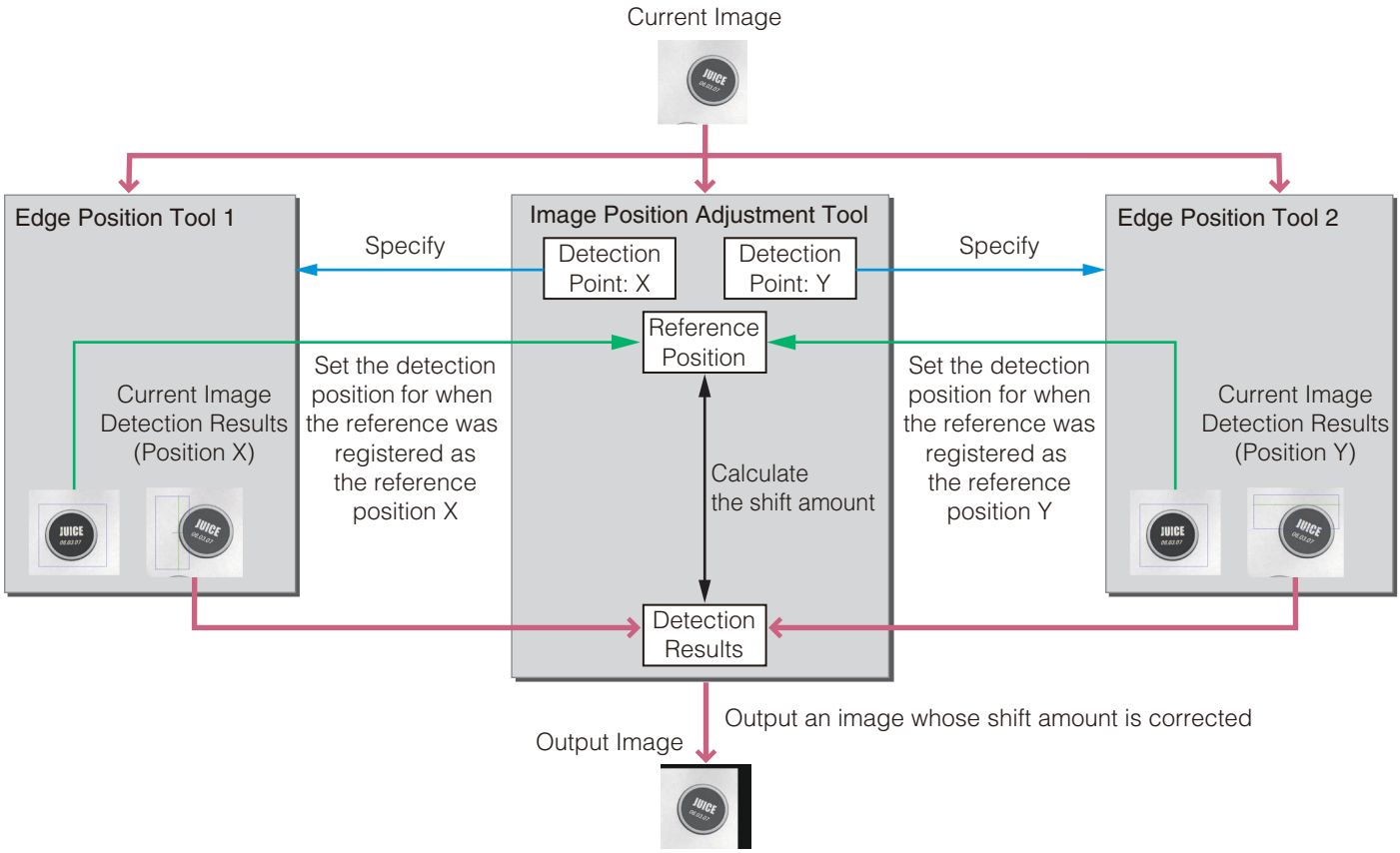
When you specify the Pattern Search Tool as the [Detection Point]



When you specify the Blob Tool as the [Detection Point]



When you specify the X coordinate with the detection result of Edge Position Tool 1, and the Y coordinate with the detection result of Edge Position Tool 2



Measurement Results Output

The following are major measurement results that are output by the image position adjustment tool:

Measurement result	Description of output
Execution Time	Period of time (ms) of measurement by the tool
Error Code	The generated error code
Shift Amount X / Shift Amount Y	Shift amounts between the current image and output image in the X and Y directions (unit: pixel).
Rotation Angle	Rotation angle of the image (unit: °).
Rotation Center X / Rotation Center Y	Rotation center of the image (unit: pixel).

Reference For the format and result data of the measurement results that are output, see “Appendix” - "Results Data List".

Properties

Use the [Properties] view to configure the image position adjustment tool. The [Properties] view of the image position adjustment tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure a captured image to use for measurement and the execution conditions of the tool.
Image Correction	Configure the reference position for the image.
Region	Specify the area on the captured image to be used for measurement.
Display	Configure a graphic that is displayed on the [Image Viewer].

Image Correction

Detection Point

The image position adjustment tool outputs an adjusted image from the current image based on the difference between the detection point of the current image and the preregistered reference position. The [Detection Point] is the detection point of current images. When you configure a [Detection Point], the graphic of the [Detection Point] is displayed in the [Image Viewer].

Specify Individually

Configure whether to make individual specification of the [Detection Point] (default: OFF). When it is set to ON, you can configure the X coordinate, Y coordinate, and the angle arbitrarily. When it is set to OFF, the detection point (X coordinate, Y coordinate, and angle) of a specific tool can be referenced.

Position

When [Specify Individually] is set to OFF, select [None] or [Tool] from the drop-down list. When you select [None], then [X], [Y], and [Angle] below are all set to 0.000. For [Tool], the tools in the [Task]

view that can be referenced are displayed. When you select a tool, its detection position is displayed in [X], [Y], and [Angle] below.

X/Y

Set the X and Y coordinates (-16383.000 to 16383.000) when [Specify Individually] is ON (default: 0.000). When [Specify Individually] is OFF, the detection position of the tool selected by [Position] is displayed.

Angle

Set the angle (0.000 to 359.999, unit: °) when [Specify Individually] is ON (default: 0.000). When [Specify Individually] is OFF, the detection position of the tool selected by [Position] is displayed.

Update Reference Position

Clicking this button applies [X], [Y], and [Angle] above to [Reference Position].

Point

If [Reference Position] refers to the result data of another tool or a cell of the Vision Dashboard, it is used as the reference position. Therefore, in this case, the reference position is not updated when you click this button.

Reference Position

Configure the reference position.

- **X**: Configure the X coordinate (-16383.000 to 16383.000, default: 0.000).
- **Y**: Configure the Y coordinate (-16383.000 to 16383.000, default: 0.000).
- **Angle**: Configure the angle (0.000 to 359.999, unit: °, default: 0.000).

Region

Region Settings

The region shape that can be selected for the image position adjustment tool is [Entire Image] or [Rectangle].

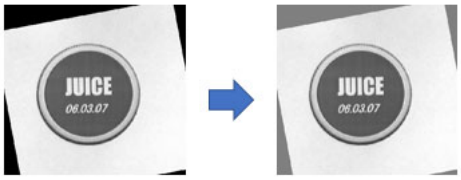
- **Entire Image** (default): The whole image becomes subject to image position adjustment.
- **Rectangle**: A specific area becomes subject to image position adjustment. Specify a center and an angle. For details of the configuration, see “Measurement” - “Tool Common Setting Items” - “Region Settings” - "Rectangle".

Processing Outside Capture Area

As a result of image position adjustment, an area outside the current image may be involved in the inspection region. Here are settings for how the outside capture area is displayed.

Processing Type

- **Fill** (default): The outside capture area is filled with pixels of [Fill Pixel Value].



- **Extended Image**: The outside area is filled with pixels of the boundary of the image and the inspection region.

Fill Pixel Value

Configure the pixel value (0 to 255, default: 0) of the outside capture area when [Fill] is selected for [Processing Type]. “0” represents white, and “255” represents black.

Display

Configure how the region is displayed. You can hide or show the region by a toggle switch.

Display Settings

Region

Select whether to display the region.

- **ON** (default): The region is displayed. Configure the line thickness and display color of the region.
- **OFF**: The region is not displayed.

Reset

Restores the display options to their default settings.

Vision-Guided Robotics

By using the vision-guided robotics tools, it is possible to output the correction value in relation to changes in the position of the detection target in robot coordinates. Additionally, vision-guided robotics application tools, which are combinations of vision-guided robotics tools, for major uses are available. By simply selecting the use, the necessary tools are automatically added, making it easy to implement vision-guided robotics.

List of Vision-Guided Robotics Tools

Vision-Guided Robotics Tools

Tool	Function
Calibration (Robot)	This tool is used to create the data for converting arbitrary points on the image captured by the camera into robot coordinates. By using this calibration data in the [Pick/Place] tool, the [Grip Shift Correction] tool, and the [Robot Coordinate Transformation] tool, the correction amount can be output in robot coordinates.
Pick/Place	This tool is used to pick a detection target or place on a detection target.
Grip Shift Correction	This tool is used to capture the shift amount of the gripped target object with a fixed camera and correct it on the spot, and to place it in the correct position by taking the shift amount into account.
Robot Coordinate Transformation	This is a tool for coordinate transformation used for the use that cannot be handled by the [Pick/Place] tool or the [Grip Shift Correction] tool.

Vision-Guided Robotics Applications

Category	Application	Function
Pick	Pick (1-Point Capture)	This application is used to capture the whole or part of the target object at one point and pick it. - Camera Installation Position: Fixed or On-Hand (mounted on the robot)
	Pick (2-Point Capture)	This application is used to capture part of the target object at two points and pick it. This is used when the shape of the object is long or the size varies greatly depending on the product type. - Camera Installation Position: On-Hand (mounted on the robot)
Grip Shift Correction	Grip Shift Correction (1-Point Capture)	This application is used to capture the whole or part of the target object gripped by the robot at one point, correct the shift amount of the target object gripped by the hand on the spot, and offset the shift amount to the registered reference position and place the object. - Camera Installation Position: Fixed
	Grip Shift Correction (2-Point Capture)	This application is used to capture the target object gripped by the robot at two points with a fixed camera, correct the shift amount of the target object gripped by the hand on the spot, and offset the shift amount to the registered reference position and place the object. This is used when the shape of the object is long or the size varies greatly depending on the product type. - Camera Installation Position: Fixed

Category	Application	Function
Place	Place (1-Point Capture)	This application is used to capture the whole or part of the place target at one point and place the object. - Camera Installation Position: Fixed or On-Hand (mounted on the robot)
	Place (2-Point Capture)	This application is used to capture part of the place target at two points and place the object. This is used when the shape of the place target is long or the size varies greatly depending on the product type. - Camera Installation Position: On-Hand (mounted on the robot)

Vision-Guided Robotics Function Setting Flow

A typical setting flow for the vision-guided robotics function is as follows.

	Setup Procedure	Reference
1	Installing camera and lighting	Setup manual chapter 2
2	Camera adjustment and capture settings	Setup manual chapter 4 Capture
3	Camera network settings	Configuring Device's Network Settings
4	Robot communication settings	Robot connection manual chapter 1
5	Loading the robot program	Robot connection manual chapter 2
6	Adding vision-guided robotics applications	Easy installation guide chapter 1
7	Setting and executing calibration	Easy installation guide chapter 2 Robot connection manual chapter 3
8	Vision-guided robotics application settings	Easy installation guide chapter 3
9	Executing and editing sample programs	Easy installation guide chapter 4 Robot connection manual chapter 4

Calibration (Robot)

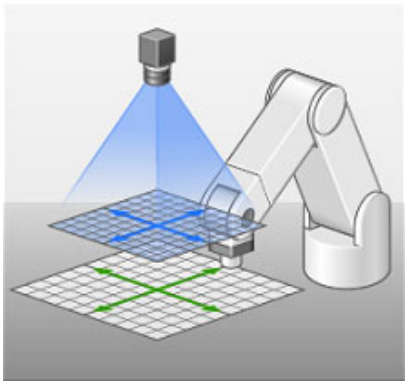
#E056

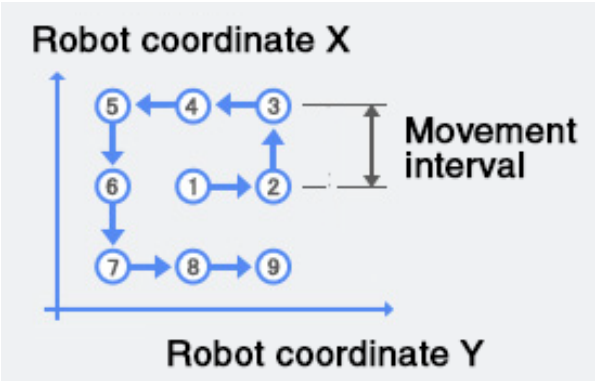
This tool is used to create the data for converting arbitrary points on the image captured by the camera into robot coordinates. By using the data in each of the [Pick/Place] tool, the [Grip Shift Correction] tool, and the [Robot Coordinate Transformation] tool, the correction amount can be output in robot coordinates.

Overview of Functions

Image of the Measurement

Operate the robot to detect the calibration target at 9 or 25 points within the field of view. Calibration data (transformation matrix) is calculated from the camera detection position of each point and the robot position information at that time.





Measurement Results Output

The main measurement results output by the [Calibration (Robot)] tool are as follows.

Measurement result	Output details
Resolution X/Y	Outputs the resolutions (mm/pix).
Field of View X/Y	Outputs the field of view (mm).
Transformation Matrix (Camera to Robot)	Outputs the transformation matrix data referenced by the TRANSXY function, etc.

Reference For details on the measurement results that can be output, see "Appendix" - "Results Data List".

Before executing calibration

Before executing calibration, you need to add a tool (ShapeTrax3A or another tool) that will detect the calibration target to the task and configure the settings so that the tool can correctly detect it.

Properties

When setting the Calibration (Robot) tool, use the [Properties] view. The [Properties] view of the Calibration (Robot) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Also, specify the current image to use for measurement.
Calibration	Sets and executes calibration.

Calibration

Sets and executes calibration.

Edit Calibration

Checks and edits the currently referenced calibration data.

[Edit Calibration] button

The [Edit Calibration] Dialog opens.

Detailed Settings

Each calibration data can be checked and managed, and the specification of the calibration data referenced by this tool can be changed.

Reference The "calibration data file" referenced by the calibration tool is commonly managed within the device. It can be referenced not only from other calibration tools within the program setting, but it can also be referenced from all program settings.

[Browse] button

The [Browse] dialog opens. The details of the selected calibration data can be checked.
Select the data to specify and then click the [OK] button.

[Manage Calibration Data] button

The [Manage Calibration Data] dialog opens. The details of the selected calibration data can be checked.

- **[Rename]**: Changes the name of the selected calibration data.
- **[Delete]**: Deletes the selected calibration data.

[Edit Calibration] Dialog

Detection

Sets the tool for detecting the target.

Specify Individually

- **ON**: Set the detected position by [X] and [Y] individually.
- **OFF** (default): Applies the detected position information of the tool selected in [Specify].

Specify

Select a detection tool to reference.

- **None** (default): [X] and [Y] are all set to 0.
- **Referable tools**: Among the tools in the task, the names of the referable tools are displayed. If the referenced tool is deleted, [Reference Tool No.: Error] is displayed in red.

Calibration

Camera Installation Position

- **Fixed** (default): Select this option when using the camera in a fixed installation.
- **On-Hand**: Select this option when using the camera attached to the robot.

Start Position

Click the [Edit] button to open the [Start Position Settings] dialog.

Point This cannot be entered if the start position is already registered. Click the [Clear] button to enable input.

X (mm)/Y (mm)/Z (mm)

– **Unit**: mm
– **Range**: -9999.999 to 9999.999

Rx (°)/Ry (°)/Rz (°)

– **Unit**: angle
– **Range**: -180.000 to 180.000

Register

Press this button to register the coordinates as the reference pick/place position coordinates after obtaining or entering the coordinates.

Reference When registration is completed, the display changes to [Clear] and each item cannot be entered. Click the [Clear] button to re-register.

Get Robot Coordinates

Click this button to open the [Get Robot Coordinates] dialog. To obtain the coordinates from the robot, execute the "utility program" on the robot side while keeping the dialog open.

Reference See the "VS Series Robot Connection Manual" for information on executing the "utility program".

Input by Robot Manufacturer's Format

Click this button to open the [Input by Robot Manufacturer's Format] dialog. If the manufacturer of the robot to be connected has been selected, coordinate values can be entered in that manufacturer's format (angle expression form).

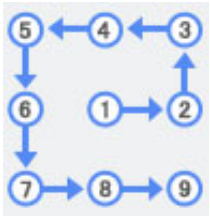
– **Manufacturer**: Displays the robot manufacturer specified in [Global Settings] > [Robot Connection Settings].

– **Angle Expression Form**: This option can be selected if a robot manufacturer is not specified.

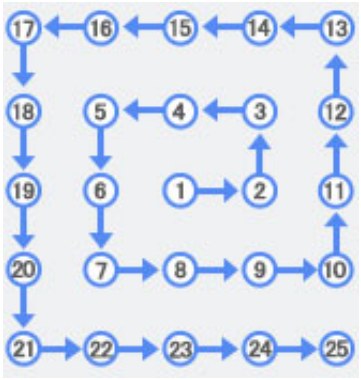
Movement Pattern

Select the number of points to move.

- **3×3**: Moves 9 points in the order shown below.



- **5×5**: Moves 25 points in the order shown below.



- **Custom**: Register arbitrary positions as detection points. Use this option when it is not possible to do a square shape like the one above.
  Select [Custom] to enable the [Detection Point Count Setting].

Movement Interval (mm)

Set the movement interval when [3x3] or [5x5] is selected in [Movement Pattern].

Point Make sure that the operating range is within the robot's range of motion and that the robot will not collide with surrounding obstacles.

Reference The setting guide is shown below.
- For movement pattern "3x3": 1/4 to 1/8 of the short side of the field of view
- For movement pattern “5x5”: 1/8 to 1/12 of the short side of the field of view

Detection Points

When [3x3] or [5x5] is selected in [Movement Pattern]: Each robot coordinate is automatically calculated to the set [Movement Interval]. When [Custom] is selected in [Movement Pattern]: Each robot coordinate can be edited. Also, detection points can be added, deleted, and rearranged.

Reference
- Uncheck the [Check] for each detection point to exclude them from the calculation.
- The detection for the selected detection point can be performed individually.
- Only when [Custom] is selected in [Movement Pattern], the coordinates of multiple detection points can be registered at once using the [Batch Paste] button.

[Auto Calibration] button

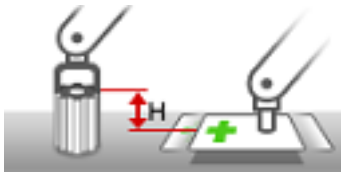
Click this button to display the [Confirm] dialog. Click the [OK] button to close the [Confirm] dialog and display the [Auto Calibration] dialog. To execute auto calibration, execute the "utility program" on the robot side while keeping the dialog open.

Reference See the "VS Series Robot Connection Manual" for information on executing the "utility program".

[Detailed Settings] button

Differing Height Correction Calibration

Use this option when the height of the plane to be calibrated and the height of the detection target are different, such as when the height of the captured surface varies depending on the product type during operation or when the height of the captured surface cannot be adjusted during calibration.
Conversion into robot coordinates at any height can be achieved by performing a calibration on two planes with a different height.
Configure the actual object height in the [Pick/Place] tool, the [Grip Shift Correction] tool, and the [Robot Coordinate Transformation] tool.



Z Direction Movement Distance

Specify the Z direction movement distance from the first plane to the second plane in mm when performing the differing height correction calibration. As the robot will operate in the Z direction, enter a height that would allow the robot to operate safely without colliding with anything. Positive and negative values depend on the direction of the robot Z-axis used. Also, verify that the value is within the camera focus range, as well as check the scale range setting of the detection tool. Specify the movement distance from the first plane to the second plane in mm.

Transformation Method

Select a transformation method for calibration. [Affine Transformation] is normally used.

- **Affine Transformation**: Corrects each of the X axis and Y axis individually.
- **Helmert Transformation**: Fixes the X axis and Y axis at right angles and then performs the correction. Use this transformation when selecting [Custom] in [Movement Pattern] and performing calibration on only one axis.
- **Projective Transformation**: Corrects the tilt of the calibration plane.

Point When [Custom] is selected in [Movement Pattern], [Differing Height Correction Calibration] cannot be turned on.

Status/Calibration Result

Displays the calibration execution result.

Tool Center Calculation

Rotates the robot at the center of the flange to calculate the position of the hand (tool) center. If you are using a robot where the angle can be controlled, make sure that you always execute tool center calculations. The start position is common with calibration.

Tool Center Calculation

- **ON** (default): Enables tool center calculation.
- **OFF**: Disables tool center calculation.

Rotation Angle (+/-)

Specifies the angle range to rotate at the center of the flange.

Point Make sure that the operating range is within the robot's range of motion and that the robot will not collide with surrounding obstacles.

Detection Points

Each robot coordinate is automatically calculated according to the angle range set in [Rotation Angle]. The coordinate values of each detection point can be edited using the [Edit] button.

Reference The detection for the selected detection point can be performed individually.

[Tool Center Calculation] button

Click this button to display the [Confirm] dialog. Click the [OK] button to close the [Confirm] dialog and display the [Tool Center Calculation] dialog. To execute tool center calculation, execute the "utility program" on the robot side while keeping the dialog open.

Reference See the "VS Series Robot Connection Manual" for information on executing the "utility program".

[High-Precision Calculation] button

Use this button if you need to calculate the tool center in high-precision. Using the camera's detection point as the virtual center, the operation of rotating the robot by the specified angle is repeated until the detection point falls within the error specified in [Convergence Target Value].

High-Precision Calculation Rotation Angle (+/-)

Specify the rotation angle range for when executing the high-precision calculation.

Convergence Target Value (pixel)

Specify the error range for completing the execution of high-precision calculation in [pixel].

[Calculate High-Precision Tool Center] button

Click this button to display the [Confirm] dialog. Click the [OK] button to close the [Confirm] dialog and display the [Calculate High-Precision Tool Center] dialog. To execute tool center high-precision calculation, execute the "utility program" on the robot side while keeping the dialog open.

Reference See the "VS Series Robot Connection Manual" for information on executing the "utility program".

Status/Tool Center Calculation Result

Displays the tool center calculation result.

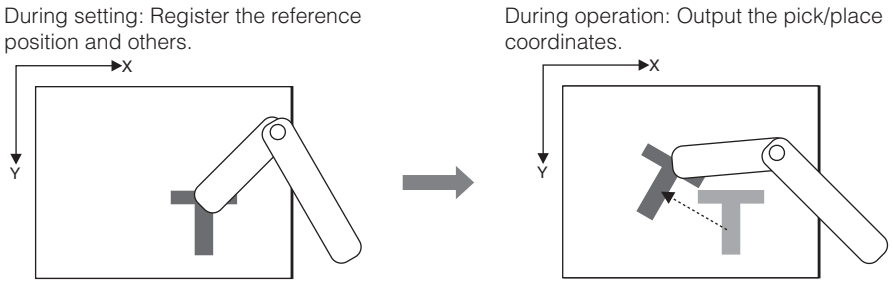
Pick/Place

#E057

This tool is a robot coordinate transformation tool used to pick a detection target or place on a detection target.

Overview of Functions

Image of the Measurement



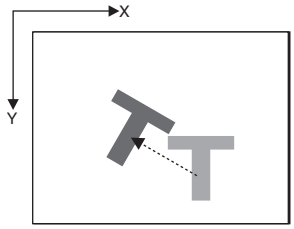
Measurement results to be output

The main measurement results output by the [Pick/Place] tool are as follows.

Measurement result	Output details
Detection Count	Outputs the calculated count. (Only when [Multiple Detection] is ON)
Post-Transformation X/Y/Angle (Rz) Shift from Reference	Outputs the shift amount from the pick/place reference position.
Robot Coordinate X/Y/Z/Rx/Ry/Rz	Outputs the pick/place position in robot coordinates.
For Capture Position: Correction Amount X/ Correction Amount Y/ Correction Amount Z	Used when correcting the capture position for on-hand. Added to the reference capture position.
For Pick/Place Position: Correction Amount X/ Correction Amount Y/ Correction Amount Z/ Correction Angle (Rx)/ Correction Angle (Ry)/ Correction Angle (Rz)	Used when correcting the pick/place position. Added to the reference pick/place position.
Tool judged value	When the measurement result of the tolerance judgment target is outside of the set tolerance range (upper limit and lower limit), it is judged as [Fail], and when the result is within the tolerance range, it is judged as [Pass].

Reference For details on the measurement results that can be output, see "Appendix" - "Results Data List".

Measurement sample



<Registration Information>

Camera Coordinates (Reference Position)	Robot Coordinates (Reference Position)
X: 1000.000 pix	X: 50.000 (mm)
Y: 800.000 pix	Y: 10.000 (mm)
⊖: 0.000 °	Z: 80.000 (mm)
	Rx: 180.000 (°)
	Ry: 0.000 (°)
	Rz: -0.123 (°)

<Detected Position>

Camera Coordinates
X: 650.000 pix
Y: 600.000 pix
⊖: -15.000 °

Transform coordinates using the calibration data.

<Measurement Result>

Shift Amount	Correction Amount	Robot Coordinates
X: -30.000 (mm)	Correction Amount X: -31.433 (mm)	X: 18.567 (mm)
Y: 20.000 (mm)	Correction Amount Y: 20.123 (mm)	Y: 30.123 (mm)
⊖: -15.000 (°)	Correction Angle (Rz): -15.000 (°)	Z: 80.000 (mm)
		Rx: 180.000 (°)
		Ry: 0.000 (°)
		Rz: -15.123 (°)

* The robot coordinates are values that take into account rotational deviation around the tool center.

Properties

When setting the Pick/Place tool, use the [Properties] view. The [Properties] view in the Pick/Place tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the current image to be used for measurement and the execution conditions for the tool.
Calibration	Specifies the calibration tool to reference.
Detection	Sets the detection position.
Reference Registration	Registers the reference pick/place position coordinates (robot) and detection coordinates (camera), and if the camera is installed on-hand, the capture position coordinates (robot) as well.
Judgment	Sets the tolerances (upper limit and lower limit) for each coordinate after transformation.
Display	Sets the display method of each coordinate and direction.

Calibration

Specify the calibration tool to reference.

Calibration Data

Specify

Select the calibration tool to reference.

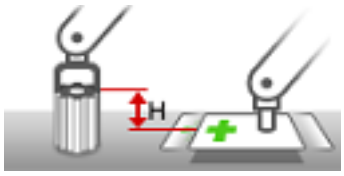
- **No Transformation** (default): Not transformed to robot coordinates.
- **Referable tools**: Among the tools in the task, the names of the referable tools are displayed. If the referenced tool is deleted, [Reference Tool No.: Error] is displayed in red.

Correct Height Difference

Turn ON to correct the differing height and convert.

- **ON**: Correct the differing height and convert. Specify the "Height Difference with Calibration Plane" in mm.
  Positive and negative values depend on the direction of the robot Z-axis used.
- **OFF** (default): Do not correct the differing height and convert.

Reference If a calibration tool that does not implement [Differing Height Correction Calibration] is specified, transformation that corrects the differing height will not be performed even if it is turned on.



Detection

Sets the detection position.

Detected Position Settings

Specify Individually

- **ON**: Sets detected positions for [X], [Y] and [Angle (Rz)] individually.
- **OFF** (default): Applies the detection position information of the tool selected in [Specify].

Specify

Select a detection tool to reference.

- **None** (default): [X], [Y] and [Angle] are all set to 0.
- **Referable tools**: Among the tools in the task, the names of the referable tools are displayed. If the referenced tool is deleted, [Reference Tool No.: Error] is displayed in red.

Angle Calculation

- **ON** (default): Includes the detected angle in the calculation when transforming to robot coordinates.
- **OFF**: Does not include the detected angle in the calculation when transforming to robot coordinates.

Point Change the setting of ON/OFF to clear the registered detection reference positions.

Multiple Detection

- **ON**: Transforms multiple detection points to robot coordinates. When there are multiple detection targets, turn ON to specify the number of detection targets.
- **OFF** (default): Transforms one detection point to robot coordinates.

Reference Cannot be set if [Specify Individually] is ON.

Reference Registration

Register the reference pick/place position coordinates (robot) and detection coordinates (camera), and if the camera is installed on-hand, the capture position coordinates (robot) as well.

Pick/Place Settings

Detected Position Coordinates

- **Camera Coordinates** (default): Select this option when the coordinate values specified in the detected position are camera coordinates.
- **Robot Coordinates**: Select this option when the coordinate values specified in the detected position are robot coordinates.

Camera installation position

- **Fixed** (default): Select this option when using the camera in a fixed installation.
- **On-Hand**: Select this option when the camera is attached to a robot.

Point
- If it differs from the [Camera Installation Position] set in the referenced calibration tool, it is displayed in red.
- Not displayed when [Robot Coordinates] is selected for [Detected Position Coordinates].

Reference Pick/Place Position Coordinates

Register the robot coordinates of the reference pick/place position.

X (mm)/Y (mm)/Z (mm)

- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Point This cannot be entered if the pick/place reference position coordinate is already registered. Click the [Clear] button to enable input.

Rx (°)/Ry (°)/Rz (°)

- **Unit**: angle
- **Range**: -180.000 to 180.000

Point This cannot be entered if the pick/place reference position coordinate is already registered. Click the [Clear] button to enable input.

Get Robot Coordinates

Click this button to open the [Get Robot Coordinates] dialog. To obtain the coordinates from the robot, execute the "utility program" on the robot side while keeping the dialog open.

Point The button cannot be pressed if the pick/place reference position coordinate is already registered. Click the [Clear] button to enable the button to be pressed.

Reference See the "VS Series Robot Connection Manual" for information on executing the "utility program".

Input by Robot Manufacturer's Format

Click this button to open the [Input by Robot Manufacturer's Format] dialog. If the robot manufacturer to be connected has been selected, coordinate values can be entered in that manufacturer's format (angle expression form).

- **Manufacturer**: Displays the robot manufacturer specified in [Global Settings] > [Robot Connection Settings].
- **Angle Expression Form**: This option can be selected if a robot manufacturer is not specified.

Register

Press this button to register the coordinates as the reference pick/place position coordinates after obtaining or entering the coordinates.

Reference When registration is completed, the display changes to [Clear] and each item cannot be entered. Click the [Clear] button to re-register.

Status

Displays the registration status.

Reference Capture Position Coordinates

Register the robot coordinates of the reference capture position.

Point Not displayed when [Robot Coordinates] is selected for [Detected Position Coordinates] or [Fixed] is selected for [Camera Installation Position].

X (mm)/Y (mm)/Z (mm)

- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Point This cannot be entered if the capture reference position coordinate is already registered. Click the [Clear] button to enable input.

Rx (°)/Ry (°)/Rz (°)

- **Unit**: angle
- **Range**: -180.000 to 180.000

Point This cannot be entered if the capture reference position coordinate is already registered. Click the [Clear] button to enable input.

Get Robot Coordinates

Click this button to open the [Get Robot Coordinates] dialog. To obtain the coordinates from the robot, execute the "utility program" on the robot side while keeping the dialog open.

Point The button cannot be pressed if the capture reference position coordinate is already registered. Click the [Clear] button to enable the button to be pressed.

Reference See the "VS Series Robot Connection Manual" for information on executing the "utility program".

Input by Robot Manufacturer's Format

Click this button to open the [Input by Robot Manufacturer's Format] dialog. If the robot manufacturer to be connected has been selected, coordinate values can be entered in that manufacturer's format (angle expression form).

- **Manufacturer**: Display the robot manufacturer specified in [Global Settings] > [Robot Connection Settings].
- **Angle Expression Form**: This option can be selected if a robot manufacturer is not specified.

Register

Press this button to register the coordinates as the capture reference position coordinate after obtaining or entering the coordinates.

Reference When registration is completed, the display changes to [Clear] and each item cannot be entered. Click the [Clear] button to re-register.

Status

Displays the registration status.

Update Capture Position for Each Measurement

This is used when changing the capture position during operation.

- **ON**: Refer to [Capture Position Coordinate]. Turn ON to display each item in [Capture Position Coordinate].
- **OFF** (default): Refer to [Reference Capture Position Coordinates]. When it is turned OFF, each item in [Capture Position Coordinate] is not displayed.

Point
- When updating the capture position using the RBCPW command, be sure to turn it ON.
- When updating the capture position using the RBCPW command, use the same working distance as at the time of calibration.
- Even with a different posture (Rx/Ry/Rz) than at the time of calibration, the RBCPW command can be used to update and correct the capture position.

Capture Position Coordinates

Displays the capture position coordinate. Input is also possible.

Register Reference Detection Position

Register the camera detection coordinates at the reference position.

Set to the Same as Detection Position Settings

- **ON** (default): Turn ON to detect and register the same detection target as during operation.
- **OFF**: Turn OFF to detect and register a different detection target (such as a reference master jig) from during operation.

Specify Individually

- **ON**: Set detected positions for [X], [Y] and [Angle (Rz)] individually.
- **OFF** (default): Apply the detection position information of the tool selected in [Specify].

Point This setting is displayed and can be set only when [Set to the Same as Detection Position Settings] is set to OFF.

Specify

Select a detection tool to reference.

- **None** (default): [X], [Y] and [Angle] are all set to 0.
- **Referable tools**: Among the tools in the task, the names of the referable tools are displayed. If the referenced tool is deleted, [Reference Tool No.: Error] is displayed in red.

Point This setting is displayed and can be set only when [Set to the Same as Detection Position Settings] is set to OFF.

Register Reference Detection Position

Click this button to display the [Register Reference Detection Position] dialog.
Capture at the detection reference position and register the detection coordinates.

- **Display Image**: Only when the reference detection position is registered, [Current Image] and "Reference Position Image" can be switched.
- **Reference Position Image**: Display the registration status of reference position images.
- **Reference Detection Position**: Display the detection coordinate. The displayed value switches according to the selection status of the displayed image.
- **[Register] button**: Clickable only if not registered.
- **[Clear] button**: Clickable only if already registered.
- **Registered Value**: The reference position registration coordinates are displayed only when registered.

Judgment

Set the tolerances (upper limit and lower limit) for each coordinate after transformation. When the measurement result of the tolerance judgment target is outside of the set tolerance range, it is judged as [Fail], and when the result is within the tolerance range, it is judged as [Pass]. The latest measurement result is displayed in [Current Value]. Select the check box for [Upper Limit] or [Lower Limit], and then enter the tolerance.

Point
- A value smaller than [Lower Limit] cannot be set to [Upper Limit]. Also, a value larger than [Upper Limit] cannot be set to [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it is always judged as "Pass".
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see "Appendix" - "Settings Parameters List".

Judgment Conditions

Post-Transformation X Shift from Reference

Set the tolerance for the shift from the reference (X coordinate) after the transformation to robot coordinates.
- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Post-Transformation Y Shift from Reference

Set the tolerance for the shift from the reference (Y coordinate) after the transformation to robot coordinates.
- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Post-Transformation Angle Shift from Reference (Rz)

Set the tolerance for the shift angle from the reference (Rz) after the transformation to robot coordinates.
- **Unit**: angle
- **Range**: -180.000 to 180.000

Robot Coordinate X

Set the tolerance for robot coordinate X after the transformation.
- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Robot Coordinate Y

Set the tolerance for robot coordinate Y after the transformation.
- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Robot Coordinate Z

Set the tolerance for robot coordinate Z after the transformation.
- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Robot Coordinate Rx

Set the tolerance for robot coordinate Rx after the transformation.

- **Unit**: angle
- **Range**: -180.000 to 180.000

Robot Coordinate Ry

Set the tolerance for robot coordinate Ry after the transformation.

- **Unit**: angle
- **Range**: -180.000 to 180.000

Robot Coordinate Rz

Set the tolerance for robot coordinate Rz after the transformation.

- **Unit**: angle
- **Range**: -180.000 to 180.000

Display

Set the display method of each coordinate and direction. The display color can be changed based on the judgment result for the tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Position

Select whether to display the detected position.

- **ON** (default): Display the detected position. Set the shape, size, thickness, and color to be displayed at the detected position.
- **OFF**: Do not display the detected position.

Reference Detection Position

Select whether to display the reference detection position.

- **ON** (default): Display the reference detection position. Set the shape, size, thickness, and color to be displayed at the reference detection position.
- **OFF**: Do not display the reference detection position.

Operation Direction Vector

Select whether to display the operation direction arrow.

- **ON** (default): Display the operation direction arrow. Set the thickness and color of the operation direction arrow.
- **OFF**: Do not display the operation direction arrow.

Robot Coordinates

Select whether to display the robot coordinates.

- **ON** (default): Display the robot coordinates. Set the shape, size, thickness, and color to be displayed at the robot coordinates.
- **OFF**: Do not display the robot coordinates.

Reset

Restores the display options to their default settings.

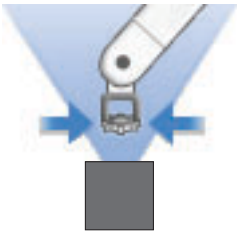
Grip Shift Correction

#E058

This tool is a robot coordinate transformation tool used to capture the shift amount of the gripped target object with a fixed camera and correct it on the spot, and to place it in the correct position by taking the shift amount into account.

Overview of Functions

Image of the Measurement



VS

During setting: Register the capture position and reference position and others.

During operation: Output the shift amount or the place coordinates.

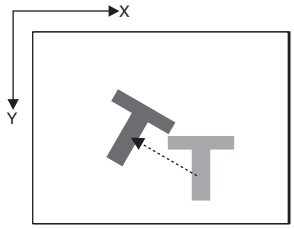
Measurement results to be output

The main measurement results output by the [Grip Shift Correction] tool are as follows.

Measurement result	Output details
Detection Count	Outputs the calculated count. (Only when [Multiple Detection] is ON)
Post-Transformation X/Y/Angle (Rz) Shift from Reference	Outputs the shift amount from the reference position.
Robot Coordinate X/Y/Z/Rx/Ry/Rz	Outputs the position to move or place the object to the reference position in robot coordinates.
Correction Amount X/ Correction Amount Y/ Correction Amount Z/ Correction Angle (Rx)/ Correction Angle (Ry)/ Correction Angle (Rz)	Outputs the correction amount.
Tool judged value	When the measurement result of the tolerance judgment target is outside of the set tolerance range (upper limit and lower limit), it is judged as [Fail], and when the result is within the tolerance range, it is judged as [Pass].

Reference For details on the measurement results that can be output, see "Appendix" - "Results Data List".

Measurement sample



<Registration Information>

Camera Coordinates (Reference Position)	Robot Coordinates (Reference Position)
X: 1000.000 pix	X: 50.000 (mm)
Y: 800.000 pix	Y: 10.000 (mm)
Θ: 0.000 °	Z: 80.000 (mm)
	Rx: 180.000 (°)
	Ry: 0.000 (°)
	Rz: -0.123 (°)

<Detected Position>

Camera Coordinates
X: 650.000 pix
Y: 600.000 pix
Θ: -15.000 °

Transform coordinates using the calibration data.

<Measurement Result>

Shift Amount	Robot Coordinates
X: -3.000 (mm)	X: 146.123 (mm)
Y: -2.000 (mm)	Y: 57.654 (mm)
Θ: -15.000 (°)	Z: 30.000 (mm)
	Rx: 180.000 (°)
	Ry: 0.000 (°)
	Rz: -15.123 (°)

* The robot coordinates are values that take into account rotational deviation around the tool center.
* The above robot coordinates are samples when calculating place position coordinates.

Calibration

Specifies the calibration tool to reference.

Calibration Data

Specify

Select the calibration tool to reference.

- **None** (default): Does not transform to robot coordinates.
- **Referable tools**: Among the tools in the task, the names of the referable tools are displayed. If the referenced tool is deleted, [Reference Tool No.: Error] is displayed in red.

Correct Height Difference

Turn ON to correct the differing height and convert.

- **ON**: Correct the differing height and convert. Specify the "Height Difference with Calibration Plane" in mm.
  Positive and negative values depend on the direction of the robot Z-axis used.
- **OFF** (default): Do not correct the differing height and convert.

Reference If a calibration tool that does not implement [Differing Height Correction Calibration] is specified, transformation that corrects the differing height will not be performed even if it is turned on.

Detection

Set the detection position.

Detected Position Settings

Specify Individually

- **ON**: Set detected positions for [X], [Y] and [Angle (Rz)] individually.
- **OFF** (default): Apply the detection position information of the tool selected in [Specify].

Specify

Select a detection tool to reference.

- **None** (default): [X], [Y] and [Angle] are all set to 0.
- **Referable tools**: Among the tools in the task, the names of the referable tools are displayed. If the referenced tool is deleted, [Reference Tool No.: Error] is displayed in red.

Angle Calculation

- **ON** (default): Include the detected angle in the calculation when transforming to robot coordinates.
- **OFF**: Do not include the detected angle in the calculation when transforming to robot coordinates.

Point Change the setting of ON/OFF to clear the registered detection reference positions.

Multiple Detection

- **ON**: Transform multiple detection points to robot coordinates. When there are multiple detection targets, turn ON to specify the number of detection targets.
- **OFF** (default): Transform one detection point to robot coordinates.

Reference Cannot be set if [Specify Individually] is ON.

Reference Registration

Register the reference capture position coordinates (robot) and detection coordinates (camera), and if the place position is output, the place position coordinates (robot) as well.

Grip Shift Correction Setting

Detected Position Coordinates

- **Camera Coordinates** (default): Select this option when the coordinate values specified in the detected position are camera coordinates.
- **Robot Coordinates**: Select this option when the coordinate values specified in the detected position are robot coordinates.

Reference Capture Position Coordinates

Register the robot coordinates of the reference capture position.

Point Not displayed when [Robot Coordinates] is selected for [Detected Position Coordinates].

X (mm)/Y (mm)/Z (mm)

- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Point This cannot be entered if the capture reference position coordinate is already registered. Click the [Clear] button to enable input.

Rx (°)/Ry (°)/Rz (°)

- **Unit**: angle
- **Range**: -180.000 to 180.000

Point This cannot be entered if the capture reference position coordinate is already registered. Click the [Clear] button to enable input.

Get Robot Coordinates

Click this button to open the [Get Robot Coordinates] dialog. To obtain the coordinates from the robot, execute the "utility program" on the robot side while keeping the dialog open.

Point The button cannot be pressed if the capture reference position coordinate is already registered. Click the [Clear] button to enable the button to be pressed.

Reference See the "VS Series Robot Connection Manual" for information on executing the "utility program".

Input by Robot Manufacturer's Format

Click this button to open the [Input by Robot Manufacturer's Format] dialog. If the robot manufacturer to be connected has been selected, coordinate values can be entered in that manufacturer's format (angle expression form).

- **Manufacturer**: Display the robot manufacturer specified in [Global Settings] > [Robot Connection Settings].
- **Angle Expression Form**: This option can be selected if a robot manufacturer is not specified.

Register

Press this button to register the coordinates as the capture reference position coordinate after obtaining or entering the coordinates.

Reference When registration is completed, the display changes to [Clear] and each item cannot be entered. Click the [Clear] button to re-register.

Status

Display the registration status.

Update Capture Position for Each Measurement

This is used when changing the capture position during operation.

- **ON**: Refer to [Capture Position Coordinates]. Turn ON to display each item in [Capture Position Coordinates].
- **OFF** (default): Refer to [Reference Capture Position Coordinates]. When it is turned OFF, each item in [Capture Position Coordinates] is not displayed.

Point When updating the capture position using the RBCPW command, be sure to turn it ON.

Capture Position Coordinates

Display the capture position coordinate. Input is also possible.

Register Reference Detection Position

Register the camera detection coordinates at the reference position.

Set to the Same as Detection Position Settings

- **ON** (default): Turn ON to detect and register the same detection target as during operation.
- **OFF**: Turn OFF to detect and register a different detection target (such as a reference master jig) from during operation.

Specify Individually

- **ON**: Set detected positions for [X], [Y] and [Angle (Rz)] individually.
- **OFF** (default): Apply the detection position information of the tool selected in [Specify].

Point This setting is displayed and can be set only when [Set to the Same as Detection Position Settings] is set to OFF.

Specify

Select a detection tool to reference.

- **None** (default): [X], [Y] and [Angle] are all set to 0.
- **Referable tools**: Among the tools in the task, the names of the referable tools are displayed. If the referenced tool is deleted, [Reference Tool No.: Error] is displayed in red.

Point This setting is displayed and can be set only when [Set to the Same as Detection Position Settings] is set to OFF.

Register Reference Detection Position

Click this button to display the [Register Reference Detection Position] dialog.
Capture at the reference position and register the detection coordinates.

- **Display Image**: Only when the reference detection position is registered, [Current Image] and "Reference Position Image" can be switched.
- **Reference Position Image**: Display the registration status of reference position images.
- **Reference Detection Position**: Display the detection coordinate. The displayed value switches according to the selection status of the displayed image.
- **[Register] button**: Clickable only if not registered.
- **[Clear] button**: Clickable only if already registered.
- **Registered Value**: The reference position registration coordinates are displayed only when registered.

Reference Place Position

Register the robot coordinates of the reference place position.

Add Shift Amount to Place Position Coordinates

This is used when outputting the robot coordinates of measurement results as place position coordinates.

- **ON**: Output the place position coordinates. Turn ON to display each item in [Place Reference Position Coordinate].
- **OFF** (default): Output the robot coordinates to move the object to the reference position. When it is turned OFF, each item in [Reference Place Position Coordinates] cannot be set.

X (mm)/Y (mm)/Z (mm)

- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Point
- This setting can be set only when [Add Shift Amount to Place Position Coordinates] is set to ON.
- This cannot be entered if the place reference position coordinate is already registered. Click the [Clear] button to enable input.

Rx (°)/Ry (°)/Rz (°)

- **Unit**: angle
- **Range**: -180.000 to 180.000

Point
- This setting can be set only when [Add Shift Amount to Place Position Coordinates] is set to ON.
- This cannot be entered if the place reference position coordinate is already registered. Click the [Clear] button to enable input.

Get Robot Coordinates

Click this button to open the [Get Robot Coordinates] dialog. To obtain the coordinates from the robot, execute the "utility program" on the robot side while keeping the dialog open.

Point
- The button can be pressed only when [Add Shift Amount to Place Position Coordinates] is set to ON.
- The button cannot be pressed if the place reference position coordinate is already registered. Click the [Clear] button to enable the button to be pressed.

Reference See the "VS Series Robot Connection Manual" for information on executing the "utility program".

Input by Robot Manufacturer's Format

Click this button to open the [Input by Robot Manufacturer's Format] dialog. If the robot manufacturer to be connected has been selected, coordinate values can be entered in that manufacturer's format (angle expression form).

- **Manufacturer**: Display the robot manufacturer specified in [Global Settings] > [Robot Connection Settings].
- **Angle Expression Form**: This option can be selected if a robot manufacturer is not specified.

Point
- The button can be pressed only when [Add Shift Amount to Place Position Coordinates] is set to ON.
- The button cannot be pressed if the place reference position coordinate is already registered. Click the [Clear] button to enable the button to be pressed.

Register

Press this button to register the coordinates as the reference place position coordinates after obtaining or entering the coordinates.

Reference When registration is completed, the display changes to [Clear] and each item cannot be entered. Click the [Clear] button to re-register.

Status

Displays the registration status.

Judgment

Set the tolerances (upper limit and lower limit) for each coordinate after transformation. When the measurement result of the tolerance judgment target is outside of the set tolerance range, it is judged as [Fail], and when the result is within the tolerance range, it is judged as [Pass]. The latest measurement result is displayed in [Current Value]. Select the check box for [Upper Limit] or [Lower Limit], and then enter the tolerance.

Point
- A value smaller than [Lower Limit] cannot be set to [Upper Limit]. Also, a value larger than [Upper Limit] cannot be set to [Lower Limit].
- If the check box is not selected, tolerance judgment is not performed and it is always judged as "Pass".
- If the check box is cleared, the set tolerance value (or reference) is reset.

Reference For details on the range of setting values and numerical format for each setting item, see "Appendix" - "Settings Parameters List".

Judgment Conditions

Post-Transformation X Shift from Reference

Set the tolerance for the shift from the reference (X coordinate) after the transformation to robot coordinates.
- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Post-Transformation Y Shift from Reference

Set the tolerance for the shift from the reference (Y coordinate) after the transformation to robot coordinates.
- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Post-Transformation Angle Shift from Reference (Rz)

Set the tolerance for the shift angle from the reference (Rz) after the transformation to robot coordinates.

- **Unit**: angle
- **Range**: -180.000 to 180.000

Robot Coordinate X

Set the tolerance for robot coordinate X after the transformation.

- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Robot Coordinate Y

Set the tolerance for robot coordinate Y after the transformation.

- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Robot Coordinate Z

Set the tolerance for robot coordinate Z after the transformation.

- **Unit**: mm
- **Range**: -9999.999 to 9999.999

Robot Coordinate Rx

Set the tolerance for robot coordinate Rx after the transformation.

- **Unit**: angle
- **Range**: -180.000 to 180.000

Robot Coordinate Rx

Set the tolerance for robot coordinate Ry after the transformation.

- **Unit**: angle
- **Range**: -180.000 to 180.000

Robot Coordinate Rz

Set the tolerance for robot coordinate Rz after the transformation.

- **Unit**: angle
- **Range**: -180.000 to 180.000

Display

Set the display method of each coordinate and direction. The display color can be changed based on the judgment result for the tool. You can also show or hide the display with the toggle switch.

Display Settings

Detected Position

Select whether to display the detected position.

- **ON** (default): Display the detected position. Set the shape, size, thickness, and color to be displayed at the detected position.
- **OFF**: Do not display the detected position.

Reference Detection Position

Select whether to display the reference detection position.

- **ON** (default): Display the reference detection position. Set the shape, size, thickness, and color to be displayed at the reference detection position.
- **OFF**: Do not display the reference detection position.

Operation Direction Vector

Select whether to display the operation direction arrow.

- **ON** (default): Display the operation direction arrow. Set the thickness and color of the operation direction arrow.
- **OFF**: Do not display the operation direction arrow.

Reference Capture Position

Select whether to display the capture detection position.

- **ON** (default): Display the capture detection position. Set the shape, size, thickness, and color to be displayed at the robot coordinates.
- **OFF**: Do not display the capture detection position.

Reset

Restores the display options to their default settings.

Robot Coordinate Transformation

#E059

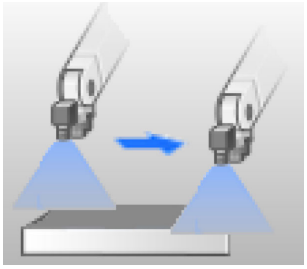
This is a tool for robot coordinate transformation used for the use that cannot be handled by the [Pick/Place] tool or the [Grip Shift Correction] tool.

Overview of Functions

Image of the Measurement

This is a robot coordinate transformation tool used for the use that cannot be handled by the [Pick/Place] tool or the [Grip Shift Correction] tool, such as capturing two or more points by moving the camera or object with one piece of calibration data. It is also possible to transform from robot coordinates to camera coordinates.

Example: On-hand 1 camera picking with movement



Move the on-hand camera and capture two points. Calculate the target object picking position from the two points' position coordinates, and output the robot coordinates.

Reference The following robot application tools use the robot coordinate transformation tools.

- Pick (2-Point Capture)
- Grip Shift Correction (2-Point Capture)
- Place (2-Point Capture)

Measurement results to be output

The main measurement results output by the [Robot Coordinate Transformation] are as follows:

Measurement result	Output details
Post-Transformation Coordinate X/Y/Angle	Outputs the shift amount from the position.
Judgment	Outputs "Pass" if the conversion was successful, and "Fail" if it is not.

Reference For details on the measurement results that can be output, see "Appendix" - "Results Data List".

Properties

When setting the Pick/Place tool, use the [Properties] view. The [Properties] view in the Pick/Place tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the captured image to be used for measurement and the execution conditions for the tool.
Transformation	Sets and executes calibration.
Display	Sets the display method of coordinates.

Transformation

Set the calibration used during conversion and the target to be transformed. Also, configure settings when the camera or object is moved from the calibration start position to capture images.

Edit Calibration

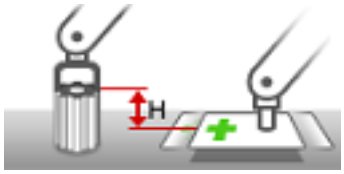
Specify

Select the calibration tool to reference.

- **None** (default): Not transformed to robot coordinates.
- **Referable tools**: Among the calibration tools in the task, the names of the referable tools are displayed. If the referenced tool is deleted, [Reference Tool No.: Error] is displayed in red.

Correct Height Difference

Turn ON to correct the differing height and convert.



- **ON**: Correct the differing height and convert. Specify the "Height Difference with Calibration Plane" in mm. Positive and negative values depend on the direction of the robot Z-axis used.
- **OFF** (default): Do not correct the differing height and convert.

Reference If a calibration tool that does not implement [Differing Height Correction Calibration] is specified, transformation that corrects the differing height will not be performed even if it is turned on.

Transformation Direction

- **Camera Coordinates→Robot Coordinates** (default): Transform camera coordinates to robot coordinates.
- **Robot Coordinates→Camera Coordinates**: Transform robot coordinates to camera coordinates.

Transformation Target

Specify the target for robot coordinate transformation.

Specify Individually

- **ON**: Set transformation targets for [Position X], [Position Y] and [Angle] individually.

- **OFF** (default): Apply the detection position information of the tool selected in [Tool ID].

Tool ID

Select a detection tool to reference.

- **None** (default): [X], [Y] and [Angle] are all set to 0.
- **Referable tools**: Among the tools in the task, the names of the referable tools are displayed. If the referenced tool is deleted, [Reference Tool No.: Error] is displayed in red.

Multiple Detection

- **ON**: Transform multiple detection points to robot coordinates. Specify the number to be calculated.
  When specifying the detection position with the tool, use the number of [Judgment Label] starting from number 0.
- **OFF** (default): Transform one detection point to robot coordinates.
  When specifying the detection position with the tool, use the data of the number specified in [Judgment Label] (initial value: 0).

Reference Cannot be set if [Specify Individually] is ON.

Camera/Object Movement Correction

When capturing by moving the camera or object, correct the position coordinates detected during capture after movement by taking into account the amount of movement of the camera or object.

Correction Type

- **No Correction** (default): No correction is performed depending on the camera or object position.
- **Camera Movement Correction**: When moving the camera to capture an image and transforming the robot coordinates after movement by using the calibration data before movement, select this with the robot coordinate transformation tool after movement.
- **Object Movement Correction**: When moving the object to capture an image and transforming the robot coordinates after movement by using the calibration data before movement, select this with the robot coordinate transformation tool after movement.

Calculation Method

- **Calculate from Current Position** (default): Select this to correct the position coordinates by the amount of movement from the camera or object position during calibration to the current position. Enter the current position or get the coordinates.
- **Specify Directly**: Select this to correct the position coordinates by the amount of movement from the camera or object position during calibration to the specified position. Enter the corrected value.

Get Robot Coordinates

Click this button to open the [Get Robot Coordinates] dialog. To obtain the coordinates from the robot, execute the "utility program" on the robot side while keeping the dialog open.

Reference See the "VS Series Robot Connection Manual" for information on executing the "utility program".

Input by Robot Manufacturer's Format

Click this button to open the [Input by Robot Manufacturer's Format] dialog. If the robot manufacturer to be connected has been selected, coordinate values can be entered in that manufacturer's format (angle expression form).

- **Manufacturer**: Displays the robot manufacturer specified in [Global Settings] > [Robot Connection Settings].
- **Angle Expression Form**: This option can be selected if a robot manufacturer is not specified.

Display

Set the display method of each coordinate. The display color can be changed based on the judgment result for the tool. You can also show or hide the display with the toggle switch.

Display Settings

Transformation Target

Select whether to display the position of the transformation target.

- **ON** (default): Display the position of the transformation target. Set the shape, size, thickness, and color to be displayed at the transformation target.
- **OFF**: Do not display the position of the transformation target.

Post-Transformation Coordinates

Select whether to display the coordinate after transformation

- **ON** (default): Display the coordinate after transformation Set the shape, size, thickness, and color to be displayed at the coordinate after transformation.
- **OFF**: Do not display the coordinate after transformation.

Reset

Restores the display options to their default settings.

Pick (1-Point Capture)

#E060

This application is used to capture the whole or part of the target object at one point and pick it.

- **Use**: Capture the image of an object whose position is not fixed with a camera and pick (grip) it
- **Camera Installation Position**: Fixed or On-Hand (mounted on the robot)
- **Number of Captured Images**: 1

Reference For details depending on the camera installation position, see the following documents. The documents can be downloaded from the VS Series User Support Page > Robot Vision.

- For [Fixed]: "VS Series Easy Introduction Guide Camera Fixed Installation 1-Point Capture Pick/Place Edition"
- For [On-Hand]: "VS Series Easy Introduction Guide Camera On-Hand Installation 1-Point Capture Pick/Place Edition"

How to add applications

1 Select [Free Layout] from the layout switch displayed in the upper right corner of the [Task] view.

Point The layout may be corrupted if an application is added using [Step Layout]. It is recommended to add it using [Free Layout].

2 Right-click in the [Task] view to select [Add Tool] > [Robot Vision] > [Pick (Application)] from the displayed menu and then [Pick (1-Point Capture)].

3 Click the [Settings] button in [Robot Connection Settings (Global Settings)] in the displayed [Setting Menu] dialog, and make sure that the robot manufacturer to be connected is selected.

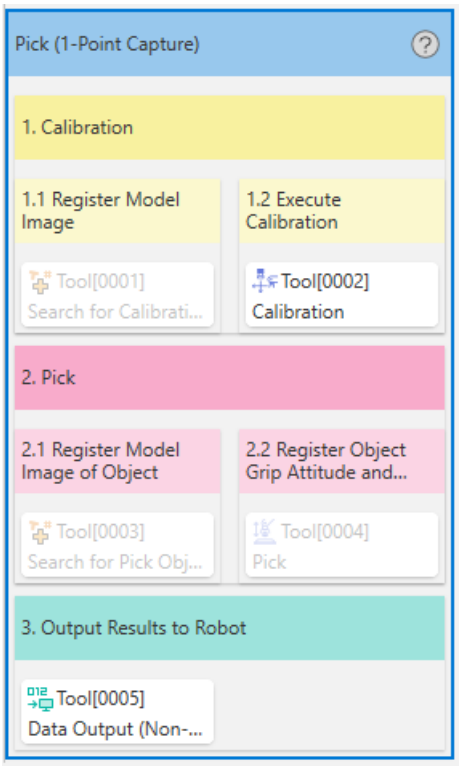
Point If a robot manufacturer to be connected is not selected before adding the application, the data output delimiter, robot coordinate angle expression form, etc. will not be optimized. Be sure to select the robot manufacturer first. For details, see "VS Series Robot Connection Manual".

4 Select [Fixed] or [On-Hand] in [Camera Installation Position].

5 Click the [OK] button.

Application details

The application consists of three groups: [1. Calibration], [2. Pick], and [3. Output Results to Robot].



(1) Calibration

(1.1) Register Model Image

Sets the [ShapeTrax3A] tool to detect calibration targets.

(1.2) Execute a Calibration

Performs the calibration and the tool center calculation with the [Calibration] tool.

(2) Pick

(2.1) Register Model Image of Object

Sets the [ShapeTrax3A] tool to detect the whole or part of the object to be picked.

(2.2) Register Object Grip Attitude and Reference

Registers the reference pick position coordinates (robot), the object's detection coordinates (camera), and if the camera is installed on-hand, the capture reference position coordinates (robot) in the [Pick/Place] tool.

(3) Output Results to Robot

Sets the results to be output to the robot using the [Data Output (Non-Procedural)] tool.

Reference The output content is set according to the sample program. No settings are required if there are no additions or changes to the output content.

Pick (2-Point Capture)

#E061

This application is used to capture part of the target object at two points and pick them.

- **Use**: Capture the image of an object whose position is not fixed with a camera and pick (grip) it
- **Camera Installation Position**: On-Hand (mounted on the robot)
- **Number of Captured Images**: 2

Reference For details, see the following document. The document can be downloaded from the VS Series User Support Page > Robot Vision.
"VS Series Easy Introduction Guide Camera On-Hand Installation 2-Point Capture Pick/Place Edition"

How to add applications

1 Select [Free Layout] from the layout switch displayed in the upper right corner of the [Task] view.

Point The layout may be corrupted if an application is added using [Step Layout]. It is recommended to add it using [Free Layout].

2 Right-click in the [Task] view to select [Add Tool] > [Robot Vision] > [Pick (Application)] from the displayed menu and then [Pick (2-Point Capture)].

3 Click the [Settings] button in [Robot Connection Settings (Global Settings)] in the displayed [Setting Menu] dialog, and make sure that the robot manufacturer to be connected is selected.

Point If a robot manufacturer to be connected is not selected before adding the application, the data output delimiter, robot coordinate angle expression form, etc. will not be optimized. Be sure to select the robot manufacturer first. For details, see "VS Series Robot Connection Manual".

4 Click the [OK] button.

Application details

The application consists of six groups: [1. Calibration], [2. Get Capture Information (Which Position) from PLC], [3. Detect 1st/2nd Position, Register Model Image of Object], [4. Calculate Midpoint of Two Points], [5. Pick at Midpoint, Register Object Grip Attitude and Reference], and [6. Output Results to Robot].

(1) Calibration

For calibration, set each capture point (1st point/2nd point).

(1.1) Register Model Image

Sets the [ShapeTrax3A] tool to detect calibration targets.

(1.2) Execute Calibration

Performs the calibration and the tool center calculation with the [Calibration] tool.

(2) Get Capture Information (Which Position) from PLC

Sets the [Data Input (Industrial Ethernet)] tool to specify which point to be captured from the PLC.

Reference

- The input contents and data reflection destination are set in advance. No settings are required if there are no additions or changes.
- The settings for the input source [Global Settings] > [Industrial Ethernet Settings] are required.

(3) Detect 1st/2nd Position, Register Model Image of Object

Sets the [ShapeTrax3A] tool to detect part of the object to be picked for each capture point (1st point/2nd point).

(4) Calculate Midpoint of Two Points

Transforms the detected position of each capture point detected in (3) to robot coordinates, and calculate the midpoint.

Reference
- The group is closed by default. Click the [V] button in the upper left to display the tools in the group.
- Each tool is set in advance. No change is required.

(5) Pick at Midpoint, Register Object Grip Attitude and Reference

Registers the reference pick position coordinates (robot) and the object's detection coordinates (camera) in the [Pick/Place] tool.

(6) Output Results to Robot

Sets the results to be output to the robot using the [Data Output (Non-Procedural)] tool.

Reference The output content is set according to the sample program. No settings are required if there are no additions or changes to the output content.

Grip Shift Correction (1-Point Capture)

#E062

This application is used to capture the whole or part of the target object gripped by the robot at one point, correct the shift amount of the target object gripped by the hand on the spot, and offset the shift amount to the registered reference position and place the object.

- **Use**: Capture the image of an object that is expected to shift when picking (gripping) with a camera and correct it
- **Camera Installation Position**: Fixed
- **Number of Captured Images**: 1

Reference For details, see the following document. The document can be downloaded from the VS Series User Support Page > Robot Vision.
"VS Series Easy Introduction Guide Camera Fixed Installation 1-Point Capture Grip Shift Correction Edition"

How to add applications

1 Select [Free Layout] from the layout switch displayed in the upper right corner of the [Task] view.

Point The layout may be corrupted if an application is added using [Step Layout]. It is recommended to add it using [Free Layout].

2 Right-click in the [Task] view to select [Add Tool] > [Robot Vision] > [Grip Shift Correction (Application)] from the displayed menu and then [Grip Shift Correction (1-Point Capture)].

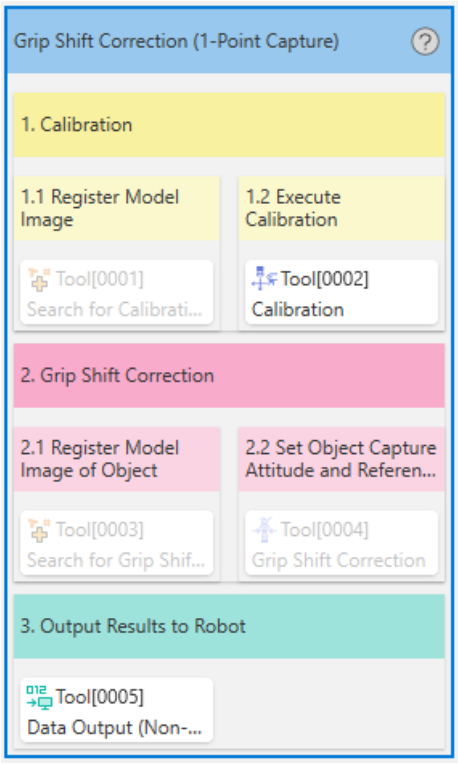
3 Click the [Settings] button in [Robot Connection Settings (Global Settings)] in the displayed [Setting Menu] dialog, and make sure that the robot manufacturer to be connected is selected.

Point If a robot manufacturer to be connected is not selected before adding the application, the data output delimiter, robot coordinate angle expression form, etc. will not be optimized. Be sure to select the robot manufacturer first. For details, see "VS Series Robot Connection Manual".

4 Click the [OK] button.

Application details

The application consists of three groups: [1. Calibration], [2. Grip Shift Correction], and [3. Output Results to Robot].



(1) Calibration

(1.1) Register Model Image

Sets the [ShapeTrax3A] tool to detect calibration targets (part of the object or a cross sticker pasted on the object, etc.).

(1.2) Execute Calibration

Performs the calibration and the tool center calculation with the [Calibration] tool.

(2) Grip Shift Correction

(2.1) Register Model Image of Object

Sets the [ShapeTrax3A] tool to detect the whole or part of the object.

(2.2) Set Object Capture Attitude and Reference

Registers the object's capture reference position coordinates (robot) and the detection coordinates (camera) in the [Grip Shift Correction] tool. The place reference position (robot) can also be registered.

(3) Output Results to Robot

Sets the results to be output to the robot using the [Data Output (Non-Procedural)] tool.

Reference The output content is set according to the sample program. No settings are required if there are no additions or changes to the output content.

Grip Shift Correction (2-Point Capture)

#E063

This application is used to capture the target object gripped by the robot at two points with a fixed camera, correct the shift amount of the target object gripped by the hand on the spot, and offset the shift amount to the registered reference position and place the object.

- **Use**: Capture the image of an object that is expected to shift when picking (gripping) with a camera and correct it
- **Camera Installation Position**: Fixed
- **Number of Captured Images**: 2

Reference For details, see the following document. The document can be downloaded from the VS Series User Support Page > Robot Vision.
"VS Series Easy Introduction Guide Camera Fixed Installation 2-Point Capture Grip Shift Correction Edition"

How to add applications

1 Select [Free Layout] from the layout switch displayed in the upper right corner of the [Task] view.

Point The layout may be corrupted if an application is added using [Step Layout]. It is recommended to add it using [Free Layout].

2 Right-click in the [Task] view to select [Add Tool] > [Robot Vision] > [Grip Shift Correction (Application)] from the displayed menu and then [Grip Shift Correction (2-Point Capture)].

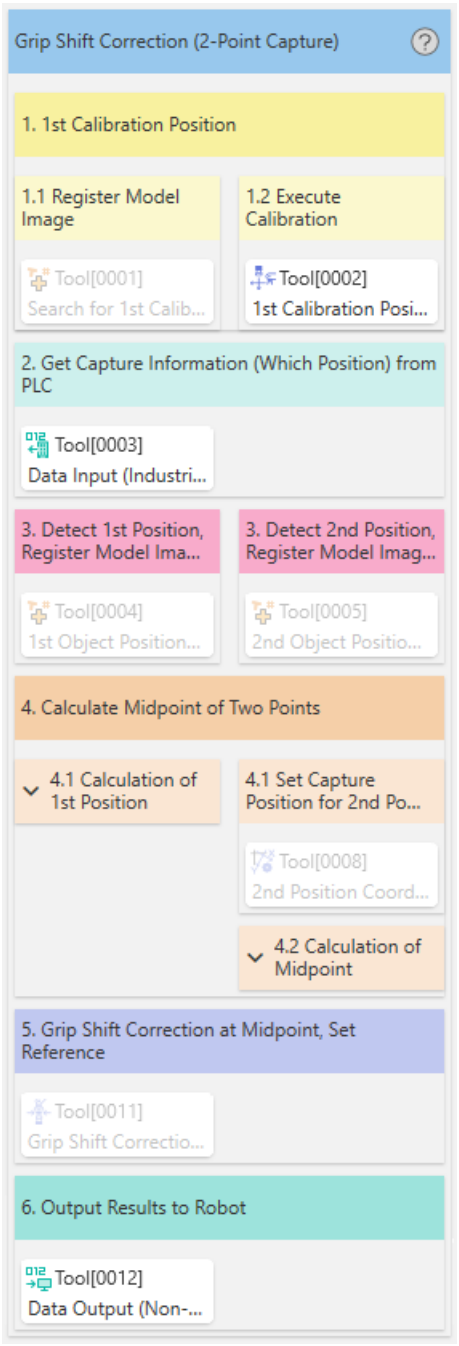
3 Click the [Settings] button in [Robot Connection Settings (Global Settings)] in the displayed [Setting Menu] dialog, and make sure that the robot manufacturer to be connected is selected.

Point If a robot manufacturer to be connected is not selected before adding the application, the data output delimiter, robot coordinate angle expression form, etc. will not be optimized. Be sure to select the robot manufacturer first. For details, see "VS Series Robot Connection Manual".

4 Click the [OK] button.

Application details

The application consists of six groups: [1. 1st Calibration Position], [2. Get Capture Information (Which Position) from PLC], [3. Detect 1st/2nd Position, Register Model Image of Object], [4. Calculate Midpoint of Two Points], [5. Grip Shift Correction at Midpoint, Set Reference], and [6. Output Results to Robot].



(1) 1st Calibration Position

Since the common calibration is used for both the 1st point and the 2nd point, set the calibration only for the 1st point here.

(1.1) Register Model Image

Sets the [ShapeTrax3A] tool to detect calibration targets (part of the object or a cross sticker pasted on the object, etc.).

(1.2) Execute Calibration

Performs the calibration and the tool center calculation with the [Calibration] tool.

(2) Get Capture Information (Which Position) from PLC

Sets the [Data Input (Industrial Ethernet)] tool to specify which point to be captured from the PLC.

Reference
- The input contents and data reflection destination are set in advance. No settings are required if there are no additions or changes.
- The settings for the input source [Global Settings] > [Industrial Ethernet Settings] are required.

(3) Detect 1st/2nd Position, Register Model Image of Object

Sets the [ShapeTrax3A] tool to detect part of the object for each capture point (1st point/2nd point).

(4) Calculate Midpoint of Two Points

Transforms the detected position of each capture point detected in (3) to robot coordinates, and calculate the midpoint.
Sets the object's movement corrected value for the [2nd Point Coordinate Transformation] tool.

Reference
- The group is closed by default. Click the [V] button in the upper left to display the tools in the group.
- Each tool in the closed group is set in advance. No change is required.

(5) Grip Shift Correction at Midpoint, Set Reference

Registers the object's detection reference position coordinates (camera) in the [Grip Shift Correction] tool. The place reference position (robot) can also be registered.

(6) Output Results to Robot

Sets the results to be output to the robot using the [Data Output (Non-Procedural)] tool.

Reference The output content is set according to the sample program. No settings are required if there are no additions or changes to the output content.

Place (1-Point Capture)

#E064

This application is used to capture the whole or part of the place target at one point and place the object.

- **Use**: Capture the place target which is not fixed with a camera and place (put) the object on the reference position
- **Camera Installation Position**: Fixed or On-Hand (mounted on the robot)
- **Number of Captured Images**: 1

Reference For details depending on the camera installation position, see the following documents. The documents can be downloaded from the VS Series User Support Page > Robot Vision.

- For [Fixed]: "VS Series Easy Introduction Guide Camera Fixed Installation 1-Point Capture Pick/Place Edition"
- For [On-Hand]: "VS Series Easy Introduction Guide Camera On-Hand Installation 1-Point Capture Pick/Place Edition"

How to add applications

1 Select [Free Layout] from the layout switch displayed in the upper right corner of the [Task] view.

Point The layout may be corrupted if an application is added using [Step Layout]. It is recommended to add it using [Free Layout].

2 Right-click in the [Task] view to select [Add Tool] > [Robot Vision] > [Place (Application)] from the displayed menu and then [Place (1-Point Capture)].

3 Click the [Settings] button in [Robot Connection Settings (Global Settings)] in the displayed [Setting Menu] dialog, and make sure that the robot manufacturer to be connected is selected.

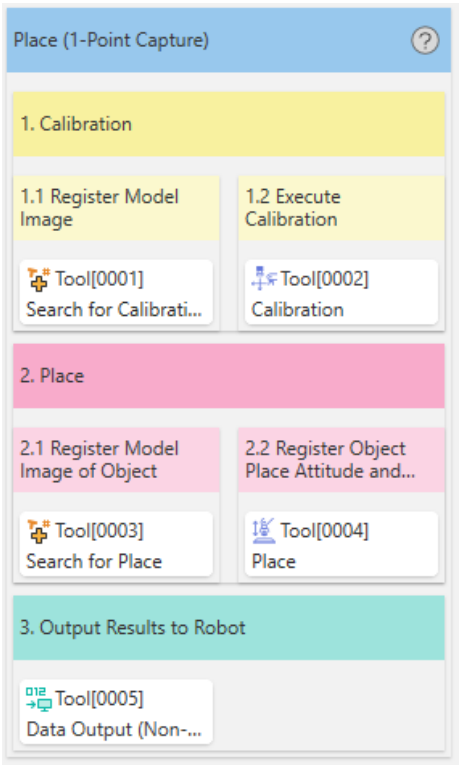
Point If a robot manufacturer to be connected is not selected before adding the application, the data output delimiter, robot coordinate angle expression form, etc. will not be optimized. Be sure to select the robot manufacturer first. For details, see "VS Series Robot Connection Manual".

4 Select [Fixed] or [On-Hand] in [Camera Installation Position].

5 Click the [OK] button.

Application details

The application consists of three groups: [1. Calibration], [2. Place], and [3. Output Results to Robot].



(1) Calibration

(1.1) Register Model Image

Sets the [ShapeTrax3A] tool to detect calibration targets.

(1.2) Execute Calibration

Performs the calibration and the tool center calculation with the [Calibration] tool.

(2) Place

(2.1) Register Model Image of Object

Sets the [ShapeTrax3A] tool to detect the whole or part of the place target.

(2.2) Register Object Place Attitude and Reference

Registers the place target's reference position coordinates (robot) and the detection reference position coordinates (camera), and if the camera is installed on-hand, the capture reference position coordinates (robot) in the [Pick/Place] tool.

(3) Output Results to Robot

Sets the results to be output to the robot using the [Data Output (Non-Procedural)] tool.

Reference The output content is set according to the sample program. No settings are required if there are no additions or changes to the output content.

Place (2-Point Capture)

#E065

This application is used to capture part of the place target at two points and place the object.

- **Use**: Capture the place target which is not fixed with a camera and place (put) the object on the reference position
- **Camera Installation Position**: On-Hand (mounted on the robot)
- **Number of Captured Images**: 2

Reference For details, see the following document. The document can be downloaded from the VS Series User Support Page > Robot Vision.
"VS Series Easy Introduction Guide Camera On-Hand Installation 2-Point Capture Pick/Place Edition"

How to add applications

1 Select [Free Layout] from the layout switch displayed in the upper right corner of the [Task] view.

Point The layout may be corrupted if an application is added using [Step Layout]. It is recommended to add it using [Free Layout].

2 Right-click in the [Task] view to select [Add Tool] > [Robot Vision] > [Place (Application)] from the displayed menu and then [Place (2-Point Capture)].

3 Click the [Settings] button in [Robot Connection Settings (Global Settings)] in the displayed [Setting Menu] dialog, and make sure that the robot manufacturer to be connected is selected.

Point If a robot manufacturer to be connected is not selected before adding the application, the data output delimiter, robot coordinate angle expression form, etc. will not be optimized. Be sure to select the robot manufacturer first. For details, see "VS Series Robot Connection Manual".

4 Click the [OK] button.

Application details

The application consists of six groups: [1. Calibration], [2. Get Capture Information (Which Position) from PLC], [3. Detect 1st/2nd Position, Register Model Image], [4. Calculate Midpoint of Two Points], [5. Place at Midpoint, Register Object Place Attitude and Reference], and [6. Output Results to Robot].

(1) Calibration

For calibration, set each capture point (1st point/2nd point).

(1.1) Register Model Image

Sets the [ShapeTrax3A] tool to detect calibration targets mounted on the robot.

(1.2) Execute Calibration

Performs the calibration and the tool center calculation with the [Calibration] tool.

(2) Get Capture Information (Which Position) from PLC

Sets the [Data Input (Industrial Ethernet)] tool to specify which point to be captured from the PLC.

Reference

- The input contents and data reflection destination are set in advance. No settings are required if there are no additions or changes.
- The settings for the input source [Global Settings] > [Industrial Ethernet Settings] are required.

(3) Detect 1st/2nd Position, Register Model Image

Sets the [ShapeTrax3A] tool to detect part of the place target to be picked for each capture point (1st point/2nd point).

(4) Calculate Midpoint of Two Points

Transforms the detected position of each capture point detected in (3) to robot coordinates, and calculate the midpoint.

Reference
- The group is closed by default. Click the [V] button in the upper left to display the tools in the group.
- Each tool is set in advance. No change is required.

(5) Place at Midpoint, Register Object Place Attitude and Reference

Registers the place target's reference position coordinates (robot) and the detection reference position coordinates (camera) in the [Pick/Place] tool.

(6) Output Results to Robot

Sets the results to be output to the robot using the [Data Output (Non-Procedural)] tool.

Reference The output content is set according to the sample program. No settings are required if there are no additions or changes to the output content.

Communication

This section explains tools for loading data from an external source to a VS camera and outputting measurement results to an external target. This section also explains the tool for outputting image files to an FTP server or a microSD card.

Tool		Function
Input tool	Data Input (Industrial Ethernet)	Loads data sent from an external source through Industrial Ethernet communication to a VS camera.
	Data Input (Non-Procedural)	Loads data sent from an external source through non-procedural communication to a VS camera.
Output tool	Data Output (Industrial Ethernet)	Outputs data such as measurement results to an external target through Industrial Ethernet communication.
	Data Output (Non-Procedural)	Outputs data such as measurement results from a VS camera to an external target by non-procedural communication.
	Data Output (FTP/Storage)	Outputs data such as measurement results to an FTP server or a microSD card.
	Data Output (Terminal)	Outputs data such as the judgment values and measurement results of tasks and measurement tools through the terminals.
	Image Output (FTP/Storage)	Outputs image files to an FTP server or a microSD card.
	Image Output with Graphics (FTP/Storage)	The images from each tool are combined and output to an FTP server or microSD card.

Data Input (Industrial Ethernet)

#E066

Data sent from an external source by EtherNet/IP or PROFINET can be loaded to a VS camera.

Point The Data Input (Industrial Ethernet) tool does not support PLC-Link.

Function overview

With the Data Input (Industrial Ethernet) tool, you can load data from a specific address of the PLC and reflect it to a specified setting parameter or a cell.

Properties

The setting of the Data Input (Industrial Ethernet) tool is made in the [Properties] view. The [Properties] view of the Data Input (Industrial Ethernet) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Input Data	Configure the target (e.g., a setting parameter of a tool) that refers to the input data.
Input Source	Configure the Industrial Ethernet settings.

Input Data

Input Data Settings

Configure the target (e.g., a setting parameter of a tool) to which you want to reflect the data that is input to the Data Input (Industrial Ethernet) tool.

Point When there is an instance of the Data Input (Industrial Ethernet) tool and a tool that refers to it, copying only the instance of the Data Input (Industrial Ethernet) tool creates another instance that inherits the address and data type but not the reference information such as the item name and value. If you copy both the instance of the Data Input (Industrial Ethernet) tool and the tool that refers to it, the reference information is also inherited.

Input Data

The information on the input data are listed.

Settings

Clicking this button displays the [Setting of Input Data] dialog. Specify a tool setting parameter or a cell to reflect the data received from the PLC to. See "Configuring Input Data" for setting details.

No.
Displays the serial numbers (0 to 99) of items.

Address
Displays the address to which the item is assigned.

Data Type
Displays the data type that you have configured when you added the item in [Settings].

Point To change the data type, use [Settings] above.

Size
Displays the size for the data type of the item.

Value
Displays the input value reflected to the item. This field is empty if the tool has not yet been executed.

Input Address Offset
Set the offset of the input address. The default setting is the top (offset: 0) of the user data region.

Point If there are multiple instances of the Data Input (Industrial Ethernet) tool, you need to coordinate them in advance to avoid the overlap of input addresses. Check them with Communication Monitor as necessary.

Communication Monitor
Clicking this button displays the [Industrial Ethernet Communication Monitor] dialog. The displayed dialog differs depending on the Industrial Ethernet used. For details, see “Utilities” - "Industrial Ethernet Communication Monitor".

Configuring Input Data
Clicking the [Settings] button displays the [Setting of Input Data] dialog. In the dialog, input data items (maximum of 100) are listed. You can configure the tool to which to reflect the input data and the data type.

Point Even if the number of input data items is less than 100, when the data size exceeds the user-defined region, the address of the input data items that do not fit in the user-defined region are indicated in red. The system cannot receive data from the PLC in such a condition, so make adjustment in one of the following ways.
- Reduce the number of input data items.
- Change the size of the user-defined region in [Global Settings] - [Industrial Ethernet Settings]. (See "User-Defined Region".)

Add
Clicking this button displays the [Specify Data Reflection Destination] dialog. Configure a cell or a setting parameter of a tool to which to reflect the input data.

Reference If you configure multiple items, they are assigned to different addresses.

The item corresponding to the selected data is displayed in the [Setting of Input Data] dialog. Clicking the [OK] button reflects the addition in "Input Data" of the [Properties] view.

Point

Click an item, [...] icon is displayed. In the menu displayed when clicking [...] icon, you can release the reference and specify data reflection destination.

- Selecting [Release Referencing] releases the reference from the item. [No.], [Address], [Data Type], and [Size] remain unchanged.
- By selecting [Specify Data Reflection Destination], you can configure or change the target destination to which to reflect the input data. The [Specify Data Reflection Destination] dialog is displayed, and you can configure the target destination to which to reflect the input data.

Add Without Specifying Data Reflection Destination

An item is added with [Data] empty. You can configure the target destination to which to reflect the input data at a later time.

Delete

Selecting an item and clicking this button deletes the item.

Reference

- You can also select multiple items.
- You can also delete an item by selecting it and pressing the [Delete] key.
- The addresses of the items listed below the deleted item are changed.

List of input data

The information on the input data are listed.

No.

Displays the serial numbers (0 to 99) of items.

Address

Displays the address to which the item is assigned. The address is assigned from the top of the user data region.

Data

The setting parameter name of the tool that was specified or the specified cell number is displayed.

Data Type

Select a data type for the item from the drop-down menu.

Size

Displays the size appropriate for the data type selected in [Data Type].

Current Value

The current value of the configured PLC address is displayed. The value is updated in the cyclic communication interval.

Initial Value

Specify the initial value to use for the item (default: 0 (NULL)).

Update the Initial Value with the Current Value Upon Saving

Specify whether to update the initial value with the current value upon saving (default: ON).

Input Source

Input Source Setting

This is used to display and configure the type of Industrial Ethernet used for the communication with the data input source.

Input Source

The type of Industrial Ethernet communication method (EtherNet/IP or PROFINET) enabled in [Industrial Ethernet Settings (Global Settings)] is displayed. The field displays “Not Set” if there is no effective Industrial Ethernet type.

Industrial Ethernet Settings (Global Settings)

Clicking this button displays the [Industrial Ethernet Settings] dialog. For setting details, see "Industrial Ethernet Settings".

Data Input (Non-Procedural)

#E067

Data sent from an external device using the Ethernet non-procedural communication can be loaded to a VS camera.

Function overview

With the Data Input (Non-Procedural) tool, you can load data from the PC or PLC using the Ethernet non-procedural communication and reflect it to a specified setting parameter or a cell.

Properties

When setting the Data Input (Non-Procedural) tool, use the [Properties] view. The [Properties] view in the Data Input (Non-Procedural) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	Displays information about the tool. You can also enter comments and the tool name. Additionally, set the execution conditions for the tool.
Input Data	Configure the target (e.g., a setting parameter of a tool) that refers to the input data.
Input Source	Configure the non-procedural communication settings.
Options	Configure the receive buffer handling and timeout period after reading data.

Point The port used for data input is different from the port used for data output/command. For details on the settings, see "Main Screen" - "Global Settings" - "Non-Procedural Communication Settings".

Input Data

Input Data Settings

Configure the target (e.g., a setting parameter of a tool) to which you want to reflect the data that is input to the Data Input (Non-Procedural) tool.

Point When there is an instance of the Data Input (Non-Procedural) tool and a tool that refers to it, copying only the instance of the Data Input (Non-Procedural) tool creates another instance that inherits the number of items and data type of each item but not the reference information such as the item name and value. If you copy both the instance of the Data Input (Non-Procedural) tool and the tool that refers to it, the reference information is also inherited.

Input Data

The information on the input data are listed.

Settings

Clicking this button displays the [Setting of Input Data] dialog. Specify a tool setting parameter or a cell to reflect the data received from outside to. See "Configuring Input Data" for setting details.

No.

Displays the serial numbers (0 to 99) of items.

Data Type

Displays the data type that you have configured when you added the item in [Settings].

Point To change the data type, use [Settings] above.

Size

Displays the size for the data type of the item.

Value

Set the offset of the input address. The default setting is the top (offset: 0) of the user data region.

Delimiter

Specify delimiters.

- Comma (default)
- Tab
- Space
- ASCII Code

Communication Monitor

Click this button to open the [Non-Procedural Communication Monitor] dialog. For details, see “Utilities” - "Non-Procedural Communication Monitor".

Configuring Input Data

Clicking the [Settings] button displays the [Setting of Input Data] dialog. In the dialog, input data items (maximum of 100) are listed. You can configure the tool to which to reflect the input data and the data type.

Add

Clicking this button displays the [Specify Data Reflection Destination] dialog. Configure a cell or a setting parameter of a tool to which to reflect the input data.

Reference If you configure multiple items, they are added together.

The item corresponding to the selected data is displayed in the [Setting of Input Data] dialog. Clicking the [OK] button reflects the addition in "Input Data" of the [Properties] view.

Point

Click an item, [...] icon is displayed on the far right. In the menu displayed when clicking [...] icon, you can release the reference and specify data reflection destination.

- Selecting [Release Referencing] releases the reference from the item. [No.], [Data Type], and [Size] remain unchanged.
- By selecting [Specify Data Reflection Destination], you can configure or change the target destination to which to reflect the input data. The [Specify Data Reflection Destination] dialog is displayed, and you can configure the target destination to which to reflect the input data.

Add Without Specifying Data Reflection Destination

An item is added with [Data] empty. You can configure the target destination to which to reflect the input data at a later time.

Delete

Selecting an item and clicking this button deletes the item.

Reference

- You can also select multiple items.
- You can also delete an item by selecting it and pressing the [Delete] key.

List of input data

The information on the input data are listed.

No.

The serial numbers (0 to 99) of items are displayed.

Data

The setting parameter name of the tool that was specified or the specified cell number is displayed.

Data Type

Select a data type for the item from the drop-down menu.

Size

Displays the size appropriate for the data type selected in [Data Type].

Initial Value

Specify the initial value to use for the item (default: 0 (NULL)).

Update the Initial Value with the Current Value Upon Saving

Specify whether to update the initial value with the current value upon saving (default: ON).

Input Source

Input Source Setting

This is used to display and configure the type of non-procedural communication used for the communication with the data input source.

Input Source

TCP/IP (Data Input) is displayed.

Non-Procedural Communication Settings (Global Settings)

Clicking this button displays the [Non-Procedural Communication Settings] dialog. To change the port number used for data input, set it from this [Non-Procedural Communication Settings]. For details on the settings, see "Main Screen" - "Global Settings" - "Non-Procedural Communication Settings".

Options

Options

Configure the receive buffer handling and data reception wait timeout period.

Clear Reception Buffer After Data Reading

Clear the receive buffer after reading data from the receive buffer (default: ON).

Data Reception Wait Timeout [ms]

Set the data reception wait time (ms) (0 to 6000 ms, default: 6000 ms) to wait for data reception if there is no data in the receive buffer when the data input (non-procedural) tool is executed.

Data Output (Industrial Ethernet)

#E068

Data such as measurement results can be output from a VS camera to an external target through Industrial Ethernet communication.

Function overview

With the Data Output (Industrial Ethernet) tool, you can output measurement tool data such as judgment results, and result data by Industrial Ethernet communication.

Properties

The setting of the Data Output (Industrial Ethernet) tool is made in the [Properties] view. The [Properties] view of the Data Output (Industrial Ethernet) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Bit Data Output (for EtherNet/IP and PROFINET)	Configure an output item such as a tool's judgment whose value is only 0 or 1.
Byte Data Output	Configure an output item that outputs measurement values, etc.
Destination	Display or configure the data output destination.
Options	Specify how result data is handled when the tool that contains the output item was not executed.

Bit Data Output (for EtherNet/IP and PROFINET)

Bit Data Output Settings

Configure an output item such as a tool's judgment whose value is only 0 or 1.

Output Data

Provides the list display of output destinations and item names of the bit data to be output.

Address

An address (8.0 to 11.7) is displayed. The number on the right of the dot indicates the bit position (0 to 7).

Output Items

Configure the items to output (maximum of 32). See "Configuring Output Data" for setting details.

Value

The bit-0 value (0 or 1) of each item (binary data) of [Output Items] is displayed. The displayed value is 0 if the item value is 2 (00000010), and 1 if it is 3 (00000011).

Point If the output item results in an error type such as INVALID, the value specified in [Options] - [Handling of Result Data of Unexecuted Tool] is output. If the data is a numeric type, the value specified in [Number] is output, and if the data is a string type, the value specified in [Character] is output.

Delete

Selecting an item of [Output Data] and clicking this button clears [Output Items] of the item. The item itself is not deleted.

Reference
- You can also select multiple items.
- You can also clear [Output Items] by selecting an item and pressing the [Delete] key.

Communication Monitor

Clicking this button displays the [Industrial Ethernet Communication Monitor] dialog. You can view how output items are allocated in the memory. (See "Industrial Ethernet Communication Monitor".)

Configuring Output Data

There are the following three ways of configuring output items for [Output Data]:

- Selecting from the [Reference] dialog

  When you click the (Link) icon, which appears when you put the cursor over an item, the [Reference] dialog is displayed.
  Select a result data item of the Data List or a cell of the Vision Dashboard.
- Dragging and dropping an item from the Data List
  You can add an output item by dragging and dropping a result data item of the Data List to [Output Data] of the [Properties] view. You can add multiple output items at a time, but you cannot add any item that does not have result data.
- Entering the result data directly
  You can click the text box and enter result data directly.

  Reference Clicking the icon in the text box displays the [Reference] dialog. You can select an output item.

Byte Data Output

Byte Data Output Settings

The list of output items (maximum of 256) is displayed. As an output item, configure the value or string of the result data of a measurement tool.

Point

Even if the number of output items is less than 256, when the data size (including cyclic communication data size) exceeds the user-defined region, the address of subsequent output items will be displayed in red. It is not possible to output data to the PLC in such a condition, so make adjustment in one of the following ways.

- Reduce the number of output items.
- Change the size of the user-defined region in [Global Settings] - [Industrial Ethernet Settings]. (See "User-Defined Region".)

Add

Clicking this button displays the [Reference] dialog. Select a cell or measurement tool result data and click the [OK] button. Then an output item is added to [Output Data].

Delete

Selecting an item from [Output Data] and clicking this button deletes the item.

Reference

- You can also select multiple items.
- You can also delete an item by selecting it and pressing the [Delete] key.

↑↓ (Arrow)

You can change the position of an item by selecting the item and clicking one of these buttons.

Output Data

Displays the list of output destinations and item names of the byte data to be output.

Address

Displays the address to which the output item is assigned. The address is assigned from the top of the user data region.

Output Items

Displays the cell number or the name of the tool result data that was added. See "Configuring Output Data" for setting details.

Value

Displays the current value of the data added as an output item. For a 32-bit floating-point number, the decimal fraction is displayed up to the third place even if it is “.000”.

When you select a configured output item or put the cursor on it, the [...] icon is displayed at the right end. You can make advanced setting by the menu that appears when you click the [...] icon. (See "Data Type Detailed Settings" and "Array Data Detailed Settings".)

Point

If the output item results in an error type such as INVALID, the value set in [Options] - [Handling of Result Data of Unexecuted Tool] is output. If the data is a numeric type, the value specified in [Number] is output, and if the data is a string type, the value specified in [Character] is output.

Output Address Offset

When you put multiple instances of the Data Output (Industrial Ethernet) tool on the [Task] view, configure offsets so that their output addresses do not overlap.

Communication Monitor

Clicking this button displays the [Industrial Ethernet Communication Monitor] dialog. You can view how output items are allocated in the memory. (See "Industrial Ethernet Communication Monitor".)

Configuring Output Data

There are the following three ways of configuring output items for [Output Data]:

- Clicking the [Add] button to configure an item
  In the [Reference] dialog that appears when you click the [Add] button, select a result data item of the Data List or a cell of the Vision Dashboard.
- Dragging and dropping an item from the Data List
  You can add an output item by dragging and dropping a result data item of the Data List to [Output Data] of the [Properties] view. You can add multiple output items at a time, but you cannot add any item that does not have result data.
- Entering the result data directly
  You can click the text box and enter result data directly.

Reference

- In order to enter result data directly, you need to add an output item by the [Add] button in advance.
- When you click the (Link) icon, which appears when you put the cursor over an item, or the icon in the text box, the [Reference] dialog is displayed. You can select an output item.

When you select a configured output item or put the cursor on it, the [...] icon is displayed at the right end. You can configure the following by the menu that appears when you click the [...] icon.

Data Type Detailed Settings

Selecting [Data Type Detailed Settings] from the menu displays the [Data Type Detailed Settings] dialog. You can configure the data type, size, and other properties of the output data.

Output Data

Displays the name of the output item.

Data Type

Select the data type of the output item. The setting after depends on the selected data type.

When a data type other than [String] is selected as [Data Type]

[Data Type Size] and [Occupied Size] (unit: byte) are displayed in accordance with the selected data type.

Data Type	Data Type Size	Occupied Size
Bit	0.1	1
8-bit Integer	1	1
8-bit Unsigned Integer	1	1
16-bit Integer	2	2
16-bit Unsigned Integer	2	2
32-bit Integer	4	4
64-bit Integer	8	8
32-bit Floating-point Number	4	4

Point

A bit-type data item occupies 1 byte. However, eight consecutive bit-type output items can be put in 1 byte, so that they occupy only 1 byte. The first output item is set in the 0th bit, and the 8th output item is set in the 7th bit of the byte.

When data type [String] is selected as [Data Type]

[Occupied Size] depends on the setting of [Size] and [Add Terminating Character].

- **Size**: Specify the number of characters of the string to be output (1 to 512, default: 8).
- **Add Terminating Character**: Specify whether to add a terminating character (default: OFF).
- **Occupied Size**: This item indicates the size of the actual occupied area. The value of this item (unit: byte) is the smallest multiple of 4 that is equal to or larger than the size of the string + terminating character (1 byte).

Array Data Detailed Settings

For the case when the output item is an array data, selecting [Array Data Detailed Settings] from the menu displays the [Array Data Detailed Settings] dialog. You can configure the starting index value of the output data and the number of elements.

Output Data

Displays the name of the output item.

Starting Index

Specify the index value of the first array element to be output. Changing this value also changes the index value of [Output Data] to the same value.

Count

Specify the number of array elements to be output.

Destination

Output Destination Settings

This is used to display and configure the Industrial Ethernet type used for the communication with the data destination.

Destination

The type of Industrial Ethernet communication method (EtherNet/IP, PROFINET, PLC link) enabled in [Industrial Ethernet Settings (Global Settings)] is displayed. The field displays “Not Set” if there is no effective Industrial Ethernet type.

Industrial Ethernet Settings (Global Settings)

Clicking this button displays the [Industrial Ethernet Settings] dialog. For setting details, see "Industrial Ethernet Settings".

Options

Options

Specify how result data is handled when the tool that is added as an output item was not executed.

Point The value configured below is output also in the case of a setting error (reference error, data type mismatch, etc.).

Handling of Result Data of Unexecuted Tool

To output result data, make the following settings: (default: Values described below are output.)

Number

If the output data is a number, configure the value to be output (0x0 to 0xFFFFFFFF, default: 0x0). If the configured value is larger than the maximum value of the data type, the maximum value is output.

Character

If the output data is a string, select a character (Space, -, *, ?, or ASCII Code) to be output from the drop-down list (default: Space). If you select [ASCII Code], enter the code value to be output (0x00 to 0x7F, default: 0x20).

Handshake

When turned ON, the next output data is written after confirming that the PLC has received the output data (default: OFF). This is displayed when the enabled industrial Ethernet communication method is PLC-Link.

Data Output (Non-Procedural)

#E069

Data such as measurement results can be output from a VS camera to an external target through Ethernet non-procedural communication.

Function overview

With the Data Output (Non-Procedural) tool, you can output measurement tool data such as judgment results, and result data by Ethernet non-procedural communication. (See "Output Data Settings".)

Properties

Use the [Properties] view to configure the Data Output (Non-Procedural) tool. The [Properties] view of the Data Output (Non-Procedural) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Output Data	Configure the output data.
Destination	Display and set the non-procedural communication used with the data output destination.
Options	Specify how result data is handled when the tool that contains the output item was not executed.

Output Data

Output Data Settings

As an output item, specify a measurement value or other data items.

Add

Clicking this button displays the [Reference] dialog. Select a cell or measurement tool result data and click the [OK] button. Then the output item (maximum: 256 items) is added to "Output Data".

Delete

Selecting an output item and clicking this button deletes the item.

Reference
- You can also select multiple items.
- You can also delete an output item by selecting it and pressing the [Delete] key.

↑↓ (Arrow)

You can change the position of multiple consecutive items by selecting them and clicking one of these buttons.

Output Data

No.
The serial numbers (0 to 255) of items are displayed.

Output Items
Displays the cell number or the name of the tool result data that was added. See "Configuring Output Data" for setting details.

Value
Displays the current value of the data added as an output item. For a 32-bit floating-point number, the decimal fraction is displayed up to the third place even if it is ".000".

When you select a configured output item or put the cursor on it, the [...] icon is displayed at the right end. You can make advanced setting by the menu that appears when you click the [...] icon. (See "Format Setting" and "Array Data Detailed Settings".)

Point — If the output item results in an error type such as INVALID, the value set in [Options] - [Handling of Result Data of Unexecuted Tool] - [Number] is output.

Delimiter

Specify a delimiter to be inserted between multiple result data items that are output. Select a delimiter from the drop-down list (Comma, Tab, Space, ASCII Code, or None; default: Comma). If you select [ASCII Code], enter the code value in the text box (0x01 to 0x7F, default: 0x01).

Communication Monitor

Click this button to open the [Non-Procedural Communication Monitor] dialog. For details, see "Utilities" - "Non-Procedural Communication Monitor".

Configuring Output Data

There are the following three ways of configuring output items for [Output Data]:

- Clicking the [Add] button to configure an item
  In the [Reference] dialog that appears when you click the [Add] button, select a result data item of the Data List or a cell of the Vision Dashboard.
- Dragging and dropping an item from the Data List
  You can add an output item by dragging and dropping a result data item of the Data List to [Output Data] of the [Properties] view. You can add multiple output items at a time, but you cannot add any item that does not have result data.
- Entering the result data directly
  You can click the text box and enter result data directly.

Reference
- In order to enter result data directly, you need to add an output item by the [Add] button in advance.
- When you click the (Link) icon, which appears when you put the cursor over an item, or the icon in the text box, the [Reference] dialog is displayed. You can select an output item.

When you select a configured output item or put the cursor on it, the [...] icon is displayed at the right end. You can configure the following by the menu that appears when you click the [...] icon.

Format Setting

Selecting [Format Setting] from the menu displays the [Output Format Settings] dialog. You can configure the format of output data.

Reference You can also select multiple items and configure them simultaneously.

Output Data

Displays the name of the output item.

Customize Format

Configure whether to customize the format of the output data (default: OFF). You can configure it manually after selecting the check box. The setting differs depending on whether the output data is a number or a string.

When the output data is a number

- **Integer Digits**: Specify the number of digits (1 to 19) of the integer part.
- **Decimal Digits**: Specify the number of digits (0 to 6) of the decimal part.
- **+ Sign**: Specify whether to add "+" when the output data is a positive value (default: ON).
- **Zero Suppress**: Specify whether to not display "0" (default: ON).

When the output data is a string

- **Size**: Specify the number of characters (default: 8).

Array Data Detailed Settings

For the case when the output item is an array data, selecting [Array Data Detailed Settings] from the menu displays the [Array Data Detailed Settings] dialog. You can configure the starting index value of the output data and the number of elements.

Output Data

Displays the name of the output item.

Starting Index

Specify the index value of the first array element to be output. Changing this value also changes the index value of [Output Data] to the same value.

Count

Specify the number of array elements to be output.

Destination

Output Destination Settings

This is used to display and configure the non-procedural communication type used for the communication with the data output destination.

Destination

TCP/IP (Data Output/Command) is displayed.

Non-Procedural Communication Settings (Global Settings)

Clicking this button displays the [Non-Procedural Communication Settings] dialog. To change the port number used for data input, set it from this [Non-Procedural Communication Settings]. For details on the settings, see "Main Screen" - "Global Settings" - "Non-Procedural Communication Settings".

Options

Options

Specify how result data is handled when the tool that is added as an output item was not executed. The setting content is the same as that described in "Handling of Result Data of Unexecuted Tool" for the Data Output (Industrial Ethernet) tool. If you select [Do Not Output], the result data of the unexecuted tool is not output.

Data Output (FTP/Storage)

#E070

Data such as measurement results can be output from a VS camera to an FTP server or a microSD card.

Reference An output file is created when the first trigger is issued after the following timings.

- When power is turned on
- When a reset is performed
- When changing program numbers
- When no output file exists at the output destination
- When Clear Tool Buffer (TBC) is executed from a terminal or industrial Ethernet (Fieldbus)
- When Clear Tool Buffer (TBC) is executed with the command

Function overview

With the Data Output (FTP/Storage) tool, you can output measurement tool data such as judgment results, and result data to an FTP server or a microSD card. You can also specify the destination folder and file name. (See "Output Destination Settings", "Folder Settings", and "File Settings".)

Properties

Use the [Properties] view to configure the Data Output (FTP/Storage) tool. The [Properties] view of the Data Output (FTP/Storage) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Output Data	Configure an output item that outputs measurement values, etc.
Destination	Display or configure the destination server/storage, folder, and file name.
Options	Specify how result data is handled when the tool that contains the output item was not executed.

Output Data

Output Data Settings

In [Output Data], specify a measurement value or other data items as an output item. The setting content is the same as that in the Data Output (Non-Procedural) tool. For details see “Data Output (Non-Procedural)” - “Output Data” - "Output Data Settings".

Destination

Output Destination Settings

Destination

Select the destination (FTP1/FTP2/SD Card) of the output data (default: FTP1).

Target FTP Settings (Global Settings)

This is displayed when you select [FTP1] or [FTP2] for [Destination]. Clicking this button displays the [Target FTP Settings] dialog. For details of FTP settings, see “Global Settings” - "Target FTP Settings".

Folder Settings

Enter the destination folder name in the [Destination Folder] text box (default: VS\Camera\Results). The hierarchy above the folder entered in the text box differs depending on the destination specified by [Destination].

Reference Pointing the cursor at the text box displays the (Link) button on the left. You can also select a folder from the [Reference] dialog that appears when you click the button.

File Settings

Specify the file name of the output data (extension: csv).

File Naming Rule

Specify the naming rule (Auto or Custom) for the file (default: Auto).

Auto

The file name becomes “[YYYYMMDD]_[hhmmss]_[Tool ID].csv”.

Custom

Enter a file name (extension: csv) in the text box.

Point The default setting is empty. Enter any string as the name.

Reference Pointing the cursor at the text box displays the (Link) icon on the left. You can also configure a file name using the [Reference] dialog that appears when you click the icon.

Options

Options

Specify how result data is handled when the tool that is added as an output item was not executed. The setting content is the same as that described in "Handling of Result Data of Unexecuted Tool"

for the Data Output (Industrial Ethernet) tool. If you select [Do Not Output], the result data of the unexecuted tool is not output.

Data Output (Terminal)

#E103

Outputs data such as the judgment values and measurement results of tasks and measurement tools through the terminals.

Point When using the Data Output (Terminal) tool, "Result Data *" must be assigned to one or more output terminals in [Main Screen] - [Global Settings] - [Terminal I/O Settings].

Function overview

When the Data Output (Terminal) tool outputs judgment values or measurement results through a terminal, it does not assign them directly to a physical terminal, but sandwiches "Result Data *" as an intermediate layer. When using another program setting, an output destination can be secured by setting the assignment destination from the intermediate layer "Result Data *" and setting errors can be avoided.

Properties

Use the [Properties] view to configure the Data Output (Terminal) tool. The [Properties] view for the Data Output (Terminal) tool is made up of the tabs below. Change the settings as required.

Properties	Settings
General	The Data Output (Terminal) tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Output Data	Displays the terminals to which "Result Data *" is assigned in the Terminal I/O Settings in the Global Settings in a list.
Destination	Configure terminal assignments, data output format, etc.
Options	Specify how result data is handled when the tool that contains the output item was not executed.

Output Data

Output Data Settings

The terminals to which "Result Data *" is assigned in the Terminal I/O Settings in the Global Settings are displayed in a list in ascending order by terminal name.

Delete

Click this to delete the selected output data from the list. Multiple items can also be selected and deleted all at once.

Terminal

The terminal name of the terminal to which "Result Data *" is assigned in [Global Settings] - [Terminal I/O Settings] is displayed.

Destination

The "Result Data *" assigned to the terminal is displayed.

Output Items

Set the contents to be output to the terminal to which "Result Data *" is assigned. For the detailed setup method, see "Configuring Output Data".
If the output item is in error, the text will turn red.

Bit

Set which bit of the result data set in the Output Items to output.

Terminal I/O Monitor

Click this to display the [Terminal I/O Monitor] dialog box. For details, see the "[Terminal I/O Monitor] dialog".

Destination

Terminal I/O Settings (Global Settings)

Click this to display the [Terminal I/O Settings] dialog box. For details, see the "Layout of the Screen" in the "Terminal I/O Settings".

Options

Set the behavior for when the tool in Output Items is unexecuted (default: Output "OFF")

Handling of Result Data of Unexecuted Tool

Output "OFF"

Outputs "OFF" if the tool set in Output Items is unexecuted.

Output "ON"

Outputs "ON" if the tool set in Output Items is unexecuted.

Image Output (FTP/Storage)

#E071

With the Image Output (FTP/Storage) tool, you can output image files to an FTP server or a microSD card.

Function overview

With the Image Output (FTP/Storage) tool, you can output captured or processed images to an FTP server or a microSD card. Also, you can output together with the images the graphic information that the measurement tool has.

Properties

Use the [Properties] view to configure the Image Output (FTP/Storage) tool. The [Properties] view of the Image Output (FTP/Storage) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Image Output	Configure output items such as images or graphics.
Destination	Configure the destination folder and file name.
Options	Configure how output images are handled when the buffer is full.

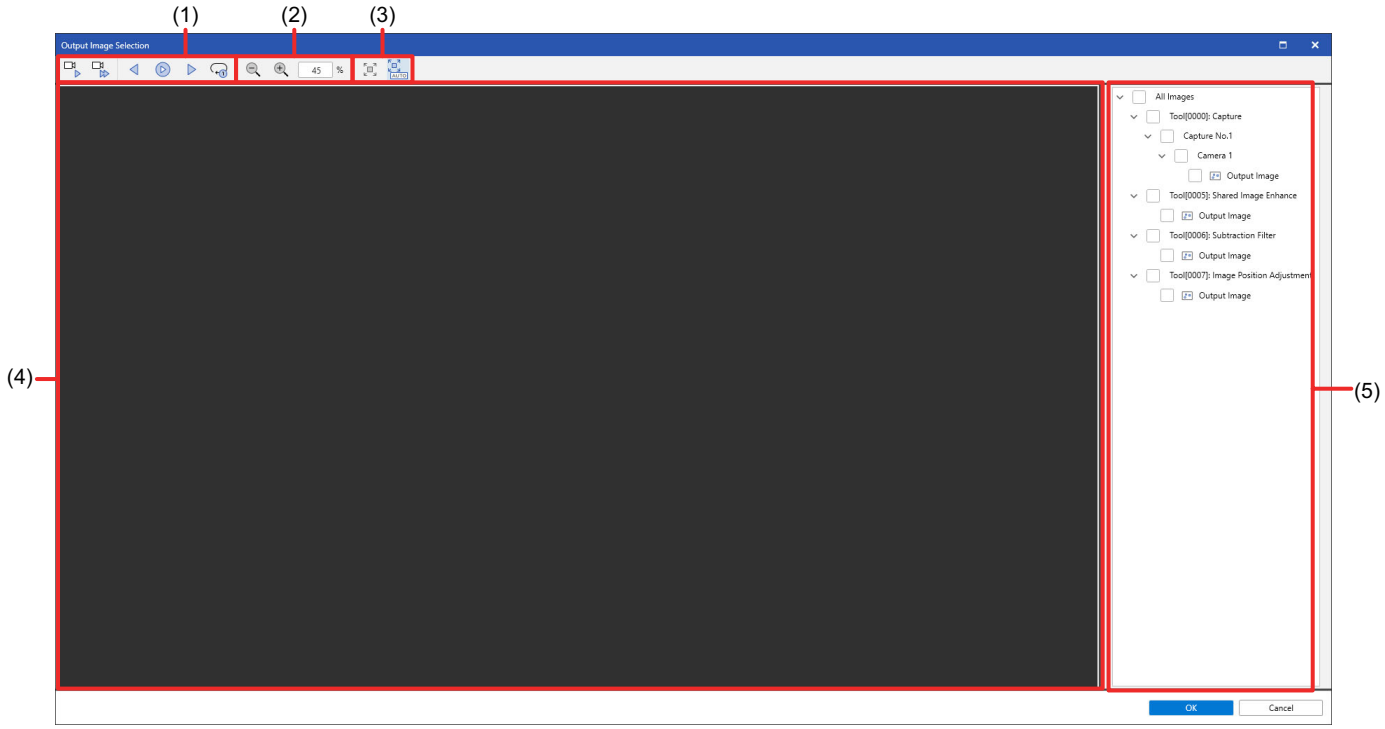
Image Output

Image Output Settings

Specify the images to be output and the image format. The images to be output are listed in [Output Target].

Add

Clicking this button displays the [Output Image Selection] dialog. Select output targets in the dialog.



(1) Trigger/Replay

– **(Trigger / Continuous Trigger)**: Clicking the button inputs a trigger.

– **(Previous Image/Repeat Image/Next Image/1 Round)**: Clicking the button replays the Archived Image/Simulation Image.

(2) Zoom setting

Zooms in/out the displayed image.

(3) Fit / Auto Fit

Adjusts the display magnification so that the image fits in the preview area.

(4) Preview area

Displays the image selected in the image list. This area becomes black when a tool is selected.

(5) Image list

The image list shows the tools in the [Task] view that have output images and their output images in the tree format. Select output targets by their check boxes (maximum of 32).

Delete

Selecting an image and clicking this button deletes the image.

Graphic

Selecting an image and clicking this button displays the [Edit Graphics] dialog. When you select a tool in the dialog, the graphic configured for the tool is integrated into the output image. If you have added a Defect tool, for example, you can view the measurement result (region and the “+” mark on the defect) over the output image.

↑↓ (Arrow)

Change the position of the selected tool.

Add

Clicking this button adds a drop-down of tool names to the list. When you select a tool from the drop-down list, the graphic that is configured for the tool is displayed on the camera image in

the [Image Viewer]. To display multiple graphics, add more tools by clicking the [Add] button (maximum of 32).

Reference Tools that can be selected from the drop-down list are the following:

- Inspection tools
- Measurements & Dimensions tools
- AI Inspection tools
- Region tools (excluding Shared Pattern (ShapeTrax3A) tool)
- Image Conversion tools (excluding Image Position Adjustment tool)
- Vision-Guided Robotics tools (excluding Calibration (Robot) and Robot Coordinate Transformation tool)
- Graphics Display tool

Delete

Selecting a tool and clicking this button deletes the tool.

Point The graphics are output as a file, and the file name is “<image file name>.svg”.

Output Target

Images selected in the [Output Image Selection] dialog are listed (maximum of 32).

File Format

Specify the format (BMP, PNG, or JPG) of the image files to be output (default: BMP).

Buffered Images

Configure the number of buffered images (1 to 1000, default: 5).

Point The actual number of buffered images that can be set changes depending on the camera type used and the available image memory space.

Destination

Output Destination Settings

Destination

Select the output destination of the images (FTP1, FTP2, or SD Card; default: FTP1).

Target FTP Settings (Global Settings)

This is displayed when you select [FTP1] or [FTP2] for [Destination]. Clicking this button displays the [Target FTP Settings] dialog. For details of settings, see “Global Settings” - "Target FTP Settings".

Folder Settings (Common within Program Setting)

Specify the output destination folder.

Point
- The folder settings are applied to all instances of the Image Output (FTP/Storage) tool in the program setting per destination (FTP1, FTP2, and SD Card). If multiple tool instances share the same destination, the changing of the destination folder in one instance will be reflected to the other instances.
- The folder settings remain even after the configured instance of the Image Output (FTP/Storage) tool is deleted. The folder settings of the deleted tool instance are also applied to a new added instance.

Destination Folder

Enter the destination folder name in the text box (maximum of 250 characters). The hierarchy above the folder entered in the text box differs depending on the destination specified by [Destination].

Reference Pointing the cursor at the text box displays the (Link) button on the left. You can also select a folder from the [Reference] dialog that appears when you click the button.

New Folder Rule

Configure how subfolders are created under the destination folder when an image file is output (default: Number of Images, 1000 images).
- **None**: Subfolders are not created.
- **Date**: A subfolder is created by date (YYYYMMDD).
- **Number of Images**: A subfolder is created by time (YYYYMMDD_hhmmss). A new subfolder is created if the number of images stored in the current subfolder reaches the specified number of images (1 to 10000).

Apply Program Setting Name

Turn ON to add program setting folders (such as “0000_NewProgram”) one level above the date folder created as the output destination.

Point Depending on the version of the program setting, the program setting folder may not be added.

File Settings

Specify the naming rule of image files.

File Naming Rule

Specify the naming rule (Auto or Custom) of the image files to output.
- **Auto** (default): The file name becomes "[YYYYMMDD]_[HHMMSSms]_[measurement count]_[string that identifies the image].[file format]".
- **Custom**: Enter the file name in the text box (maximum of 64 characters).

Point If the file names are duplicated, files are overwritten when output. In order to prevent duplicated file names, include information in the file name such as the date and time, the measurement count, and a string that identifies the image.

Reference Pointing the cursor at the text box displays the (Link) button on the left. You can also configure a file name using the [Reference] dialog that appears when you click the button.

– **Add Image Identifier**: Configure whether to add a string that identifies the image to the file name in order to prevent duplicated file names (default: ON). If you set this parameter ON, "_<string that identifies the image>" is added at the end of the file name.

Options

Options

Behavior When Buffer Full

Configure how to handle the case when the buffer becomes full.

- **Skip Output of Images** (default): Skips new image output.
- **Wait for Buffer Availability**: Processing stops when the buffer becomes full until a buffer space becomes available.

Image Output with Graphics (FTP/Storage)

#E095

The Image Output with Graphics (FTP/Storage) tool can combine images of each tool and output them to an FTP server or a microSD card.

Function overview

The Image Output with Graphics (FTP/Storage) tool can combine images including the filtered images and contrast images of each tool and output them to an FTP server or a microSD card. Also, it can output the graphical information that the inspection tool has together with the images.

Properties

Use the [Properties] view to configure the Image Output with Graphics (FTP/Storage) tool. The [Properties] view of the Image Output with Graphics (FTP/Storage) tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Also, configure execution conditions of the tool.
Image Output	Configure an output item such as an image or graphic, etc.
Destination	Configure the output destination folder and file name.
Options	Configure how output images are handled when the buffer is full.

Image Output

Image Output Settings

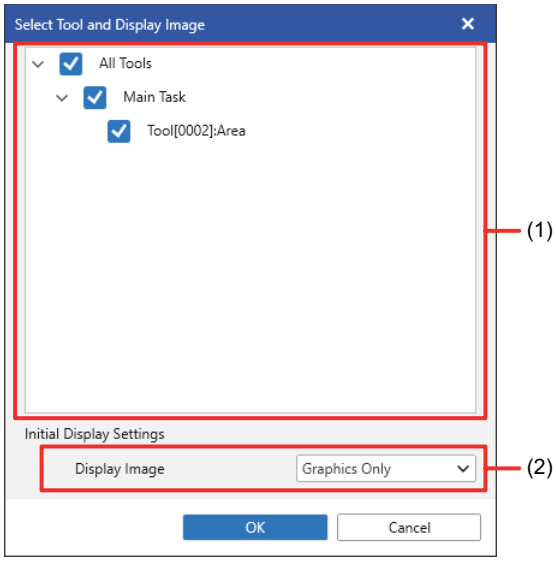
Configure the background image to be input and the foreground image to be output. The foreground images to be output will be listed under [Graphics and Processed Layer].

Select

Click the button to display the [Image Source] dialog box. Select a base background image in the dialog box.

Add

Click the button to display the [Select Tool and Display Image] dialog box. Select a foreground image in the dialog box.



(1) Image list

A list of tools with output images added to the task and their output images is displayed in a tree format. Select the check boxes for the images to be foreground images (maximum of 500).

Point When selecting [Filtered Image] or [Contrast Image] in the [Initial Display Settings],an error will occur if image generation is disabled in each original tool.

(2) Display Image

Narrows down the type of image to be displayed in the image list.

- **Graphics Only** (default): Displays graphics only.
- **Filtered Image**: Displays filtered images.
- **Contrast image**: Displays contrast images.

Delete

Select an image and click the button to delete the image.

Graphics and Processed Layer

The images selected in the [Select Tool and Display Image] dialog box are listed in the order they were added (maximum of 500).

Graphic

If this is turned OFF, the graphics of the selected tools will be excluded from the output (default: ON).

File Format

Select the file format (PNG/BMP/JPG) of the images (default: BMP).

Buffered Images

Configure the number of buffered images (1 to 1000, default: 5).

Point The actual number of buffered images that can be set changes depending on the camera type used and the available image memory space.

Destination

Output Destination Settings

Destination

Select the output destination of the images (FTP1, FTP2, or SD Card; default: FTP1).

Target FTP Settings (Global Settings)

This is displayed when you select [FTP1] or [FTP2] for [Destination]. Click this button to display the [Target FTP Settings] dialog box. For details of settings, see "Global Settings" - "Target FTP Settings".

Folder Settings (Common within Program Setting)

Specify the output destination folder.

Reference
- The folder settings are applied to all instances of the Image Output with Graphics (FTP/Storage) tools in the program setting per destination (FTP1, FTP2, and SD Card). If multiple tool instances share the same destination, the changing of the output destination folder in one instance will be reflected to the other instances.
- The folder settings remain even after the configured instance of the Image Output with Graphics (FTP/Storage) tool is deleted. The folder settings of the deleted tool instance are also applied to a new added instance.

Destination Folder

Enter the output destination folder name in the text box (maximum of 250 characters). The hierarchy above the folder entered in the text box differs depending on the destination specified by [Destination].

Reference Point the cursor at the text box to display the (Link) button on the left. You can also select a folder from the [Reference] dialog that appears when you click the button.

New Folder Rule

Configure how subfolders are created under the output destination folder when an image file is output (default: Number of Images, 1000 images).

- **None**: Subfolders are not created.
- **Date**: A subfolder is created by date (YYYYMMDD).
- **Number of Images**: A subfolder is created by time (YYYYMMDD_hhmmss). A new subfolder is created if the number of images stored in the current subfolder reaches the specified number of images (1 to 10000).

Apply Program Setting Name

Turn ON to add a program setting folder (such as “0000_NewProgram”) one level above the date folder created as the output destination.

Point Depending on the version of the program setting, the program setting folder may not be added.

Preview

Displays the output destination path according to the new folder rule.

File Settings

Specify the naming rule of image files.

File Naming Rule

Specify the naming rule (Auto or Custom) of the image files to output.

- **Auto** (default): The file name becomes "[YYYYMMDD]_[HHMMSSms]_[measurement count]_[string that identifies the image].[file format]".
- **Custom**: Enter the file name in the text box (maximum of 64 characters).

Point

If the file names are duplicated, files are overwritten when output. In order to prevent duplicated file names, include information in the file name such as the date and time, the measurement count, and a string that identifies the image.

Reference

Point the cursor at the text box to display the (Link) button on the left. You can also configure a file name using the [Reference] dialog that appears when you click the button.

Preview

Displays the image file name according to the file naming rule.

Options

Options

Behavior When Buffer Full

Configure how to handle the case when the buffer becomes full.

- **Skip Output of Images** (default): Skip new image output.
- **Wait for Buffer Availability**: Processing stops when the buffer becomes full until a buffer space becomes available.

Display

The display tool is used to display pre-set figures and characters at the time of measurement. VS Creator provides the [Graphics Display] tool.

Graphics Display

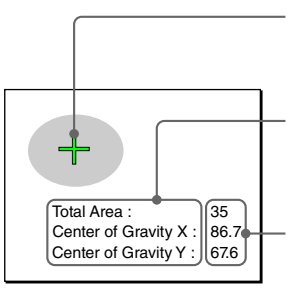
#E072

The tool allows you to draw a maximum of 32 graphics, which are figures, plain texts, or numerical values, on the camera image of the [Image Viewer] view.
The tool has access to result data and Vision Dashboard, so that you can use other tools to specify the display positions and display content.

Function overview

Display image

Example) Place a point, character strings, and numbers to display the results data of the [Blob] tool



Point
Shape : Cross
Position X / Position Y : Refer to the center of gravity coordinates of the [Blob] tool.

String
String : Enter the string to be displayed.
Position X / Position Y : Refer to the center of gravity coordinates of the [Blob] tool and offset them to adjust the display position.

Number
Value Specification : Refer to the Total Area, Center of Gravity X, Center of Gravity Y of the [Blob] tool.
Position X / Position Y : Refer to the center of gravity coordinates of the [Blob] tool and offset them to adjust the display position.

Properties

Use the [Properties] view to configure the [Graphics Display] tool. The [Properties] view of the [Graphics Display] tool consists of the tabs below. Configure the settings under the tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure the Current Image to use for measurement and the execution condition of the tool.
Graphic Part	Configure the type, display position, and display content of the graphic parts to be displayed on the camera image.

Graphic Part

Configure the type, display position, and display content of the graphic parts to be displayed on the camera image.

Reference For the setting value range and format of individual setting items, see “Appendix” - "Settings Parameters List".

Position Adjustment

The reference position (X coordinate, Y coordinate, and angle) of the coordinate system of the tool is configured by the measurement result of a different tool or by [Specify Individually].

Reference This setting is made in the same way as for [Position Adjustment] in the [Region] tab of a measurement tool. For details, see [Position Adjustment].

Graphic Part

Add

Clicking [Add] displays the [Graphic Part Addition] dialog. Select the type of the graphic part to be added, and click [OK].

Selectable graphic part types

- **Rectangle**: You can specify the width, height, and coordinates to display a rectangle.
- **Circle**: You can specify the radius and coordinates to display a circle.
- **Oval**: You can specify the radiuses and coordinates to display an oval.
- **Ring**: You can specify the radiuses and coordinates to display a ring.
- **Arc**: You can specify the radiuses, coordinates, starting angle, and ending angle to display an arc.
- **Point**: You can specify the coordinates of the point, and display a [Cross], [L-shaped Arrow], or [Circle] for the point.
- **Line**: You can display a straight line by specifying the coordinates of the start point and end point or by specifying σ and θ to calculate a straight line.
- **Horizontal Line**: You can specify the coordinates to display a horizontal line.
- **Vertical Line**: You can specify the coordinates to display a vertical line.
- **String**: You can specify the coordinates to display a plain text.
- **Number**: You can specify the coordinates to display a numerical value.

Graphics are sequentially numbered as they are added, and they are added as [Graphic Part n] (n: the assigned number. 0 to 31. Maximum of 32 graphic parts) in the list.

↑ / ↓

You can change the order of an added graphic part in the list by clicking this button. The order in the list is the overlapping order of graphic parts in the camera image. The graphic part that is at the bottom of the list will be displayed topmost over the other graphics on the camera image.

Graphic Part 0–31

You can specify the display position and display content of a graphic part.

Point
- To delete [Graphic Part n], click [x] on the right of the graphic part. A confirmation message is displayed. Click [OK] to delete the graphic part.
- Open the setting items for each added part to change the name of the part. The "sequential number n + (type name)" automatically set at the beginning of the part name cannot be changed.

Type

The type that was selected in the [Graphic Part Addition] dialog is displayed. You can use the drop-down menu to change it to a different type.

Items to be configured are different depending on the type. For more details, see below.
→ Setting Items of [Rectangle]
→ Setting Items of [Circle]
→ Setting Items of [Oval]
→ Setting Items of [Ring]
→ Setting Items of [Arc]
→ Setting Items of [Point]
→ Setting Items of [Line]
→ Setting Items of [Horizontal Line]
→ Setting Items of [Vertical Line]
→ Setting Items of [String]
→ Setting Items of [Number]

Setting Items of [Rectangle]

Point You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure the size and coordinate of the rectangle.

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

Width

Configure the width (1.000 to 16383.000. Default: 200.000) of the rectangle.

Height

Configure the height (1.000 to 16383.000. Default: 160.000) of the rectangle.

Center X

Configure the X coordinate (-16383.000 to 16383.000. Default: 160.000) of the center.

Center Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 160.000) of the center.

Angle

Configure the rotation angle

Fill

Configure whether to fill the graphic with the color set in [Display Settings].

Display Type

Select a display type for the graphic to be displayed on the camera image.

- **Display Type 0**
- **Display Type 1** (default)

Point If you set [Display Type] with reference to the result data of a different tool, you can switch between different graphics to display them in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate (positions X and Y) by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify an angle for the rotation around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the graphic.

Display Type 0 / Display Type 1

The graphic of the enabled display type is displayed. To display the graphic, also configure its line thickness, color, and other properties.

Point If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Line Thickness

Configure the line thickness of the displayed graphic by a pixel count (1 to 64. Default: 2).

Color

To specify a line color for the displayed graphic, select the check box and configure the color of the graphic.

Fill

To specify a filling color for the displayed graphic, select the check box and configure the color of the graphic.

Setting Items of [Circle]

Point You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure the radius and coordinate of the circle.

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

Center X

Configure the X coordinate (-16383.000 to 16383.000. Default: 260.000) of the center.

Center Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 240.000) of the center.

Radius

Configure the radius (0 to 9600. Default: 120) of the circle.

Fill

Configure whether to fill the graphic with the color set in [Display Settings].

Display Type

Select a display type for the graphic to be displayed on the camera image.

- **Display Type 0**
- **Display Type 1** (default)

Point If you set [Display Type] with reference to the result data of a different tool, you can switch between different graphics to display them in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate (positions X and Y) by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify an angle for the rotation around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the graphic.

Display Type 0 / Display Type 1

The graphic of the enabled display type is displayed. To display the graphic, also configure its line thickness, color, and other properties.

Point If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Line Thickness

Configure the line thickness of the displayed graphic by a pixel count (1 to 64. Default: 2).

Color

To specify a line color for the displayed graphic, select the check box and configure the color of the graphic.

Fill

To specify a filling color for the displayed graphic, select the check box and configure the color of the graphic.

Setting Items of [Oval]

Point You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure the radiuses and coordinates of the oval.

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

Center X

Configure the X coordinate (-16383.000 to 16383.000. Default: 260.000) of the center.

Center Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 240.000) of the center.

Radius 1

Configure radius 1 (8 to 2580. Default: 120) of the oval.

Radius 2

Configure radius 2 (8 to 2580. Default: 180) of the oval.

Angle

Configure the angle (0.000 to 360.000. Default: 0.000) of the oval.

Fill

Configure whether to fill the graphic with the color set in [Display Settings].

Display Type

Select a display type for the graphic to be displayed on the camera image.

- **Display Type 0**
- **Display Type 1** (default)

Point

If you set [Display Type] with reference to the result data of a different tool, you can switch between different graphics to display them in accordance with the result data.

- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate (positions X and Y) by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify an angle for the rotation around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the graphic.

Display Type 0 / Display Type 1

The graphic of the enabled display type is displayed. To display the graphic, also configure its line thickness, color, and other properties.

Point If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Line Thickness

Configure the line thickness of the displayed graphic by a pixel count (1 to 64. Default: 2).

Color

To specify a color for the displayed graphic, select the check box and configure the color of the graphic.

Fill

To specify a filling color for the displayed graphic, select the check box and configure the color of the graphic.

Setting Items of [Ring]

Point You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure the radiuses and coordinate of the ring.

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

Center X

Configure the X coordinate (-16383.000 to 16383.000. Default: 260.000) of the center.

Center Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 240.000) of the center.

Radius 1

Configure the radius (0 to 9600. Default setting: 120) of the ring.

Radius 2

Configure the radius (0 to 9600. Default: 60) of the ring.

Fill

Configure whether to fill the graphic with the color set in [Display Settings].

Display Type

Select a display type for the graphic to be displayed on the camera image.

- **Display Type 0**
- **Display Type 1** (default)

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate (positions X and Y) by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate (-16383.000 to 16383.000. Default: 0.000) before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify a rotation angle (0.000 to 360.000. Default: 0.000) around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the graphic.

Display Type 0 / Display Type 1

The graphic of the enabled display type is displayed. To display the graphic, also configure its line thickness, color, and other properties.

Point

If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.

- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Line Thickness

Configure the line thickness of the displayed graphic by a pixel count (1 to 64. Default: 2).

Color

To specify a line color for the displayed graphic, select the check box and configure the color of the graphic.

Fill

To specify a filling color for the displayed graphic, select the check box and configure the color of the graphic.

Setting Items of [Arc]

Point You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure the radius, coordinate, starting angle, and ending angle of the arc.

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

Center X

Configure the X coordinate (-16383.000 to 16383.000. Default: 260.000) of the center.

Center Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 240.000) of the center.

Radius 1

Configure radius 1 (0 to 9600. Default: 120) of the arc.

Radius 2

Configure radius 2 (0 to 9600. Default: 30) of the arc.

Starting Angle

Configure the angle (0.000 to 360.000. Default: 45.000) of the arc.

Ending Angle

Configure the angle (0.000 to 360.000. Default: 315.000) of the arc.

Fill

Configure whether to fill the graphic with the color set in [Display Settings].

Display Type

Select a display type for the graphic to be displayed on the camera image.

- **Display Type 0**
- **Display Type 1** (default)

Point If you set [Display Type] with reference to the result data of a different tool, you can switch between different graphics to display them in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate (positions X and Y) by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify an angle for the rotation around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the graphic.

Display Type 0 / Display Type 1

The graphic of the enabled display type is displayed. To display the graphic, also configure its line thickness, color, and other properties.

Point

If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.

- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Line Thickness

Configure the line thickness of the displayed graphic by a pixel count (1 to 64. Default: 2).

Color

To specify a color for the displayed graphic, select the check box and configure the color of the graphic.

Fill

To specify a filling color for the displayed graphic, select the check box and configure the color of the graphic.

Setting Items of [Point]

Point

You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure the position and orientation of the display of a graphic configured by [Display Settings].

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

Center X

Configure the X coordinate (-16383.000 to 16383.000. Default: 260.000) of the position where the graphic is to be displayed.

Center Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 240.000) of the position where the graphic is to be displayed.

Angle

Configure the rotation angle (0.000 to 360.000. Default: 0.000) of the graphic.

Zoom Link

Specify whether to change the size of the graphic in proportion to the display magnification of the camera image of the [Image Viewer] view.

- **ON**: The size of the graphic is changed in proportion to the magnification/reduction.
- **OFF** (default): The size of the graphic is not changed in proportion to the magnification/reduction.

Display Type

Select a display type for the graphic to be displayed on the camera image.

- **Display Type 0**
- **Display Type 1** (default)

Point If you set [Display Type] with reference to the result data of a different tool, you can switch between different graphics to display them in accordance with the result data.

- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate (positions X and Y) by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify an angle for the rotation around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the graphic.

Display Type 0 / Display Type 1

The graphic of the enabled display type is displayed. To display the graphic, also configure its line thickness, color, and other properties.

Point If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Shape

Select a shape for the graphic to be displayed at the configured coordinate (Center X, Center Y).
- **Cross** (+)
- **L-shaped Arrow** ( )
- **Circle** (○)

Size

Configure the size of the displayed graphic by a pixel count (4 to 1024. Default: 16).

Line Thickness

Configure the line thickness of the displayed graphic by a pixel count (1 to 64. Default: 2).

Color

To specify a color for the displayed graphic, select the check box and configure the color of the graphic.

Border Color

To display a border for the displayed graphic, select the check box and configure the color of the border.

Setting Items of [Line]

Point You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure a specification method for the straight line, and configure the display manner of the straight line according to the specification method.

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

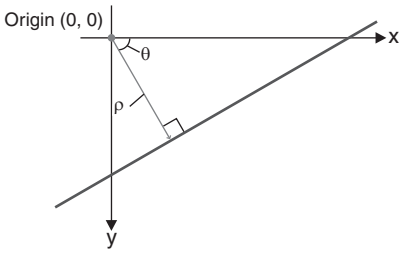
Specification Method

Select a straight-line specification method.

- **Specify 2 Points**: You can specify the coordinates of a start point and an end point to draw the line segment between the two points or the straight line that passes the two points.
- **Specify ρ,θ**: You can specify ρ and θ to draw a straight line.

Reference

- ρ (rho): The length of the perpendicular line from the origin (0, 0) to the straight line
- θ (theta): Clockwise angle of the perpendicular line of length ρ from the 3-o'clock direction (0 to 360.000°) (Hesse's normal form)



- **Specify X/Y/Angle**: You can specify the coordinates and angle to draw a line.

When [Specify 2 Points] is specified

Start Point X / Start Point Y

Configure the X coordinate (-16383.000 to 16383.000. Default: 260.000) and the Y coordinate (-16383.000 to 16383.000. Default: 200.000) of the start point.

End Point X / End Point Y

Configure the X coordinate (-16383.000 to 16383.000. Default: 300.000) and the Y coordinate (-16383.000 to 16383.000. Default: 240.000) of the end point.

Line Style

Select a line style of the line to draw.

- **Line Segment** (Default): A line segment between the start point coordinate and the end point coordinate is drawn.
- **Line**: A straight line that passes the start point coordinate and the end point coordinate is drawn.

Start Point Arrow / End Point Arrow

When enabled, arrows are drawn at the start point and the end point of the line segment.

When [Specify ρ,θ] is specified

ρ

Configure the length of the perpendicular line from the origin (0, 0) to the straight line by a pixel count (-16889.000 to 16889.000. Default: 240.000).

θ

Configure the clockwise angle of the perpendicular line of length ρ from the 3-o'clock direction (0.000 to 360.000. Default: 0.000).

When [Specify X/Y/Angle] is specified

X

Configure the X coordinate (-16383.000 to 16383.000. Default: 240.000).

Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 180.000).

Angle

Configure the angle (0.000 to 360.000. Default: 0.000).

Display Type

Select a display type for the line to be displayed on the camera image.

- **Display Type 0**
- **Display Type 1** (default)

Point

If you set [Display Type] with reference to the result data of a different tool, you can switch between different graphics to display them in accordance with the result data.

- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify an angle for the rotation around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the line.

Display Type 0 / Display Type 1

The line of the enabled display type is displayed. To display the graphic, also configure its line thickness, color, and other properties.

Point If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Line Thickness

Configure the thickness of the displayed line by a pixel count (1 to 64. Default: 2).

Color

To specify a color for the displayed line, select the check box and configure the color of the line.

Setting Items of [Horizontal Line]

Point You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure the position to display the horizontal line.

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

Position X

Configure the X coordinate (-16383.000 to 16383.000. Default: 260.000) of the position where the graphic is to be displayed.

Position Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 240.000) of the position where the graphic is to be displayed.

Display Type

Select a display type for the graphic to be displayed on the camera image.
- **Display Type 0**
- **Display Type 1** (default)

Point If you set [Display Type] with reference to the result data of a different tool, you can switch between different graphics to display them in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate (positions X and Y) by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify an angle for the rotation around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the graphic.

Display Type 0 / Display Type 1

The graphic of the enabled display type is displayed. To display the graphic, also configure its line thickness, color, and other properties.

Point If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Line Thickness

Configure the line thickness of the displayed graphic by a pixel count (1 to 64. Default: 2).

Color

To specify a color for the displayed graphic, select the check box and configure the color of the graphic.

Setting Items of [Vertical Line]

Point You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure the position to display the vertical line.

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

Position X

Configure the X coordinate (-16383.000 to 16383.000. Default: 260.000) of the position where the graphic is to be displayed.

Position Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 240.000) of the position where the graphic is to be displayed.

Display Type

Select a display type for the graphic to be displayed on the camera image.

- **Display Type 0**
- **Display Type 1** (default)

Point

If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.

- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate (positions X and Y) by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify an angle for the rotation around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the graphic.

Display Type 0 / Display Type 1

The graphic of the enabled display type is displayed. To display the graphic, also configure its line thickness, color, and other properties.

Point

If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.

- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Line Thickness

Configure the line thickness of the displayed graphic by a pixel count (1 to 64. Default: 2).

Color

To specify a color for the displayed graphic, select the check box and configure the color of the graphic.

Setting Items of [String]

Point You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure a plain text to be displayed and the display position of the plain text.

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

String

Enter a plain text of 128 characters (64 double byte characters) or less to be displayed in the camera image.

Point
- Tab and linefeed cannot be used.
- Space can be used.

Position X

Configure the X coordinate (-16383.000 to 16383.000. Default: 260.000) of the position where the plain text is to be displayed.

Position Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 240.000) of the position where the plain text is to be displayed.

Display Type

Select a display type for the plain text to be displayed on the camera image.

- **Display Type 0**
- **Display Type 1** (default)

Point If you set [Display Type] with reference to the result data of a different tool, you can switch between different graphics to display them in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate (positions X and Y) by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify an angle for the rotation around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the plain text.

Display Type 0 / Display Type 1

The plain text of the enabled display type is displayed. To display the text, also configure its font size, color, and other properties.

Point If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Font Size

Configure the size of the displayed character by a pixel count (12 to 256. Default: 16).

Color

To specify a color for the displayed character, select the check box and configure the color of the character.

Border Color

To draw a border for the displayed character, select the check box and configure the color of the border.

Setting Items of [Number]

Point You can specify parameters by the result data of a different tool so as to display a graphic in accordance with the result data.

Settings

Configure a numerical value to be displayed and the display position of the numerical value.

Count

Configure the number of graphics to be displayed (0 to 30000. Default: 1).

Value Specification

Enter the numerical value (-10000000000.000000 to 10000000000.000000. Default: 0.000000) to be displayed in the camera image.

Position X

Configure the X coordinate (-16383.000 to 16383.000. Default: 260.000) of the position where the numerical value is to be displayed.

Position Y

Configure the Y coordinate (-16383.000 to 16383.000. Default: 240.000) of the position where the numerical value is to be displayed.

Integer Digits

Configure the number of digits of the integer portion of the displayed numerical value (1 to 11. Default: 7).

Decimal Digits

Configure the number of digits of the decimal part of the displayed numerical value (0 to 6. Default: 3).

Zero Suppress

Select whether or not to remove leading zeros when displaying the numerical value.

- **ON** (default): Leading zeros are removed when the numerical value is displayed.
- **OFF**: Leading zeros are not removed when the numerical value is displayed.

For example, if the number of digits to display for the integral portion is configured to be 5 and the display value is 500, it is displayed as [00500] if Zero Suppress is [OFF], and [500] if Zero Suppress is [ON].

+ Sign

Select whether to display [+] before a positive numerical value.

- **ON**: [+] is displayed.
- **OFF** (default): [+] is not displayed.

Display Type

Select a display type for the numerical value to be displayed on the camera image.

- **Display Type 0**
- **Display Type 1** (default)

Point If you set [Display Type] with reference to the result data of a different tool, you can switch between different graphics to display them in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Advanced Settings

For the coordinate configured in [Settings], set an offset and rotation of the display coordinate as necessary.

Offset X / Offset Y

Set an offset relative to the configured coordinate (positions X and Y) by a pixel count (-16383.000 to 16383.000. Default: 0.000).

Rotation Center X / Rotation Center Y

Specify the rotation center position for when [Rotation Angle] is to be applied to the configured coordinate, by an absolute coordinate before offset or position adjustment is applied.

Rotation Angle

For the configured coordinate, specify an angle for the rotation around the configured rotation center (Rotation Center X / Rotation Center Y).

Display Settings

For each display type, configure the display manner of the numerical value.

Display Type 0 / Display Type 1

The numerical value of the enabled display type is displayed. To display the numerical value, also configure its font size, color, and other properties.

Point If the result data of a different tool is referenced by [Display Type], you can switch between different graphics to be displayed in accordance with the result data.
- When the result data is [0]: The graphic of [Display Type 0] is displayed.
- When the result data is [1]: The graphic of [Display Type 1] is displayed.

Font Size

Configure the size of characters of the displayed numerical value by a pixel count (12 to 256. Default: 16).

Color

To specify a color for the displayed numerical value, select the check box and configure the color of the numerical value.

Border Color

To draw a border for the displayed numerical value, select the check box and configure the color of the border.

Data Analysis

The Data Analysis tools are tools for obtaining statistical data and yield rate data from any measurement result. For this device, the following Data Analysis tools are provided.

Tool	Function overview
Statistics	Tool for checking and displaying statistical data of measurement results
Yield Rate	Tool for checking and displaying judgment results as yield rate data
Data History	Tool to retain data to be archived for the last specified number of times

Statistics

#E073

With the statistics tool, you can specify any measurement item beforehand as statistics target so that the tool collects statistics of measurement results during operation and the statistical data can be pasted to the Vision Dashboard for you to check it. The tool is useful for finding the optimal tolerance from statistics in a trial run before real operation, and for grasping the condition of the inspection process in the real operation.

Function overview

The statistics tool has the following functions.

- Collecting statistics of any measurement item, and displaying the statistics result (→ "Statistical Data Accumulated")
- Posting statistical data on the Vision Dashboard (→ "Posting statistical data on the Vision Dashboard")

Statistical Data Accumulated

Major statistical data items accumulated by the statistics tool are displayed in the [Results] view.

Statistical Data	Description
Archive Count	Number of times of execution of the statistics tool during Run Mode
Item n	Name of statistics target (n: 0 to 31)
Item Name	Name of statistical data item
Latest Value	Latest value of statistical data
Maximum Value	Maximum value of statistical data
Minimum Value	Minimum value of statistical data
Deviation (σ)	√ (Σ((Measured value - average)^2) / (flow measurement count - skipped execution count - execution error count))
Average + 3σ	Average + 3 x standard deviation (σ)
Average	Sum of measured values / (flow measurement count - skipped execution count - execution error count)
Average - 3σ	Average - 3 x standard deviation (σ)
Cpu	(Standard maximum value - average) / 3σ*1
Cpl	(Average - standard minimum value) / 3σ*1
Cpk	Cpu or Cpl, whichever is smaller*1
Sum Total	Sum of statistical data

*1:These items become invalid data if the tolerance is not configured.

The statistics tool has the "Archive Count" specific to the tool. The archive count is different from the measurement count of the system, and it is counted up when the statistics tool is executed during Run Mode.

On the Vision Dashboard, you can post the statistical data displayed in the [Results] view (→ "Posting statistical data on the Vision Dashboard").

Point The statistical data is accumulated when the statistics tool is executed in Run Mode.

Properties

Use the [Properties] view to configure the statistics tool. The [Properties] view of the statistics tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Statistics	Register the statistics target item for which you want to collect statistics.
Options	The accumulated statistical data is cleared.

Statistics

Setting of Statistical Targets

Point Setting of statistics targets can be made only in Setup Mode.

Register desired items from the following as statistics targets (maximum of 32 items).

- Data List item (result data)
- Cell of Vision Dashboard

Add

Clicking this button displays the [Reference] dialog. Configure statistics targets. Each statistics target corresponds to a statistical data item.

Point If you have more than 32 statistics targets, add a statistics tool to register surplus targets to it.

Setting a Vision Dashboard cell as a statistics target

Click the [Vision Dashboard] tab and select a cell from the Vision Dashboard. The cell number is displayed as the item name of [Statistics Target]. You can change the cell number as necessary.

Setting a data list item as a statistics target

Click the [Data List] tab, and select an item from the displayed result data list. The item name associated with the result data is automatically displayed. You can change the item name as necessary.

Point The selected item is reflected to [Statistics Target] only if it is valid as a statistics target.

Reference
- You can filter the result data list.
- You can also add an item from the main screen's Data List by dragging and dropping it to the [Properties] view.

Delete

Selecting an item and clicking this button deletes the item from the statistics targets.

Reference
- You can also select multiple items.
- You can also delete an item by selecting it and pressing the [Delete] key.

Statistics Target

The details of statistics targets are listed.

No.

The serial numbers (0 to 31) of items are displayed.

Item Name

Names of items are displayed. When an item is added, the item name associated with the result data or the cell number is automatically configured. You can change the item name as necessary in [Detailed Settings].

Detailed Settings

Pointing the cursor at an item displays the (Detailed Settings) button. Clicking the button displays the [Detailed Settings] dialog, in which you can edit the statistics target and the item name (maximum of 256 characters).

Options

Clear Statistical Data

Point
You can clear statistical data in Setup Mode and Run Mode.

Clicking [Clear] displays the [Confirm] dialog. Click [OK] to clear the statistical data.

Posting statistical data on the Vision Dashboard

The [Results] view of the statistics tool lists statistical data items vertically. If you want to compare and check different statistical data items, you can post them on the Vision Dashboard for their list display.

Select a cell in the [Vision Dashboard] view and then click the (Insert Data Table) button at the top-right of the [Results] view. Then, the data items from [Item Name] to [Sum Total] are posted on the [Vision Dashboard] view. Rows of the table represent different information items and columns represent different statistical items.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Tool[0004] Statistical Data											
2	Item Name	Latest Value	Maximum Value	Minimum Value	Deviation (σ)	Average + 3σ	Average	Average - 3σ	Cpu	Cpl	Cpk	Sum Total
3	Tool[0002]:Blob.Center of Gravity X	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Tool[0002]:Blob.Center of Gravity Y	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Tool[0002]:Blob.Major Axis Angle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Tool[0002]:Blob.Area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Tool[0003]:Edge Position.Number of Detected Edges	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Tool[0003]:Edge Position.Position X	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Tool[0003]:Edge Position.Position Y	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10												

Point

- Statistical data can be posted on the Vision Dashboard by the Admin account in Setup Mode.
- If the [Vision Dashboard] is not displayed in the main screen, clicking the button displays the [Vision Dashboard] view and posts statistical data from the top-left corner.
- Statistical data is spread out on the Vision Dashboard from the selected cell. On the Vision Dashboard, select a cell distant from cells already used so that the posted data does not overlap them.
- If the statistical data requires a space that spreads out from the Vision Dashboard, you cannot post the data.

Reference You can copy the statistical data posted on the Vision Dashboard to a spreadsheet.

Yield Rate

#E074

A yield rate generally means the rate of good-quality products in the inspection process. The yield rate tool is a tool for checking and displaying any judgment result (Pass/Fail counts, total judgment count, etc.) as yield rate data. The tool is useful for finding the optimal tolerance in a trial run before real operation, and for grasping the condition of the inspection
process in the real operation.

Function overview

The yield rate tool has the following functions.

- Displaying the yield rate data for any judgement result (→ "Yield Rate Data Accumulated")
- Posting yield rate data on the Vision Dashboard (→ "Posting yield rate data on the Vision Dashboard")

Yield Rate Data Accumulated

Yield rate data items accumulated by the yield rate tool are displayed in the [Results] view.

Statistical Data	Description
Archive Count	Number of times of execution of the yield rate tool during Run Mode
Item n	Name of target (n: 0 to 31)
Item Name	Item name of yield rate data
Latest Judgment (Pass)	Whether the latest judgment is Pass or not (True/False)
Pass Count	Number of times of Pass judgment
Fail Count	Number of times of Fail judgment
Total	Pass Count + Fail Count

The yield rate tool has the "Archive Count" specific to the tool. The archive count is different from the measurement count of the system, and it is counted up when the yield rate tool is executed during Run Mode.
On the Vision Dashboard, you can post yield rate data displayed in the [Results] view (→ "Posting yield rate data on the Vision Dashboard").

Point The yield rate data is accumulated when the yield rate tool is executed in Run Mode.

Properties

Use the [Properties] view to configure the yield rate tool. The [Properties] view of the yield rate tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Yield Rate	Register the target item for which you want to collect the yield rate data.
Options	The yield rate data is cleared.

Yield Rate

Setting of Targets

Register the target item for which you want to collect the yield rate data (maximum of 32 items.)

- Data List item (result data)
- Cell of Vision Dashboard

Point
- Setting of targets can be made only in Setup Mode.
- The Pass/Fail counts are counted up when the yield rate tool is executed during Run Mode.
- Counting is not made when the tool that contains the target item is not executed.
- If the target is a cell, it is judged Pass if the cell value is “True” or a non-zero value, and judged Fail if the cell value is “False” or “0”.

Add

Clicking this button displays the [Reference] dialog. Configure a counting target. Each counting target corresponds to a data item.

Point
If you have more than 32 yield rate targets, add a yield rate tool to register surplus targets to it.

Setting a Vision Dashboard cell as a target

Click the [Vision Dashboard] tab and select a cell from the Vision Dashboard. The cell number is displayed as the item name of [Target]. You can change the cell number as necessary.

Setting a data list item as a target

Click the [Data List] tab, and select an item from the displayed result data list. The item name associated with the result data is automatically displayed. You can change the item name as necessary.

Point
The selected item is reflected to [Target] only if it is valid as a target.

Reference
- You can filter the result data list.
- You can also add an item from the main screen's Data List by dragging and dropping it to the [Properties] view.

Delete

Selecting an item and clicking this button deletes the item from the targets.

Reference
- You can also select multiple items.
- You can also delete an item by selecting it and pressing the [Delete] key.

Target

The details of targets are listed.

No.

The serial numbers (0 to 31) of items are displayed.

Item Name

Names of items are displayed. When an item is added, the item name associated with the result data or the cell number is automatically configured. You can change the item name as necessary in [Detailed Settings].

Detailed Settings

Pointing the cursor at an item displays the (Detailed Settings) button. Clicking the button displays the [Detailed Settings] dialog, in which you can edit the target and the item name (maximum of 256 characters).

Options

Clear Yield Rate Data

Point You can clear yield rate data in Setup Mode and Run Mode.

Clicking [Clear] displays the [Confirm] dialog. Click [OK] to clear the yield rate data.

Posting yield rate data on the Vision Dashboard

The [Results] view of the yield rate tool lists yield rate items vertically. If you want to compare and check different yield rate data items, you can post them on the Vision Dashboard for their list display.

Select a cell in the [Vision Dashboard] view and then click the (Insert Data Table) button at the top-right of the [Results] view. Then, the data items from [Latest Judgment] to [Total] are posted on the [Vision Dashboard] view. Rows of the table represent different information items and columns represent different yield rate data.

	A	B	C	D	E
1	Tool[0005] Yield Rate Data				
2	Item Name	Latest Judgment	Pass Count	Fail Count	Total
3	Tool[0001]:ShapeTrax3A.Judgment (True = Pass)	TRUE	0.00	0.00	0.00
4	Tool[0002]:Blob.Judgment (True = Pass)	TRUE	0.00	0.00	0.00
5	F2	TRUE	0.00	0.00	0.00
6	F3	TRUE	0.00	0.00	0.00
7					

Point

- Yield rate data can be posted on the Vision Dashboard by the Admin account in Setup Mode.
- If the [Vision Dashboard] is not displayed in the main screen, clicking the button displays the [Vision Dashboard] view and posts yield rate data from the top-left corner.
- Yield rate data is spread out on the Vision Dashboard from the selected cell. On the Vision Dashboard, select a cell distant from cells already used so that the posted data does not overlap them.
- If the yield rate data requires a space that spreads out from the Vision Dashboard, you cannot post the data.

Data History

#E075

The data history tool retains data for the most recent n times (n: specified number of times) for the items to be archived. The average of the results of the last several measurements can be calculated and graphed for easy viewing of the trend of changes.

Function overview

The Data History tool retains result data for a specified count (n) for each item (up to 32) specified as an archive target. If the specified count is exceeded, the oldest data is overwritten and only the latest data are retained at all times.

Archived Data

The archived data is displayed in the [Results] view.

Statistical Data	Description
Data Count	Number of times of data retained for the archive target
Item Name	Item name of the archive target
Value	Archived data (number/string)

Values between -100000000000.000 and 100000000000.000 can be retained.
On the Vision Dashboard, you can post the archived data displayed in the [Results] view.
(→ "Posting archived data on the Vision Dashboard")

Properties

Use the [Properties] view to configure the Data History tool. The [Properties] view of the Data History tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Archive	Register the items to archive and the number of times they are retained.
Options	Clears the archived data.

Archive

Archive Target Settings

Register the following items to be archived as targets (maximum of 32):

- Data List item (result data)
- Cell of Vision Dashboard

Point The target settings can only be configured in Setup Mode.

Add

Clicking this button displays the [Reference] dialog. Set the archive target. It is also possible to select multiple items.

Point If you have more than 32 archive targets, add a new Data History tool to register those targets.

Setting a Vision Dashboard cell as a target

Click the [Vision Dashboard] tab and select a cell from the Vision Dashboard that is displayed. The cell number is displayed as the item name in [Archive Target]. You can change the cell number as necessary.

Setting a data list item as a target

Click the [Data List] tab, and select an item from the displayed result data list. The item name associated with the result data is automatically displayed. You can change the item name as necessary.

Point The selected item is reflected to [Archive Target] only if it is valid as a target.

Reference
- You can filter the result data list to narrow down the items.
- You can also add an item from the main screen's Data List by dragging and dropping it to the [Properties] view.

Delete

Selecting an item and clicking this button deletes the item from the targets.

Reference
- You can also select multiple items.
- You can also delete an item by selecting it and pressing the [Delete] key.

Archive Target

The details of targets are listed.

No.

The serial numbers (0 to 31) of items are displayed.

Item Name

Names of items are displayed. When an item is added, the item name associated with the result data or the cell number is automatically set. You can change the item name as necessary in [Detailed Settings].

Detailed Settings

Pointing the cursor at an item displays the (Detailed Settings) button. Click the button to open the [Detailed Settings] dialog, in which you can edit the archive target, the item name (maximum of 256 characters), and data type.

Data Count

Set the number of times of data retention for the archive target (1 to 5000 times, default: 10).

Options

Clear Archived Data

Clicking [Clear] displays the [Confirm] dialog. Click [OK] to clear the archived data.

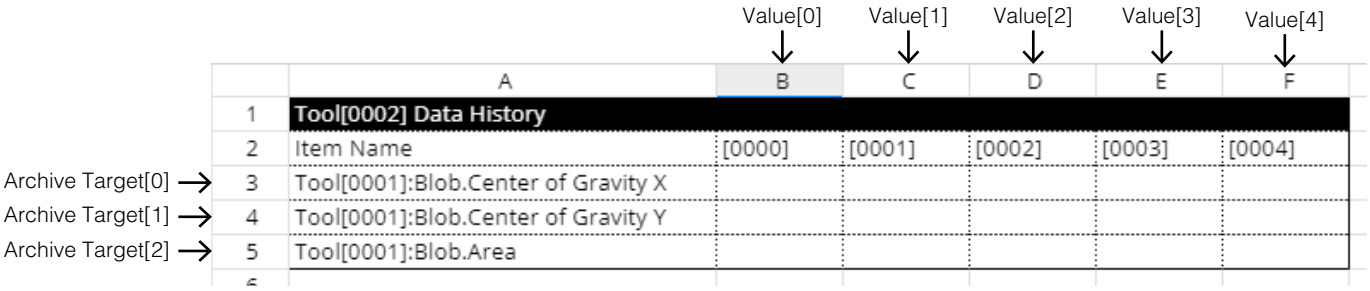
Point

- Archived data can be cleared in both Setup Mode and Run Mode.
- Clicking the [Clear] button does not reset the archived data displayed in the [Results] view. It is reset at the start of the next measurement.
- The archived data is also cleared at the following times:
  –When the power is turned off
  –When switching program settings
  –When the RS (reset) command is executed
  –When changing the setting of the items to be archived or the data count

Posting archived data on the Vision Dashboard

The [Results] view of the Data History tool lists archived data by item vertically. If you want to compare and check the archived data of the different items to see the trend, you can post them on the Vision Dashboard for their tabular display.

Select a cell in the [Vision Dashboard] view and then click the (Insert Data Table) button at the top-right of the [Results] view. Then, the data for [Item Name] to [Value[n]] (n: 0 to 98) are posted on the [Vision Dashboard] view. Each row displays the archive target and each column displays archived data.



Point

- The archived data can be posted on the Vision Dashboard by the Admin account in Setup Mode.
- If the [Vision Dashboard] is not displayed in the main screen, clicking the button displays the [Vision Dashboard] view and posts archived data from the top-left corner.
- The archived data is placed on the Vision Dashboard from the selected cell as the starting point. On the Vision Dashboard, select a cell distant from cells already used so that the posted data does not overlap them.
- If the area for posting will extend beyond the boundary of the Vision Dashboard, you cannot post the archived data.

Control

Control tools are tools for controlling various processes by command execution. In a Task in the [Task] view, you can arrange processes that have been executed through communication from devices such as PLC, and this enables you to design the control of various processes of program settings clearly. For this device, the following commands are provided as control tools.

List of Control Tools

Control tool	Function overview
Change Program Setting (PL)	Switches the program setting to the program setting of the specified number in the specified storage to read from.
Save Settings (PS)	Saves the program setting that is currently loaded on the device.
Issue Soft Event (SEI)	Issues the soft event of the specified number.
Clear Error (ERC)	Clears an error condition and an error code of the specified error type.
Clear Tool Buffer (TBC)	Clears the buffer of the specified tool type and number.
Reset (RS)	Clears system properties, the total status, execution results of tools and tasks, and archive and statistical data.
Initialize Output Data (RSOD)	Initializes the output data.
Disable Output (OD)	Suppress data output to external devices from the [Data Output] tool (industrial Ethernet, non-procedural, FTP/storage, terminal) and the [Image Output] tool.
Disable Trigger Input (TD)	Controls (Disables/Enables) trigger input.
Register Model Image (MG)	Saves the latest input image of the tool with the specified number as the model image with the specified number.
Change Model Image (MS)	Switches the model image used by the tool of the specified number to the model image of the specified number.
Update Pattern Information (PDU)	Updates the pattern information registered in the tool with the specified number using the set model image.
Update Position Adjustment Reference Value (RPU)	Updates the position adjustment reference value of the specified [Image Position Adjustment] tool with the latest position information of the referenced tool.
Update Registered String (JSU)	Updates the registered string of the specified OCR2 tool or AI OCR tool using the latest reading result of that tool.
Update Collation Pattern (CRU)	Updates the collation pattern of the specified 1D Code Reader tool and 2D Code Reader tool using the latest reading result of that tool.
Copy Cell Value (CCV)	Specify the copy source cells and copy destination cell to copy cell values.
Export Cell Values (CEV)	Specify the file number and export source cells to export cell values.
Import Cell Values (CIV)	Specify the file number and import destination cell to import cell values.

Reference

- For other commands supported by the VS series, see [Control/Data Output] - [Control via Commands].
- Control tools can be added when Free Layout is selected.

Change Program Setting (PL)

#E076

Switches the program setting to the program setting of the specified number in the specified storage to read from.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - [109 : PL : Change Program Setting (Specify No.)].

Properties

Use the [Properties] view to configure the [Change Program Setting (PL)] tool. The [Properties] view of the [Change Program Setting (PL)] tool consists of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Command Settings	Configure the storage from which to read the program setting to switch to and the program setting number.
Execution Order	Configure the execution order for the tool.

Command Settings

Configure the storage from which to read the program setting to switch to and the program setting number.

Command Settings

PL Change Program Setting

The command name is displayed.

Storage

Select the storage from which the program setting to switch over to is read.

- **Internal Storage** (default): A program setting is read from the internal storage.
- **SD Card**: A program setting is read from an SD card.

Program No.

Configure the number (0 to 9999, default: 0) of the program setting to switch over to.

Save Settings (PS)

#E077

Saves the program setting that is currently loaded on the device.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - [111 : PS : Save Program Setting].

Properties

Use the [Properties] view to configure the [Save Settings (PS)] tool. The [Properties] view of the [Save Settings (PS)] tool consists of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Command Settings	The command name is displayed.
Execution Order	Configure the execution order for the tool.

Command Settings

The command name is displayed.

Command Settings

PS Save Settings

The command name is displayed.

Issue Soft Event (SEI)

#E078

Issues the soft event of the specified number.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - [123 : SEI : Issue Soft Event].

Properties

Use the [Properties] view to configure the [Issue Soft Event (SEI)] tool. The [Properties] view of the [Issue Soft Event (SEI)] tool consists of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Command Settings	Configure the number of the soft event to be issued.
Execution Order	Configure the execution order for the tool.

Command Settings

Configure the number of the soft event to be issued.

Command Settings

SEI Issue Soft Event

The command name is displayed.

Soft Event No.

Configure the number (0 to 31, default: 0) of the soft event to be issued.

Clear Error (ERC)

#E079

Clears an error condition and an error code of the specified error type.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - [117 : ERC : Clear Error].

Properties

Use the [Properties] view to configure the [Clear Error (ERC)] tool. The [Properties] view of the [Clear Error (ERC)] tool consists of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Command Settings	Select the error type of the error to be cleared.
Execution Order	Configure the execution order for the tool.

Command Settings

Select the error type of the error to be cleared.

Command Settings

ERC Clear Error

The command name is displayed.

Error Type

Select the error type of the error to be cleared.

- **Error0** (default): The error condition and the error code of the error assigned to Error0 are cleared.
- **Error1**: The error condition and the error code of the error assigned to Error1 are cleared.

Clear Tool Buffer (TBC)

#E096

Clears the buffer of the specified tool type and number.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - "139: TBC: Clear Tool Buffer".

Properties

Use the [Properties] view to configure the [Clear Tool Buffer (TBC)] tool. The [Properties] view of the [Clear Tool Buffer (TBC)] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Also, configure execution conditions of the tool.
Command Settings	Select the type and the number of the tool for which to clear the buffer of.
Execution Order	Configure the execution order of the tool.

Command Settings

Select the type and the number of the tool for which to clear the buffer of.

Command Settings

TBC Clear Tool Buffer

The command name is displayed.

Tool Type

Set the tool type.

- Image Output Tool (default)
- Data Output Tool
- Statistics Tool
- Yield Rate Tool
- Data History Tool
- Data Input (Non-Procedural)

Tool No.

Set the tool number (0 to 1999 and 9999, default: 0).

Reset (RS)

#E080

Clears system properties, the total status, execution results of tools and tasks, and archive and statistical data.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - [103 : RS : Reset].

Properties

Use the [Properties] view to configure the [Reset (RS)] tool. The [Properties] view of the [Reset (RS)] tool consists of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Command Settings	The command name is displayed.
Execution Order	Configure the execution order for the tool.

Command Settings

The command name is displayed.

Command Settings

RS Reset

The command name is displayed.

Initialize Output Data (RSOD)

#E097

Initializes the output data.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - "142: RSOD: Initialize Output Data".

Properties

Use the [Properties] view to configure the [Initialize Output Data (RSOD)] tool. The [Properties] view of the [Initialize Output Data (RSOD)] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Also, configure execution conditions of the tool.
Command Settings	The command name is displayed.
Execution Order	Configure the execution order for the tool.

Command Settings

The command name is displayed.

RSOD Initialize Output Data

The command name is displayed.

Disable Output (OD)

#E081

Suppresses data output to external devices from the [Data Output] tool (industrial Ethernet, non-procedural, FTP/storage, terminal) and the [Image Output] tool.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - [108 : OD : Disable Output].

Properties

Use the [Properties] view to configure the [Disable Output (OD)] tool. The [Properties] view of the [Disable Output (OD)] tool consists of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Command Settings	Select whether to enable or disable the output of images and data.
Execution Order	Configure the execution order for the tool.

Command Settings

Select whether to enable or disable the output of images and data.

Command Settings

OD Disable Output

The command name is displayed.

Image Output, Data Output

Select whether to enable or disable the output of images and data.

- **Enable**: Output of images and data is enabled.
- **Disable** (default): Output of images and data is disabled.

Disable Trigger Input (TD)

#E082

Controls (Disables/Enables) trigger input.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - [101 : TD : Disable Trigger Input].

Properties

Use the [Properties] view to configure the [Disable Trigger Input (TD)] tool. The [Properties] view of the [Disable Trigger Input (TD)] tool consists of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Command Settings	Select whether or not to allow trigger input (enabled/disabled).
Execution Order	Configure the execution order for the tool.

Command Settings

Select whether or not to allow trigger input (enabled/disabled).

Command Settings

TD Disable Trigger Input

The command name is displayed.

Trigger Input

Select whether or not to allow trigger input (enabled/disabled).

- **Enable**: Trigger input is enabled.
- **Disable** (default): Trigger input is disabled.

Register Model Image (MG)

#E083

Saves the latest input image of the tool with the specified number as the model image with the number specified by the model image number.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - "129: MG: Register Model Image (Specify No.)".

Properties

When setting the [Register Model Image (MG)] tool, use the [Properties] view. The [Properties] view of the [Register Model Image (MG)] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter comments and the tool name. Additionally, set the execution conditions for the tool.
Command Settings	Configure the tool number of the tool for which the model image is registered and the model image number of the registered model image.
Execution Order	Configure the execution order for the tool.

Command Settings

Configure the tool number of the tool for which the model image is registered and the model image number of the registered model image.

Command Settings

MG Register Model Image

The command name is displayed.

Tool No.

Configure the number (0 to 1999, default: 0) of the tool for which the model image is registered.

Model Image No.

Configure the number (0 to 999, default: 0) of the registered model image.

Change Model Image (MS)

#E084

Switches the model image used by the tool of the specified number to the model image of the specified number.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - [112 : MS : Change Model Image (Specify No.)].

Properties

Use the [Properties] view to configure the [Change Model Image (MS)] tool. The [Properties] view of the [Change Model Image (MS)] tool consists of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Command Settings	Configure the tool number of the tool for which the model image is changed and the model image number of the replacing model image.
Execution Order	Configure the execution order for the tool.

Command Settings

Configure the tool number of the tool for which the model image is changed and the model image number of the replacing model image.

Command Settings

MS Change Model Image

The command name is displayed.

Tool No.

Configure the number (0 to 1999, default: 0) of the tool for which the model image is changed. When [9999] is specified, the model image is changed for all model image-using tools added to the task.

Model Image No.

Configure the number (0 to 999, default: 0) of the replacing model image.

Update Pattern Information (PDU)

#E085

Update the pattern information registered in the specified [Pattern Search] tool, [ShapeTrax3A] tool, [Subtraction Filter] tool, [Image Region (Model Image)] tool, or [Shared Pattern (ShapeTrax3A)] tool using the configured model image.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - [115 : PDU : Update Pattern Information].

Properties

Use the [Properties] view to configure the [Update Pattern Information (PDU)] tool. The [Properties] view of the [Update Pattern Information (PDU)] tool consists of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Command Settings	Specify the tool number of the [Pattern Search] tool, the [ShapeTrax3A] tool, the [Subtraction Filter] tool, the [Image Region (Model Image)] tool, or the [Shared Pattern (ShapeTrax3A)] tool for which the pattern information is updated.
Execution Order	Configure the execution order for the tool.

Command Settings

Specify the tool number of the [Pattern Search] tool, the [ShapeTrax3A] tool, the [Subtraction Filter] tool, the [Image Region (Model Image)] tool, or the [Shared Pattern (ShapeTrax3A)] tool for which the pattern information is updated.

Command Settings

PDU Update Pattern Information

The command name is displayed.

Tool No.

Configure the number (0 to 1999, default: 0) of the tool for which the pattern information is updated. When [9999] is specified, pattern information is updated for all of the [Pattern Search] tools, the [ShapeTrax3A] tools, the [Subtraction Filter] tools, the [Image Region (Model Image)] tools, and the [Shared Pattern (ShapeTrax3A)] tools that are added to the task.

Update Position Adjustment Reference Value (RPU)

#E086

Updates the position adjustment reference value of the specified [Image Position Adjustment] tool with the latest position information of the referenced tool.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - [114 : RPU : Update Position Adjustment Reference Value].

Properties

Use the [Properties] view to configure the [Update Position Adjustment Reference Value (RPU)] tool. The [Properties] view of the [Update Position Adjustment Reference Value (RPU)] tool consists of the tabs below. Configure settings on each tab as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Configure execution conditions of the tool.
Command Settings	Specify the number of the tool for which the position adjustment reference value is updated.
Execution Order	Configure the execution order for the tool.

Command Settings

Specify the number of the tool for which the position adjustment reference value is updated.

Command Settings

RPU Update Position Adjustment Reference Value

The command name is displayed.

Tool No.

Configure the number (0 to 1999, default: 0) of the tool for which the position adjustment reference value is updated. When [9999] is specified, the position adjustment reference value is updated for all [Image Position Adjustment] tools that are added to the task.

Update Registered String (JSU)

#E087

Update the registered string of the specified [OCR2] tool and [AI OCR] tool using the latest reading result of that tool.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - "127 : JSU: Update Registered String".

Properties

When setting the [Update Registered String (JSU)] tool, use the [Properties] view. The [Properties] view of the [Update Registered String (JSU)] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter comments and the tool name. Additionally, set the execution conditions for the tool.
Command Settings	Configure the tool number of the tool for which the registered string is updated.
Execution Order	Configure the execution order for the tool.

Command Settings

Configure the tool number of the tool for which the registered string is updated.

Command Settings

JSU Update Registered String

The command name is displayed.

Tool No.

Configure the number (0 to 1999, default: 0) of the tool for which the registered string is updated. When [9999] is specified, the registered string is updated for all [OCR2] tools and [AI OCR] tools added to the task.

Update Collation Pattern (CRU)

#E088

Updates the matching pattern of the [1D Code Reader] tool and [2D Code Reader] tool with the specified number using the latest read data of that tool.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - "128: CRU: Update Collation Pattern".

Properties

When setting the [Update Collation Pattern (CRU)] tool, use the [Properties] view. The [Properties] view of the [Update Collation Pattern (CRU)] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter comments and the tool name. Additionally, set the execution conditions for the tool.
Command Settings	Configure the tool number of the tool for which the matching pattern is updated.
Execution Order	Configure the execution order for the tool.

Command Settings

Configure the tool number of the tool for which the matching pattern is updated.

Command Settings

CRU Update Collation Pattern

The command name is displayed.

Tool No.

Configure the number (0 to 1999, default: 0) of the tool for which the matching pattern is updated. When [9999] is specified, the matching pattern is updated for all of the [1D Code Reader] tools and [2D Code Reader] tools added to the task.

Copy Cell Value (CCV)

#E098

Specify the copy source cells and copy destination cell to copy cell values.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - "140: CCV: Copy Cell Value".

Properties

Use the [Properties] view to configure the [Copy Cell Value (CCV)] tool. The [Properties] view of the [Copy Cell Value (CCV)] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Also, configure execution conditions of the tool.
Command Settings	Specify the copy source cells and copy destination cell.
Execution Order	Configure the execution order for the tool.

Command Settings

Specify the copy source cells and copy destination cell.

Command Settings

CCV Copy Cell Value

The command name is displayed.

Copy Source Cells

- **Settings**: Click this to display the [Reference] dialog box (Vision Dashboard). Drag and select cells from the start point to the end point and click [OK] to specify the copy source cells.

Copy Destination Cell

- **Settings**: Click this to display the [Reference] dialog box (Vision Dashboard). Click and select a user-selected cell and click [OK] to specify the copy destination cell.

Export Cell Values (CEV)

#E099

Specify the file number and export source cells to export cell values.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - "143: CEV: Export Cell Values".

Properties

Use the [Properties] view to configure the [Export Cell Values (CEV)] tool. The [Properties] view of the [Export Cell Values (CEV)] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Also, configure execution conditions of the tool.
Command Settings	Specify the file number and export source cells.
Execution Order	Configure the execution order for the tool.

Command Settings

Specify the file number and export source cells.

Command Settings

CEV Export Cell Values

The command name is displayed.

File No.

Set the file number (0 to 99, default: 0).

Export Source Cells

- **Settings**: Click this to display the [Reference] dialog box (Vision Dashboard). Drag and select cells from the start point to the end point and click [OK] to specify the export source cells.

Import Cell Values (CIV)

#E100

Specify the file number and import destination cell to import cell values.
For command details, see [Control/Data Output] - [Control via Commands] - [Command] - "144: CIV: Import Cell Values".

Properties

Use the [Properties] view to configure the [Import Cell Values (CIV)] tool. The [Properties] view of the [Import Cell Values (CIV)] tool consists of the tabs below. Change the settings as required.

Properties	Settings
General	The tool information is displayed. You can also enter the tool name and comments. Also, configure execution conditions of the tool.
Command Settings	Specify the file number and import destination cell.
Execution Order	Configure the execution order for the tool.

Command Settings

Specify the file number and import destination cell.

Command Settings

CIV Import Cell Values

The command name is displayed.

File No.

Set the file number (0 to 99, default: 0).

Import Destination Cell

- **Settings**: Click this to display the [Reference] dialog box (Vision Dashboard). Click and select a user-selected cell and click [OK] to specify the import destination cell.

Execution Order

#E089

Configure the execution order for the tool.

Execution Order

Execution Timing Specification

Select the timing to execute the tool.

- **Resolve Automatically** (default): The tool execution timing is determined automatically.
- **Execute After Specified Tool**: The tool in question is executed after the execution of the specified tool.

Execute After the Following Tool

When [Execution Timing Specification] is set to [Execute After Specified Tool], specify the tool after which the tool in question is executed.

Tool Common Setting Items

This section explains dialog navigation for adding a tool, as well as setting items common among different tools.

- Navigation Dialogs When Adding a Tool
- General
- Region
- Image Enhance
- Detailed Settings

Navigation Dialogs When Adding a Tool

#E090

When you add a tool to the Task in the [Task] view, different navigation dialogs appear in turn to prompt you to make settings in accordance with the setting content of the tool.
This section explains the operation of the following navigation dialogs that appear when adding a tool.

- [Current Image] Dialog: Select the input image to be used by the tool.
- [Edit Inspection Region] Dialog: Edit the region to be inspected.
  For the case when the [Subtraction Filter] tool is added, see [Edit Inspection Region] Dialog ([Subtraction Filter] Tool).
- [Edit Pattern Region] Dialog: Edit the [Pattern Region] for registering the pattern to be detected.
- [Reference Position Registration] Dialog: Register a detection point and a reference position for correcting image positions.
- [Specify Point] Dialog, [Specify Line] Dialog, [Specify Circle] Dialog, [Line Detection] Dialog, and [Circle Detection] Dialog: Specify a point, line, or circle that will be the basis for the measurement in the measurements & dimensions tools.

Tool	[Current Image]	[Edit Inspection Region]	[Edit Pattern Region]	[Reference Position Registration]	Measurements & Dimensions				
					[Specify Point]	[Specify Line]	[Specify Circle]	[Line Detection]	[Circle Detection]
Inspection									
Area	✓	✓							
Intensity	✓	✓							
Color Detection	✓	✓							
Pattern Search	✓		✓						
ShapeTrax3A	✓		✓						
Edge Position	✓	✓							
Edge Width	✓	✓							
Edge Pitch	✓	✓							
Edge Pairs	✓	✓							
Profile Position	✓	✓							
Profile Width	✓	✓							
Profile Defect	✓	✓							
Defect	✓	✓							
Blob	✓	✓							
Grayscale Blob	✓	✓							
OCR2	✓	✓							
1D Code Reader	✓	✓							
2D Code Reader	✓	✓							
AI Inspection									
AI Classification	✓	✓							
AI Detection	✓	✓							
AI Segmentation	✓	✓							
Measurements & Dimensions									
Measuring distance									
Points Distance	✓				✓				
Point/Line Distance	✓				✓	✓			
Lines Distance	✓					✓			
Point/Circle Distance	✓				✓		✓		
Line/Circle Distance	✓					✓	✓		
Circles Distance	✓						✓		

Tool	[Current Image]	[Edit Inspection Region]	[Edit Pattern Region]	[Reference Position Registration]	Measurements & Dimensions				
					[Specify Point]	[Specify Line]	[Specify Circle]	[Line Detection]	[Circle Detection]
Detecting a line and measuring an angle									
Line Detection	✓							✓	
Line Passing Two Points	✓				✓				
Bisection of Two Lines	✓					✓			
Angle Formed by Two Lines	✓					✓			
Detecting a circle									
Circle Detection	✓								✓
Detecting points									
Obtaining an intersection									
Line/V-Line Intersection	✓				✓	✓			
Two Lines Intersection	✓					✓			
Obtaining the center									
Center of Quadrangle	✓					✓			
Midpoint of Points	✓				✓				
Region									
Shared Region	✓	✓							
Image Region (Current Image)	✓	✓							
Image Region (Model Image)	✓	✓							
Shared Pattern (ShapeTrax3A)	✓		✓						
Image Conversion									
Shared Image Enhance	✓	✓							
Subtraction Filter	✓	✓							
Image Position Adjustment				✓					
Vision-Guided Robotics									
Calibration (Robot)	✓								
Pick/Place	✓								
Grip Shift Correction	✓								
Robot Coordinate Transformation	✓								
Display									
Graphics Display	✓								

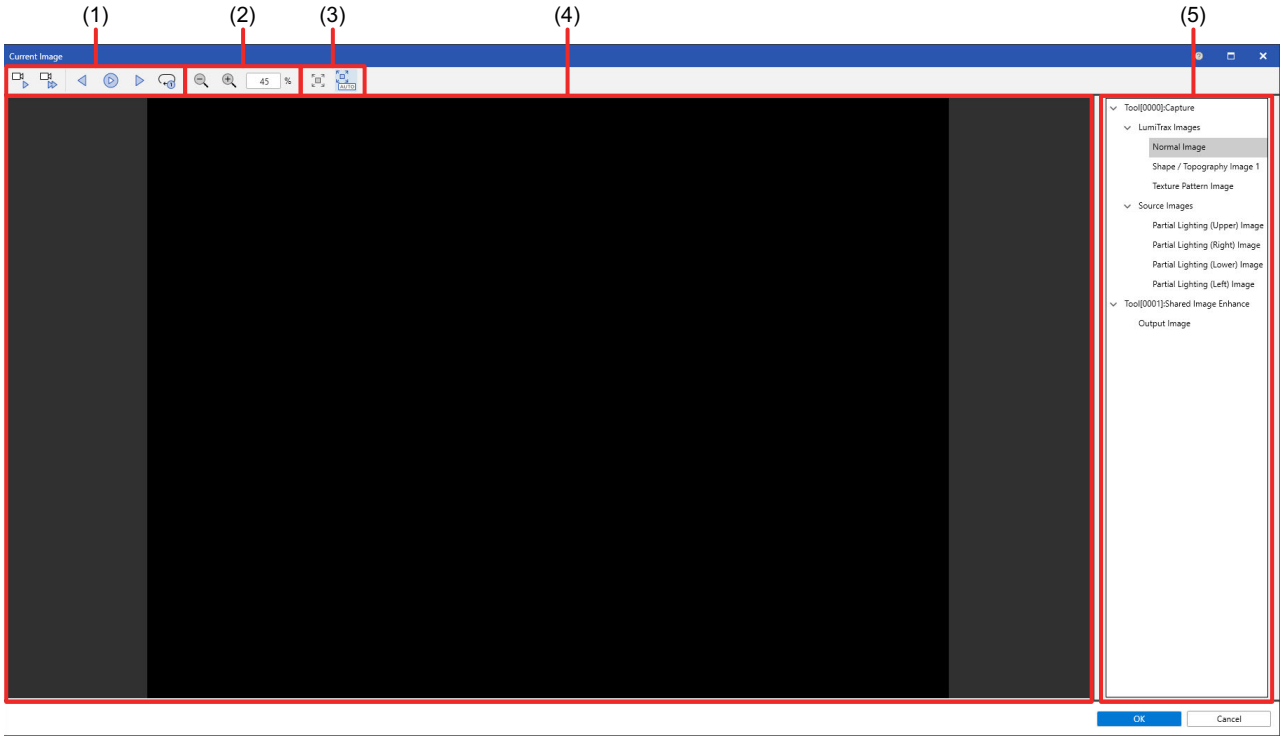
[Current Image] Dialog

When you add a tool that measures and processes images, the [Current Image] dialog appears. As the input image for the tool, select an output image of a [Capture] tool or an image processed by other tools.

Point The [Current Image] dialog appears in the following cases where there are multiple candidates for the input image:

- A [Capture] tool that has multiple output images has been added to the task.
- [Multi-Capture] is configured for the [Capture] tool.
- A tool that has an output image has been added to the task.

Dialog details



(1) Trigger / Replay

- **(Trigger/Continuous Trigger)**: Click to input a trigger.
- **(Previous Image/Repeat Image/Next Image/1 Round)**: Click to replay the Archived Images/Simulation Images.

(2) Zoom Settings

Zooms in/out the displayed image.

- : Zooms out the displayed image.
- : Zooms in the displayed image.
- Zoom Rate: Displays the current zoom rate. Enter a zoom rate (1 to 2500 (%)) to zoom in/out the image at the specified rate.

(3) Fit/Auto Fit

- : Clicking this button automatically adjusts the zoom rate so that the displayed image fits in the preview area.
- : When enabled, the zoom rate of the displayed image automatically changes in accordance with the size of the preview area.

Reference Auto Fit is canceled when you zoom in/out the displayed image by zoom setting.

(4) Preview area

The image currently selected from the image list is displayed in this area.

Reference You can adjust the width of the preview area by dragging and dropping the border.

(5) Image list

This area lists, in the tree format, the tools added to the [Task] view that have output images and their output images.

Reference
- If there are multiple cameras, the output images of the [Capture] tool are displayed by camera ID.
- If Multi-Capture is enabled, the output images of the [Capture] tool are displayed by Capture No.

Operation

1 From the image list, select the image to be used for measurement.
The selected image is displayed in the preview area.

2 Click [OK].
The selected image is set as the input image to be used for measurement.

Reference The input image can be changed at a later time.
Clicking [Select] from [Properties] view - [General] tab - [Current Image] opens the [Current Image] dialog, where you can select a different input image.
→ [Current Image]

[Edit Inspection Region] Dialog

When you add a tool that requires the setting of an inspection region, the [Edit Inspection Region] dialog appears. Select an inspection region shape and draw the inspection region on the image displayed in the [Image Viewer].

Point For only the [Subtraction Filter] tool, the operation of the [Edit Inspection Region] dialog is different.
→ [Edit Inspection Region] Dialog ([Subtraction Filter] Tool)

1 Select the shape of the inspection region by [Shape].

Point Available shapes differ depending on the tool to be added.
→ "Shapes of regions that can be used by different tools"

2 Draw the inspection region over the image displayed in the [Image Viewer].
→ "Drawing a Region"

3 When the drawing of the region is complete, click [OK].

Reference
- For tools other than AI Inspection tools, you can edit the region that has been drawn, by graphical operation on the [Image Viewer] or by the [Properties] view - [Region] tab - [Region Settings].
  → Drawing a Region
  → Region Settings
  For AI Inspection tools, you cannot edit the region by graphical operation on the [Image Viewer]. An inspection region that was configured at the time of adding an AI Inspection tool can be changed only in [Edit Region] of the [Region] tab.
  → Editing the Inspection Region of the AI Inspection Tool
- When adding the [Pattern Search] tool and [ShapeTrax3A] tool, the [Edit Pattern Region] dialog appears.
  → [Edit Pattern Region] Dialog

[Edit Inspection Region] Dialog ([Subtraction Filter] Tool)

When you add the [Subtraction Filter] tool, the [Edit Inspection Region] dialog appears. Specify the model image to be used for difference detection, and draw the inspection region over the model image displayed in the [Image Viewer].

1 In [Image], select the model image to be used by the tool.
- **Get New Image**: Capture a new image and register and use it as the model image.
- **Use Saved Model Image**: Use a model image registered by a different tool.

Reference For the operation after choosing [Use Saved Model Image], see "Model Image" - "Select" in "Editing the Inspection Region of the [Subtraction Filter] Tool".

2 If you chose [Get New Image] for [Image], enter the model image name in [Registered Name].

Reference If you chose [Use Saved Model Image] for [Image], the name of the selected model image is displayed.

3 Select the shape of the inspection region by [Shape].

Point For shapes available for the [Subtraction Filter] tool, see "Shapes of regions that can be used by different tools".

4 Draw the inspection region over the image displayed in the [Image Viewer].
→ "Drawing a Region"

5 When the drawing of the region is complete, click [OK].

Point If there is already a model image whose name is the same as the one you entered in [Registered Name], a message for overwriting confirmation is displayed after clicking [OK].

Reference You can edit the region that has been drawn, by graphical operation on the [Image Viewer] or by the [Properties] view - [Region] tab - [Region] - [Edit Region].
→ Drawing a Region
→ "Editing the Inspection Region of the [Subtraction Filter] Tool"

[Edit Pattern Region] Dialog

When adding the [Pattern Search] tool or [ShapeTrax3A] tool, the [Edit Pattern Region] dialog appears. Specify the model image to be used for pattern registration, and draw the pattern region over the model image displayed in the [Image Viewer].

1 In [Image], select the model image to be used by the tool.

- **Get New Image**: Capture a new image and register and use it as the model image.
- **Use Saved Model Image**: Use a model image registered by a different tool.

Reference For the operation after choosing [Use Saved Model Image], see "Model Image" - "Select" in "Editing a Pattern Region".

2 If you chose [Get New Image] for [Image], enter the model image name in [Registered Name].

Reference If you chose [Use Saved Model Image] for [Image], the name of the selected model image is displayed.

3 Select the shape of the pattern region by [Shape].

Point For shapes available for the [Pattern Search] and [ShapeTrax3A] tools, see "Shapes of regions that can be used by different tools".

4 Draw the pattern region over the image displayed in the [Image Viewer].
→ "Drawing a Region"

Point A mask region cannot be set in the [Edit Pattern Region] dialog that appears during navigation. If you want to set a mask region for the pattern region, register the pattern region first, and then add a mask in the [Edit Pattern Region] dialog that is displayed from the [Properties] view - [Region] tab - [Pattern Search] - [Edit Pattern Region].
→ "Editing a Pattern Region"

5 When the drawing of the region is complete, click [OK].

Point If there is already a model image whose name is the same as the one you entered in [Registered Name], a message for overwriting confirmation is displayed after clicking [OK].

Reference The region that has been drawn can be edited from the [Properties] view - [Region] tab - [Pattern Search] - [Edit Pattern Region].
→ Editing a Pattern Region

[Reference Position Registration] Dialog

When you add an [Image Position Adjustment] tool, the [Reference Position Registration] dialog appears. Register a detection point and a reference position for correcting image positions.

1 In [Position], specify a measurement tool to set the detected point of the measurement tool as the detection point.

Point To specify the detection point directly, enable [Specify Individually], and then specify the X coordinate, Y coordinate, and angle.

Referenceable tools	X	Y	Angle
Pattern Search	Position X	Position Y	Angle
ShapeTrax3A	Position X	Position Y	Angle
Edge Position	Position X	Position Y	Angle
Profile Position (Best Fit Circle/ Line: Off)	Position X	Position Y	Angle
Profile Position (Best Fit Circle/ Line: Line)	Detected Line Center X	Detected Line Center Y	Detected Line Angle
Profile Position (Best Fit Circle/ Line: Circle)	Detected Circle Center X	Detected Circle Center Y	None*1
Profile Defect	Defect Position X	Defect Position Y	Defect Angle
Defect (Grouping: OFF)	Position X	Position Y	None*1
Defect (Grouping: ON)	Center of Gravity X	Center of Gravity Y	Major Axis Angle
Blob	Center of Gravity X	Center of Gravity Y	Major Axis Angle
Grayscale Blob	Center of Gravity X	Center of Gravity Y	Major Axis Angle
1D Code Reader	Position X	Position Y	Code Angle
2D Code Reader	Position X	Position Y	Code Angle
Line Detection	Detected Line Center X	Detected Line Center Y	Detected Line Angle
Line Passing Two Points	Detected Line Center X	Detected Line Center Y	Detected Line Angle
Bisection of Two Lines	Median X	Median Y	Bisector Angle
Angle Formed by Two Lines	Two Lines Intersection X	Two Lines Intersection Y	Detected Line 1 Angle
Circle Detection	Detected Circle Center X	Detected Circle Center Y	None*1
Line/V-Line Intersection	Intersection X	Intersection Y	Detected Line Angle
Two Lines Intersection	Intersection X	Intersection Y	Detected Line 1 Angle
Center of Quadrangle	Center X	Center Y	Detected Line 1 Angle
Midpoint of Points	Midpoint X	Midpoint Y	Detected Line Angle

*1:The setting value is treated as ineffective.

2 Click [OK].

The detection point is registered as the reference position.

Reference You can edit the detection point and the reference position in the [Properties] view - [Image Correction] tab.

See "Measurement Parts" - "Image Position Adjustment" - "Image Correction".

Measurements & Dimensions

When you add a Measurements & Dimensions tool, the [Specify Point], [Specify Line], [Specify Circle], [Line Detection], and [Circle Detection] dialogs appear as wizard-type dialogs.

Reference Wizard-type dialogs are dialogs combined according to the detection target of the tool.
Example of wizard-type dialogs
- Points Distance: Combination of [Specify Point (Point 1)] and [Specify Point (Point 2)]
- Point/Line Distance: Combination of [Specify Point] and [Specify Line]
- Point/Circle Distance: Combination of [Specify Point] and [Specify Circle]

With the [Specify Point], [Specify Line], and [Specify Circle] dialogs, you specify a detection target by selecting a graphic of a point, straight line, or circle of another tool displayed in the [Image Viewer].
With the [Line Detection] and [Circle Detection] dialogs, you draw a line segment, ring, or arc in order to detect edges in the image in the [Image Viewer] to recognize a straight line or circle.

[Specify Point] Dialog

The [Specify Point] dialog is a dialog that lets you specify a point measured by a different tool as the detection target of a Measurements & Dimensions tool.

Point To specify the measurement result graphic of a different tool in the [Image Viewer], you need to enable the display of the graphic in the Display Settings of the pertinent tool.

1 Select a measurement result point of a different tool displayed in the [Image Viewer].
When you have selected a graphic, the next navigation dialog appears.

Reference
- For the measurement results that you can specify, see “Appendix” - "Results Data List".
- You can move back/forward to the previous/next dialog by clicking ◂/▸.

2 When you have configured all detection targets, click [Done].

Reference You can edit the configured detection target and judgment conditions in the [Detection] tab and [Judgment] tab of the [Properties] view of the Measurements & Dimensions tool.
→ "Measurements & Dimensions"

[Specify Line] Dialog

The [Specify Line] dialog is a dialog that lets you specify a straight line measured by a different tool as the detection target of a Measurements & Dimensions tool.

Point To specify the measurement result graphic of a different tool in the [Image Viewer], you need to enable the display of the graphic in the Display Settings of the pertinent tool.

1 Select a measurement result straight line of a different tool displayed in the [Image Viewer].
When you have selected a graphic, the next navigation dialog appears.

Reference
- For the measurement results that you can specify, see “Appendix” - "Results Data List".
- You can move back/forward to the previous/next dialog by clicking ◂/▸.

2 When you have configured all detection targets, click [Done].

Reference You can edit the configured detection target and judgment conditions in the [Detection] tab and [Judgment] tab of the [Properties] view of the Measurements & Dimensions tool.
→ "Measurements & Dimensions"

[Specify Circle] Dialog

The [Specify Circle] dialog is a dialog that lets you specify a circle measured by a different tool as the detection target of a Measurements & Dimensions tool.

Point To specify the measurement result graphic of a different tool in the [Image Viewer], you need to enable the display of the graphic in the Display Settings of the pertinent tool.

1 Select a measurement result circle of a different tool displayed in the [Image Viewer].
When you have selected a graphic, the next navigation dialog appears.

Reference
- For the measurement results that you can specify, see “Appendix” - "Results Data List".
- You can move back/forward to the previous/next dialog by clicking ◂/▸.

2 When you have configured all detection targets, click [Done].

Reference You can edit the configured detection target and judgment conditions in the [Detection] tab and [Judgment] tab of the [Properties] view of the Measurements & Dimensions tool.
→ "Measurements & Dimensions"

[Line Detection] Dialog

The [Line Detection] dialog is a dialog that lets you draw a line segment over the image displayed in the [Image Viewer]. An edge detection region is created according to the line segment that you drew, and the line will be detected from the edge information of the multiple points detected.

1 In the [Image Viewer], click a point on the edge where you want to detect the line in the image displayed.

Reference If you click [Redo] after specifying the first point, the point is deleted so that you can specify the first point again.

2 In the same way as you did for the first point, click another point on the edge where you want to detect the line.

When you click a second point, a measurement region for edge detection is automatically drawn around the line segment so that the line will be detected from the detected edge information.

Reference You can edit the detection conditions for the line in the different tabs of the [Properties] view.
→ [Line Detection]

[Circle Detection] Dialog

The [Circle Detection] dialog is a dialog that lets you draw a ring or arc over the image displayed in the [Image Viewer]. An edge detection region is created according to the ring or arc that you drew, and the circle will be detected from the edge information of the multiple points detected.

1 Select the type of shape ( ) that you will draw.

2 Draw the selected shape upon the edge where you want to detect the circle.
When you have drawn the ring or arc, a measurement region for edge detection is automatically drawn around it so that the circle will be detected from the detected edge information.

Reference
- If you click [Redo] after specifying the first or the second point, the specified points are deleted so that you can specify points from the first one again.
- For steps of drawing a ring and arc, see "Drawing a ring" and "Drawing an arc" of "Region" - "Drawing a Region".
- You can edit the detection conditions for the circle in the different tabs of the [Properties] view.
  → [Circle Detection]

General

#E091

In the [General] tab, you make basic settings of the tool that you are configuring. The [General] tab displays the information of the currently selected tool. You can also configure the captured image to be used for measurement and the execution conditions of the tool.
Clicking the [General] tab in the [Properties] view displays the following setting items:

Point The following items are not displayed for the [Capture] tool.
- Current Image
- Execute Condition

Tool ID

The serial number (max. 1999) of the selected tool is displayed.

Tool Name

The name of the selected tool is displayed.

Tool Type

The tool type is displayed.

Current Image

The ID of the image used as the current image is displayed in the format that is a series of IDs of different naming levels connected by dots (".") (Tool<tool ID>:<tool name>(.<camera No.>)(.<capture No.>)(.<name of output image>)).
Example: Tool[0001]:Capture.CAM1.Capture No.1.Shape / Topography Image 1
To change the current image, click [Select] to display the [Current Image] Dialog. Then, select the image that you want to measure and click [OK].

Execute Condition

Select a method for configuring the execution condition.
- **Specify by ON/OFF** (default): Choose to execute or not to execute the tool by the [Tool Execution] toggle switch.
- **Follow Judgment Result of Other Tool**: The tool is executed or not executed in accordance with the judgment result of another tool.

Point If the referenced tool is configured to not be executed, the referencing tool is also not executed.

- **Specify Condition**: Execute the tool if the value specified in [Reference Value] matches [Condition].

Tool Execution

When [Execute Condition] is set to [Specify by ON/OFF], specify whether to execute the tool or not (default: ON).

Select Judgment Result Reference Tool

When [Execute Condition] is set to [Follow Judgment Result of Other Tool], select a referable tool that has a judgment result. If the referenced tool was not executed, this tool is also not executed. If you select [None] (default), the tool is executed regardless of the judgment result.

Execute when Judgment Result is

Select the judgment result of the tool selected by [Select Judgment Result Reference Tool] for the judgment of executing the target tool.

- **Pass**: The target tool is executed when the judgment result of the tool selected by [Select Judgment Result Reference Tool] is [Pass].
- **Fail**: The target tool is executed when the judgment result of the tool selected by [Select Judgment Result Reference Tool] is [Fail].

Comment

The comment added to the selected tool is displayed. You can enter any comment within 512 characters. It is useful to write information such as reasons and comments on the tool setting for later reference.

Image Generation

Enable this to display the filtered image or contrast image on the camera image in the web browser display of the custom screen.

- **Generate Filtered Image**: Set whether to generate the tool's filtered image for display purposes (default: OFF).
- **Generate Contrast Image**: Set whether to generate the tool's contrast image for display purposes (default: OFF).

Point

- [Generate Filtered Image] is available in the following tools.
  - –Inspection tools (excluding Color Detection tool. It is available in the Defect tool when selecting an extraction method other than “Fine Color” for color extraction.)
  - –AI Classification tool (when selecting an extraction method other than "Fine Color" for color extraction)
  - –Line Detection tool
  - –Circle Detection tool
  - –Image Region (Current Image) tool
  - –Image Region (Model Image) tool
  - –Subtraction Filter tool
  - –Shared Image Enhance tool
- [Generate Contrast Image] is available in the following tools.
  - –Defect tool
  - –Grayscale Blob tool
  - –AI Detection tool
  - –AI Segmentation tool
- Enabling this setting increases the consumption of the resource memory and image memory.
- Generated filtered images and contrast images can be used as current images when adding tools such as the Defect tool or the Blob tool.
- For the AI Detection tool and AI Segmentation tool, contrast images linked to the [Heat Map Range] setting are generated.

Region

#E092

The [Region] tab has two setting items: [Position Adjustment] for adjusting the reference position of the tool coordinate system and [Region Settings] for configuring a region to be used for measurement.

Processing Overview

Position Adjustment

The position (X coordinate, Y coordinate, and angle) that will serve as the reference of the coordinate system of the tool is configured by a measurement result of a different tool or by [Specify Individually].

Point

With the position adjustment that is prepared for each measurement tool individually, you are adjusting the position and angle of the inspection region according to the measurement result of a different tool or according to the individual specification. In this case, the coordinate system (X axis and Y axis) of the position-adjusted inspection region is tilted. For a tool that is sensitive to the processing direction (X direction or Y direction), the processing result changes as a result of adjustment in accordance with the tilt of the X axis and Y axis because the coordinate system of the region changes by position adjustment. To keep the processing result constant between the time of setting and after position adjustment, you must make position adjustment of the current image itself to align it with the inspection region.

The [Image Position Adjustment] tool is a tool that generates the image where the position and angle of an image have been adjusted according to the measurement result of a different tool or according to the individual specification. When you use a tool that is sensitive to the processing direction (X direction or Y direction), we recommend that you use the [Image Position Adjustment] tool instead of the position adjustment function of individual measurement tools.

Region Settings

Specify the scope of area from the captured image to be used for measurement. There are the following types of regions used for measurement:

Inspection Region

Within the current image displayed in the [Image Viewer], the inspection region is the area subject to the measurement by a tool.

Mask Region

A mask region is a portion of an inspection region excluded from inspection. You can set a maximum of 31 mask regions within an inspection region. Mask regions are useful for hiding unnecessary areas.

Search Region / Pattern Region

You can set a search region and a pattern region for the Pattern Search tool and the ShapeTrax3A tool.
A search region is the area of an image from which the model to be registered by the pattern region is to be detected. You can reduce the processing time by setting a smaller search region. You can also set mask regions to hide unnecessary portions.
A pattern region is a region for specifying on the model image the pattern to be detected from the search region. In cases where the pattern region covers a complex shape, you can set mask regions after to hide unnecessary portions.

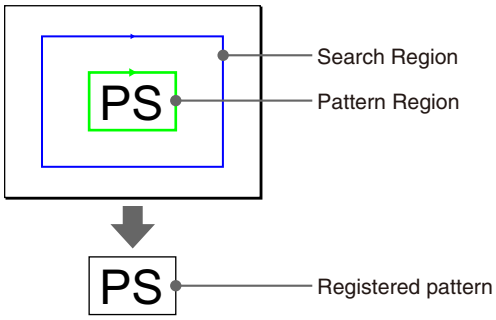
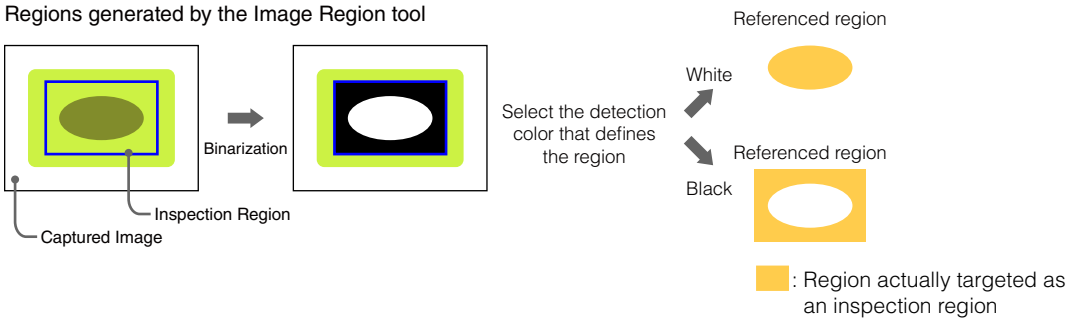


Image Region

You can reference a region generated by the [Image Region (Current Image)] tool / [Image Region (Model Image)] tool to use it as an inspection region. It is useful because an inspection region of a complex shape, for such as a component with multiple separate parts, is automatically configured.



Shapes of regions that can be used by different tools

With region setting, you specify a region to be used for measurement by specifying a shape such as rectangle and circle.
Region shapes that can be used vary by tool.

Tool	Rectangle	Circle	Oval	Ring	Arc	Polygon	Refer to Image Region
Inspection							
Area	✓	✓	✓	✓	✓	✓	✓
Intensity	✓	✓	✓	✓	✓	✓	✓
Color Detection	✓	✓	✓	✓	✓	✓	✓
Pattern Search	✓	✓	✓	✓	✓	✓	✓
ShapeTrax3A	✓	✓	✓	✓	✓	✓	✓
Edge Position	✓	✓	✓	✓	✓	✓	✓
Edge Width	✓	✓	✓	✓	✓	✓	✓
Edge Pitch	✓	✓	✓	✓	✓	✓	✓
Edge Pairs	✓	✓	✓	✓	✓	✓	✓
Profile Position	✓	-	-	✓	✓	-	✓
Profile Width	✓	-	-	✓	✓	-	✓
Profile Defect	✓	-	-	✓	✓	-	✓
Defect	✓	✓	✓	✓	✓	✓	✓
Blob	✓	✓	✓	✓	✓	✓	✓
Grayscale Blob	✓	✓	✓	✓	✓	✓	✓
OCR2	✓	-	-	-	✓*1	-	✓
1D Code Reader	✓	-	-	-	-	-	✓
2D Code Reader	✓	-	-	-	-	-	✓
AI Inspection							
AI Classification	✓	✓	✓	✓	✓	✓	-
AI Detection	✓	✓	✓	✓	✓	✓	-
AI Segmentation	✓	✓	✓	✓	✓	✓	-
Region							
Shared Region	✓	✓	✓	✓	✓	✓	✓
Image Region (Current Image)	✓	✓	✓	✓	✓	✓	-
Image Region (Model Image)	✓	✓	✓	✓	✓	✓	-
Image Conversion							
Shared Image Enhance	✓	✓	✓	✓	✓	✓	✓
Subtraction Filter	✓	✓	✓	✓	✓	✓	✓
Image Position Adjustment	✓	-	-	-	-	-	-

*1:Cannot be used when [Block Settings] - [Block Mode] is [Fixed].

Position Adjustment

The position (X coordinate, Y coordinate, and angle) that will serve as the reference of the coordinate system of the tool is configured by a measurement result of a different tool or by [Specify Individually].

Specify Individually

Set this item ON when you will configure the position adjustment target coordinates and angle individually.

- **ON**: When you wish to specify the position adjustment targets individually, select and configure [X], [Y], and [Angle].
- **OFF**: The position adjustment targets are not specified individually.

Specify

Select the tool to be referenced when you use the measurement result of a different tool for position adjustment.

- **None**: [X], [Y], and [Angle] are all set to 0.
- **Referable tools**: Among the tools in the [Task] view, the names of the referable tools are displayed. For [X], [Y], and [Angle], the measurement results of the referenced tool are applied. If the referenced tool is deleted, a reference error occurs.

Point When you modify Position Adjustment, the settings of the region are automatically changed so that the region position stays the same. However, the region settings are not changed when the value of a different tool is referenced in [Region Settings] or when the region shape is Rectangle.

Region Settings

Select a region shape, and configure the angle and vertex positions.

Point
- For the [Pattern Search] tool and the [ShapeTrax3A] tool, this item is displayed as [Search Region].
- For the [Subtraction Filter] tool and AI Inspection tools ([AI Classification], [AI Detection] and [AI Segmentation] tools), edit the inspection region in the [Edit Region] dialog displayed from [Edit Region]/[Edit] of the [Region] tab.
  → Editing the Inspection Region of the [Subtraction Filter] Tool
  → Editing the Inspection Region of the AI Inspection Tool

Shape

Select a region shape.

- Rectangle
- Circle
- Oval
- Ring
- Arc
- Polygon

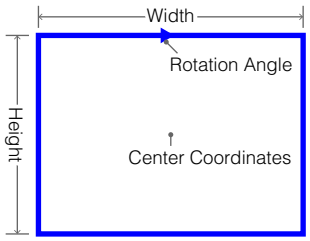
Point

- Shapes that can be used vary by tool.
  → Shapes of regions that can be used by different tools
- Regions other than those referenced from the [Shared Region] tool/[Image Region (Current Image)] tool/[Image Region (Model Image)] tool can be drawn directly in the [Image Viewer].
  → Drawing a Region
- When the inspection region includes portions unnecessary to the inspection, they can be excluded from the inspection by setting mask regions to hide them.
  → Mask
- You can reference a region created by the [Shared Region] tool to use it as an inspection region. If you use such a region, the content of [Region Settings] becomes ineffective.
  → Refer to Shared Region Tool
- You can reference a region generated by the [Image Region (Current Image)] tool / [Image Region (Model Image)] tool to use it as an inspection region.
  → Refer to Image Region Tool

Configure the angle, vertex positions, and other settings in accordance with the selected shape.

Rectangle

Configure the region by specifying the position, size, and rotation angle of the rectangle.



Width

Specify the width (1 to 16383) of the rectangle.

Height

Specify the height (1 to 16383) of the rectangle.

Center X/Y

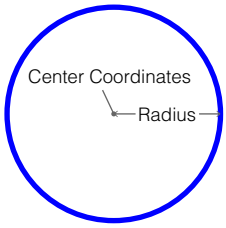
Specify the X and Y coordinates (-16382.000 to 16382.000) of the center of the rectangle.

Rotation Angle

Specify the rotation angle (0.000 to 359.999, default: 0.000) of the rectangle.

Circle

Configure the region by specifying the radius and the center coordinates of the circle.



Center X/Center Y

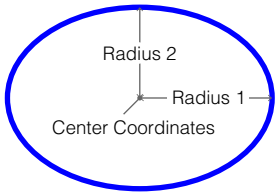
Specify the X and Y coordinates (-16383.000 to 16383.000) of the center of the circle.

Radius

Specify the radius (0 to 9600) of the circle.

Oval

Configure the region by specifying the center coordinates, the X-axis direction radius, the Y-axis direction radius, and the rotation angle of the oval.



Center X/Center Y

Specify the X and Y coordinates (-16383.000 to 16383.000) of the center of the oval.

Radius 1

Specify the X-direction radius (8 to 2580) of the oval.

Radius 2

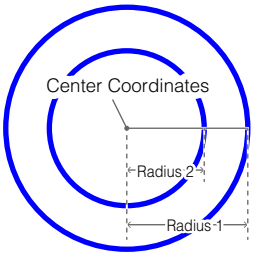
Specify the Y-direction radius (8 to 2580) of the oval.

Rotation Angle

Specify the rotation angle (0.000 to 359.999, default: 0.000) of the oval.

Ring

Configure the region by specifying the common center coordinates of the outer and inner circles, the radius of the outer circle, and the radius of the inner circle.



Center X/Center Y

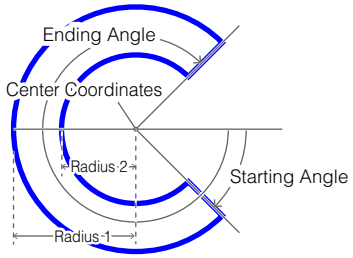
Specify the X and Y coordinates (-16383.000 to 16383.000) of the common center of the outer and inner circles.

Radius 1 / Radius 2

Specify the radii (0 to 9600) of the inner and outer circles. The larger value specifies the outer circle (Radius 1).

Arc

Configure the region by specifying the common center coordinates of the outer and inner circles, the radius of the outer circle, the radius of the inner circle, and starting and ending angles of the arc.



Center X/Center Y

Specify the X and Y coordinates (-16383.000 to 16383.000) of the center of the inner and outer circles.

Radius 1 / Radius 2

Specify the radii (0 to 9600) of the inner and outer circles. The larger value specifies the outer circle.

Starting Angle

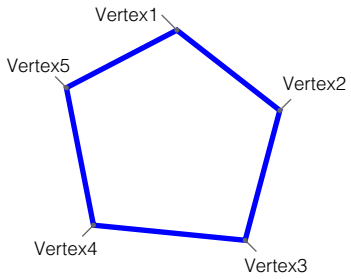
Specify the starting point of the arc by an angle (0.000 to 359.999).

Ending Angle

Specify the ending point of the arc by an angle (0.000 to 359.999).

Polygon

Configure the region by specifying the X and Y coordinates of each vertex.



Changes the sequence number of the selected vertex.

Add

Adds a vertex at the midpoint between the selected vertex and the next vertex. You can add up to 100 vertexes.

Vertex n (n: 0 to 99)

Specify the X and Y coordinates of each vertex.

X / Y

Specify the X and Y coordinates (-16383.000 to 16383.000) of the vertex.

Deletes the selected vertex.

Mask

Configure mask regions, which are excluded from measurement. Mask regions are useful for a complex-shape measurement target and for hiding unnecessary areas.

Changes the sequence number of the selected mask region.

Add

Adds a mask region. You can set a maximum of 31 mask regions within an inspection region.

Mask Region n (n: 0 to 30)

Configure the shape and area of the mask region. Setting items vary according to the [Shape].

Reference Setting items of each shape are the same as the case of Region Settings.

Deletes the selected mask region. When you delete a region, remaining regions are renumbered to fill the place of the deleted one.

Options

Configure optional functions of region setting.

Refer to Shared Region Tool

By setting this item [ON], you can use a region configured by the [Shared Region] tool to set it as the inspection region. This function is useful because inspection regions can be linked between

tools and positions measured by a preceding tool can be referenced by a subsequent tool to dynamically set inspection regions.

Referenced Shared Region Tool

Select the [Shared Region] tool to be referenced. Only Shared Region tools in the [Task] view can be referenced.

Point

- With this item being [ON], the region of the selected [Shared Region] tool is prioritized and the settings of the [Region Settings] category and [Mask] category become ineffective.
- For the region setting of the following tools, measurement results cannot be referenced:
  - –ShapeTrax3A: Rotation feature region settings and detection target selection conditions
  - –OCR2: Block Settings (Fixed block mode)
  - –Calibration: Calibration Points

Refer to Image Region Tool

By setting this item [ON], you can use a region generated by the [Image Region (Current Image)] tool / [Image Region (Model Image)] tool as the inspection region.

Referenced Image Region Tool

Select the [Image Region (Current Image)] tool / [Image Region (Model Image)] tool to be referenced. Only Image Region tools in the [Task] view can be referenced. You can view the referenced region by clicking [Preview].

Detection Color

Select the areas to set as the inspection region from the specified image region by selecting either [Black] or [White] (default: white).

Pattern Region

Edit the pattern region (image of the model to be detected from the search region). If you change the settings in Image Enhance or Color Extraction, you need to re-register the pattern.

Point

[Pattern Region] is displayed only for the Pattern Search tool, the ShapeTrax3A tool, and the Shared Pattern (ShapeTrax3A) tool.

Edit Pattern Region

Click this button to display the [Edit Pattern Region] dialog. For details, see "Editing a Pattern Region".

Refer to Shared Pattern Tool (ShapeTrax3A tool only)

Set this to [ON] to use the pattern generated by the [Shared Pattern] tool as the pattern region.

Referenced Shared Pattern Tool

Select the [Shared Pattern] tool to be referenced. Only the Shared Pattern tool on the [Task] view can be referenced.

Enable Eraser Tool (ShapeTrax3A tool and Shared Pattern (ShapeTrax3A) tool only)

Set to [ON] to enable the use of the eraser tool which removes unnecessary feature information in the image. For details, see "Erasing Unnecessary Feature Information/Boundary Information (Eraser Tool)".

Erasing Unnecessary Feature Information/Boundary Information (Eraser Tool)

When using the ShapeTrax3A tool, unnecessary detected edges within a range can be removed as noise components by specifying a user-selected location on the reference image.

1 Turn on [Enable Eraser Tool] in the [Region] tab and click [Edit].
The [Edit Eraser] dialog box is displayed and the edge information is indicated in green (fine feature) and light blue (coarse feature).

2 Drag and trace over unnecessary edge information to erase it.

3 Once editing is done, click [OK].

Reference
- Use [Eraser Size] to change the area to be erased at a time.
- To specify the type of display feature to display it on the screen, uncheck [Display Feature (Coarse)] or [Display Feature (Fine)].
- The eraser information will be deleted when the model image is changed, added, or deleted.

Drawing a Region

Selecting a region shape displays a region graphic over the image in the [Image Viewer] or the [Edit Pattern Region] dialog. You can draw a region directly by dragging and dropping handles on the graphic.
With VS Creator, you can draw regions of the following shapes:

- Drawing a rectangle
- Drawing a circle
- Drawing an oval
- Drawing a ring
- Drawing an arc
- Drawing a polygon

Point

- Available shapes differ depending on the tool to be added.
  → "Shapes of regions that can be used by different tools"
- The color of the frame drawn varies according to the type of region.
  –Inspection region / Search region: Blue
  –Pattern region: Green
  –Mask region: Purple
- You can change the color of a frame in the Display Settings of the relevant tool.
- The creation of each region consumes the processing memory of the system. The current processing memory usage (%) is displayed together with a graph in the status bar. When the displayed number reaches 100%, you cannot create any more regions. Delete unnecessary regions to secure more processing memory.
- When all or part of the inspection region is outside the image capture area, the part of the region outside the image capture area is always excluded from processing.
- The specifiable range for each region is fixed.
  –X and Y for the center of Rectangle: -16382.000 to 16382.000
  –X and Y for the center of Circle/Oval/Ring/Arc: -16383.000 to 16383.000
  –X and Y for the vertex of Polygon: -16383.000 to 16383.000
- The way of drawing inspection regions can also be used for the setting of the search region and pattern region of the [Pattern Search] and [ShapeTrax3A] tools.
- You can also use the measurement results of other tools to set the inspection region. See [Refer to Shared Region Tool] for more details.

Drawing a rectangle

When you add a tool to a task or select [Rectangle] for [Shape], a rectangle is displayed in the center of the [Image Viewer].

Editing a rectangle

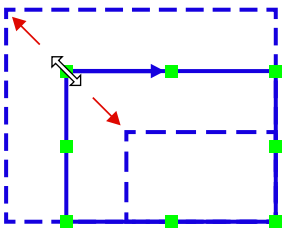
Reference If you want to configure a region accurately, enter numbers in the [Properties] view.
→ Rectangle

1 Click the frame line of the rectangle to select it.
Handles appear at the vertexes and the midpoints of the sides of the rectangle.

2 Correct the rectangle.

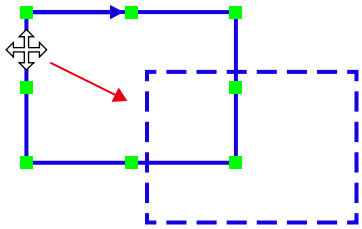
Resize

Drag a green handle on the frame line to change the size.



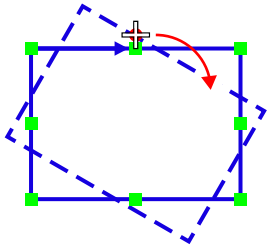
Move

Drag the frame line to move the location of the region without changing the size.



Adjust angle

Drag the red handle to change the angle.



Drawing a circle

When you select [Circle] for [Shape], follow the instruction of the [Circle Drawing] dialog to click three points in the [Image Viewer] to draw a circle which passes through the three points.

1 In the [Image Viewer], specify the first point of the circle.

2 Specify the second and third points in the same way.
A circle which passes through the three points will be drawn.

Editing a circle

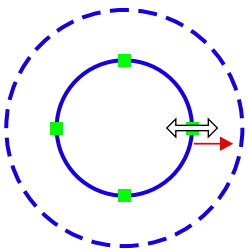
Reference If you want to configure a region accurately, enter numbers in the [Properties] view.
→ Circle

1 Click the frame line of the circle to select it.
Handles appear at the top, bottom, left, and right edges of the circle.

2 Correct the circle.

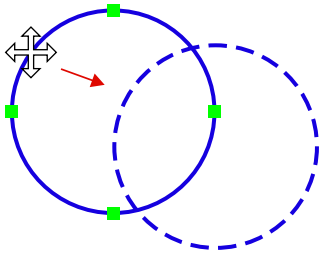
Resize

Drag a green handle on the frame line to change the size.



Move

Drag the frame line to move the location of the region without changing the size.



Drawing an oval

When you select [Oval] for [Region Settings] - [Shape], an oval is displayed in the center of the [Image Viewer].

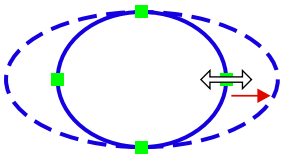
Editing an oval

Reference If you want to configure a region accurately, enter numbers in the [Properties] view.
→ Oval

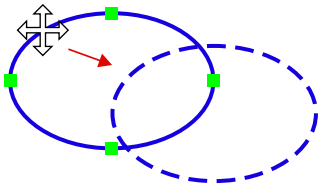
1 Click the frame line of the oval to select it.
Handles appear at the top, bottom, left, and right edges of the oval.

2 Correct the oval.

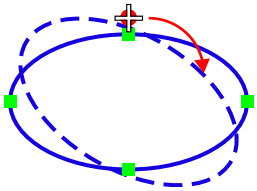
Resize
Drag a green handle on the frame line to change the size.



Move
Drag the frame line to move the location of the region without changing the size.



Adjust angle
Drag the red handle to change the angle.



Drawing a ring

When you select [Ring] for [Shape], follow the instruction of the [Ring Drawing] dialog to specify an inner circle and an outer circle in the [Image Viewer] to draw a ring.

1 In the [Image Viewer], specify the first point of the ring.

2 Specify the second and third points in the same way.
A circle which passes through the three points will be drawn.

3 Specify the position of the inner circle.

Point You can swap the outer circle and the inner circle by clicking outside the outer circle.

An inner circle is drawn whose center is the same as the outer circle.

Editing a ring

Reference If you want to configure a region accurately, enter numbers in the [Properties] view.
→ Ring

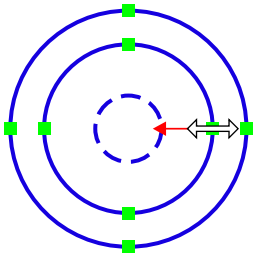
1 Click the frame line of the ring to select it.
Handles appear at the top, bottom, left, and right edges of the ring.

2 Correct the ring.

Resize

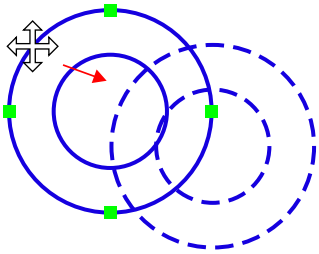
Drag a green handle on the frame line of the outer circle or inner circle to change the size.

Point You can swap the inner circle and the outer circle.



Move

Drag the frame line to move the location of the region without changing the size.



Drawing an arc

When you select [Arc] as [Shape], follow the instruction of the [Arc Drawing] dialog to specify the starting, midpoint, and ending points of the outer circle and the inner circle on the [Image Viewer] to draw an arc.

1 In the [Image Viewer], specify the starting point of the arc.

2 In the same way, specify the midpoint and the ending point of the arc.
An outer arc is drawn through these points.

3 Click one point that the inner circle runs through.

Point You can swap the outer circle and the inner circle by clicking outside the outer circle.

An inner arc is drawn whose center is the same as the outer circle.

Editing an arc

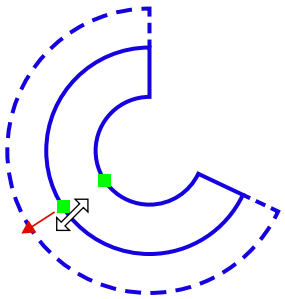
Reference If you want to configure a region accurately, enter numbers in the [Properties] view.
→ Arc

1 Click the frame line of the arc to select it.
Handles appear at four points of the arc.

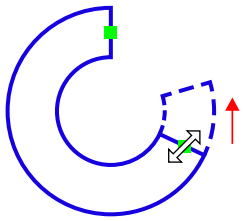
2 Correct the arc.

Resize
Drag the green handle on the frame line of the outer circle or inner circle to change the size.

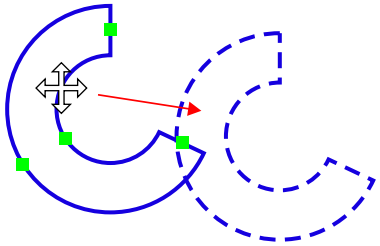
Point You can swap the inner circle and the outer circle.



Changing the starting or ending angle of the arc
Change the angle by dragging the green handle on the frame line at the starting or ending edge of the arc.



Move
Drag the frame line to move the location of the region without changing the size.



Drawing a polygon

When you select [Polygon] for [Shape], follow the instruction of the [Polygon Drawing] dialog to specify the vertexes in the [Image Viewer] to draw a polygon.

Point If the X/Y coordinate of a vertex is specified outside the range of -16383 to 16383, the vertex is forcibly moved to the inside of the range when the polygon setting is confirmed.

1 In the [Image Viewer], click the positions of the vertexes (maximum of 100).
A frame line is drawn between neighboring vertexes.

2 Click again the vertex that you clicked first.
The polygon is drawn.

Point The polygon is also set when the number of specified vertexes reaches the maximum.

Editing a polygon

Reference If you want to configure a region accurately, enter numbers in the [Properties] view.
→ Polygon

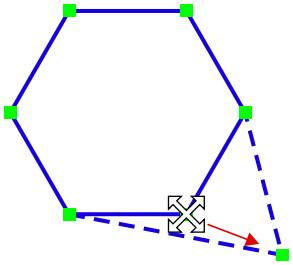
1 Click the frame line of the polygon to select it.
Handles appear at the vertexes.

2 Correct the polygon.

Point In the [Image Viewer], you cannot add or delete a vertex and cannot swap the order of vertexes. Use the [Properties] view.
→ Polygon

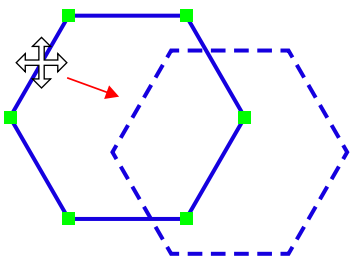
Changing the position of a vertex

Drag the green handle on the vertex to change the vertex position.



Move

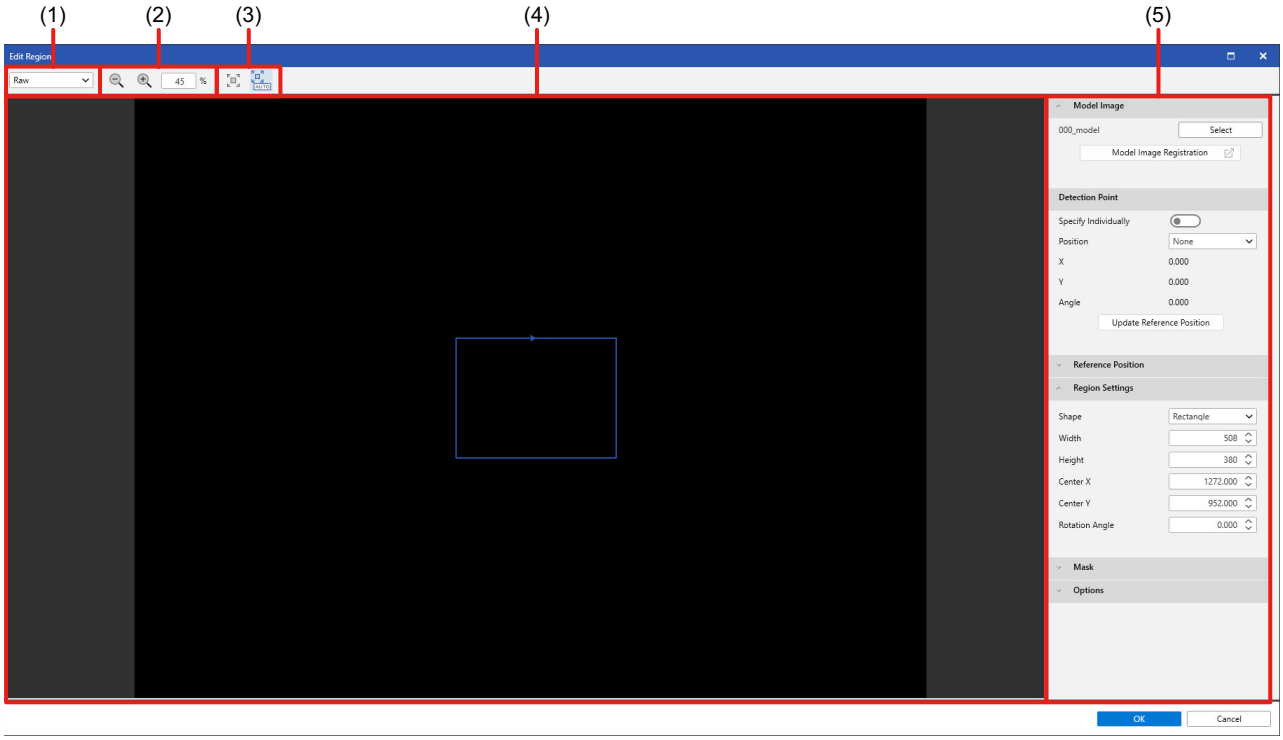
Drag the frame line to move the location of the region without changing the size.



Editing the Inspection Region of the [Subtraction Filter] Tool

In the [Edit Region] dialog of the [Subtraction Filter] tool, set position adjustment for the inspection region, select or register a model image for extracting difference, edit the inspection region, and add mask regions.

Dialog details



(1) Image Type

Specify the type of image to be displayed in the preview area.

(2) Zoom Settings

Zooms in/out the displayed image.

- : Zooms out the displayed image.
- : Zooms in the displayed image.
- Zoom Rate: Displays the current zoom rate. Enter a zoom rate (1 to 2500 (%)) to zoom in/out the image at the specified rate.

(3) Fit/Auto Fit

- : Clicking this button automatically adjusts the zoom rate so that the displayed image fits in the preview area.
- : When enabled, the zoom rate of the displayed image automatically changes in accordance with the size of the preview area.

Reference Auto Fit is canceled when you zoom in/out the displayed image by zoom setting.

(4) Preview area

The selected model image is displayed.

(5) Setting items

Configure the position adjustment, model registration, inspection region, mask regions, and options while checking the image in the preview area.
→ "Properties of [Edit Region] Dialog"

Properties of [Edit Region] Dialog

Model Image

The name of the selected model image is displayed.

Select

Clicking this button opens the [Select Model Image] dialog. Select an image from [Model Image List], and click [OK].

Reference
- You can change the size of the displayed thumbnail image in [Display Size].
- To delete a model image, click [Delete].
  → See "File" - "Manage Model Images".

Model Image Registration

Clicking this button opens the [Model Image Registration] dialog. Enter the name for the model image in [Registered Name], and then click [Register]. The registered model image is displayed in the preview area.

Detection Point

Set a reference detection point for correcting the position of the inspection region.

Specify Individually

Configure whether to make individual specification of the [Detection Point] (default: OFF). When it is set to ON, you can configure the X coordinate, Y coordinate, and the angle arbitrarily. When it is set to OFF, the detected position (X coordinate, Y coordinate, and angle) of a specific tool can be referenced.

Position

When [Specify Individually] is set to OFF, select [None] or a [Tool] from the drop-down list. When you select [None], then [X], [Y], and [Angle] below are all set to 0.000. For [Tool], the tools in the [Task] view that can be referenced are displayed. When you select a tool, its detected position is displayed in [X], [Y], and [Angle] below.

X/Y

Set the X and Y coordinates (-16383.000 to 16383.000) when [Specify Individually] is ON (default: 0.000). When [Specify Individually] is OFF, the detected position of the tool selected in [Position] is displayed.

Angle

Set the tilt (0.000 to 359.999, unit: °) when [Specify Individually] is ON (default: 0.000). When [Specify Individually] is OFF, the detected position of the tool selected in [Position] is displayed.

Update Reference Position

Clicking this button applies [X], [Y], and [Angle] above to [Reference Position].

If [Reference Position] refers to the result data of another tool or a cell of the Vision Dashboard, it is used as the reference position. Therefore, in this case, the reference position is not updated when you click this button.

Reference Position

Configure the reference position.

- **X**: Configure the X coordinate (-16383.000 to 16383.000, default: 0.000).
- **Y**: Configure the Y coordinate (-16383.000 to 16383.000, default: 0.000).
- **Angle**: Configure the tilt (0.000 to 359.999, unit: °, default: 0.000).

Region Settings

Configure the shape and area of the inspection region. Setting items vary according to the specified [Shape].
→ [Region Settings]

Reference You can directly edit the region by manipulating the graphic of the inspection region displayed in the preview area.
→ "Drawing a Region"

Mask

Configure the shape and area of the mask region.
→ [Mask]

Options

Configure optional functions of region setting.
→ [Options]

Editing the Inspection Region of the AI Inspection Tool

In the [Edit Region] dialog of the AI Inspection tool ([AI Classification] tool, [AI Detection] tool, [AI Segmentation] tool), configure a detection point and reference position for correcting the position of the inspection region, edit the inspection region and add mask regions.

Point The AI Inspection tool trains on, classifies, and distinguishes features within the set inspection region, so if you edit the inspection region, you will need to perform training once again.

Dialog details

(1) Image Type

Specify the type of image to be displayed in the preview area.

(2) Trigger/Continuous Trigger

Click to input a trigger.

(3) Previous Image/Next Image/1 Round

Click to replay the Archived Images/Simulation Images.

(4) Zoom Settings

Zooms in/out the displayed image.

- : Zooms out the displayed image.
- : Zooms in the displayed image.
- Zoom Rate: Displays the current zoom rate. Enter a zoom rate (1 to 2500 (%)) to zoom in/out the image at the specified rate.

(5) Fit/Auto Fit

- : Clicking this button automatically adjusts the zoom rate so that the displayed image fits in the preview area.
- : When enabled, the zoom rate of the displayed image automatically changes in accordance with the size of the preview area.

Reference Auto Fit is canceled when you zoom in/out the displayed image by zoom setting.

(6) Switch Screen

Toggle the number of images displayed on the camera screen (1-screen/2-screen).

(7) Preview area

The captured camera image is displayed with the input of a trigger.

(8) Setting items

Configure the detection point, reference position, region settings, mask regions, and options while checking the image in the preview area.
→ "Properties of [Edit Region] Dialog"

Properties of [Edit Region] Dialog

Detection Point

Set a reference detection point for correcting the position of the inspection region.

Specify Individually

Configure whether to make individual specification of the [Detection Point] (default: OFF). When it is set to ON, you can configure the X coordinate, Y coordinate, and the angle arbitrarily. When it is set to OFF, the detected position (X coordinate, Y coordinate, and angle) of a specific tool can be referenced.

Position

When [Specify Individually] is set to OFF, select [None] or a [Tool] from the drop-down list. When you select [None], then [X], [Y], and [Angle] below are all set to 0.000. For [Tool], the tools in the [Task] view that can be referenced are displayed. When you select a tool, its detected position is displayed in [X], [Y], and [Angle] below.

X/Y

Set the X and Y coordinates (-16383.000 to 16383.000) when [Specify Individually] is ON (default: 0.000). When [Specify Individually] is OFF, the detected position of the tool selected in [Position] is displayed.

Angle

Set the tilt (0.000 to 359.999, unit: °) when [Specify Individually] is ON (default: 0.000). When [Specify Individually] is OFF, the detected position of the tool selected in [Position] is displayed.

Update Reference Position

Clicking this button applies [X], [Y], and [Angle] above to [Reference Position].
If [Reference Position] refers to the result data of another tool or a cell of the Vision Dashboard, it is used as the reference position. Therefore, in this case, the reference position is not updated when you click this button.

Reference Position

Configure the reference position.

- **X**: Configure the X coordinate (-16383.000 to 16383.000, default: 0.000).
- **Y**: Configure the Y coordinate (-16383.000 to 16383.000, default: 0.000).
- **Angle**: Configure the tilt (0.000 to 359.999, unit: °, default: 0.000).

Region Settings

Configure the shape and area of the inspection region. Setting items vary according to the specified [Shape].
→ [Region Settings]

Reference You can directly edit the inspection region by manipulating the graphic of the region displayed in the preview area.
→ "Drawing a Region"

Mask

Configure the shape and area of the mask region.
→ "Mask"

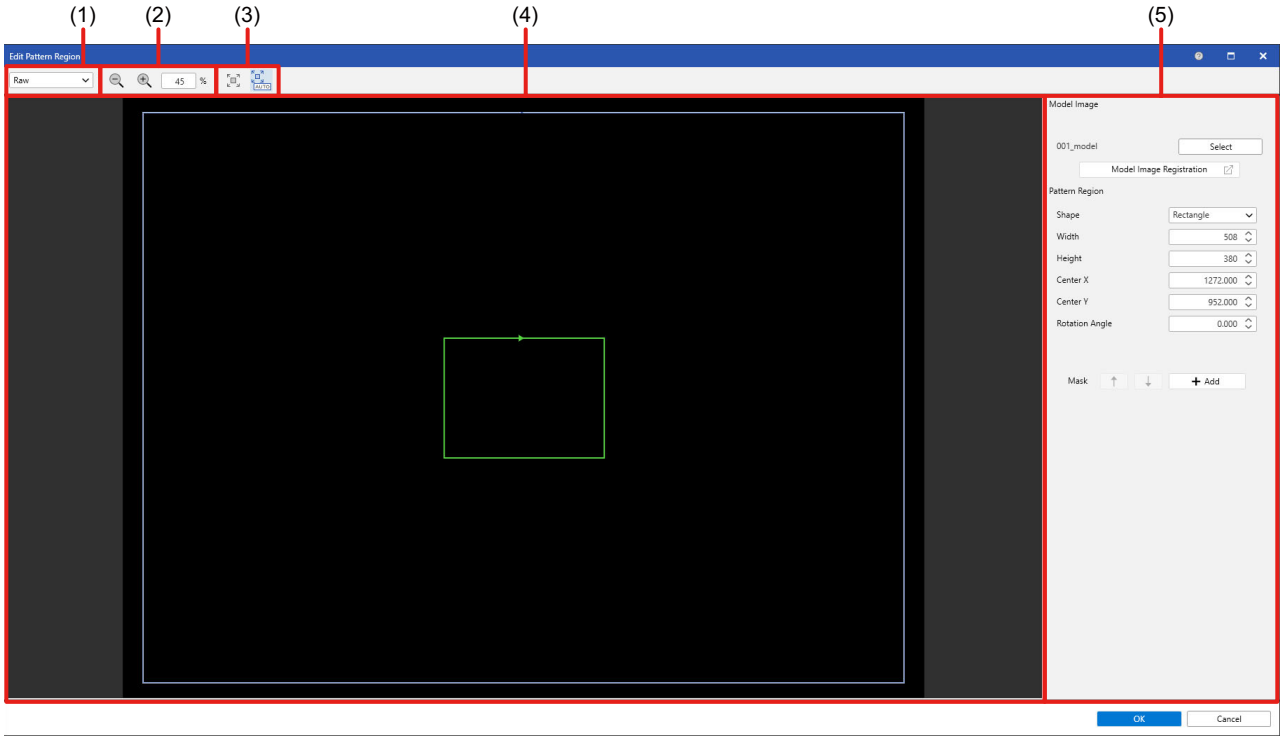
Options

Configure optional functions of region setting.
→ "Options"

Editing a Pattern Region

In the [Edit Pattern Region] dialog, you select or register a model image for registering the pattern to detect, edit the pattern region, and add mask regions.

Dialog details



(1) Image Type

Specify the type of image to be displayed in the preview area.

(2) Zoom Settings

Zooms in/out the displayed image.

- : Zooms out the displayed image.
- : Zooms in the displayed image.
- Zoom Rate: Displays the current zoom rate. Enter a zoom rate (1 to 2500 (%)) to zoom in/out the image at the specified rate.

(3) Fit/Auto Fit

- : Clicking this button automatically adjusts the zoom rate so that the displayed image fits in the preview area.
- : When enabled, the zoom rate of the displayed image automatically changes in accordance with the size of the preview area.

Reference Auto Fit is canceled when you zoom in/out the displayed image by zoom setting.

(4) Preview area

The selected model image is displayed. When you register a model image, the preview area is updated by the registered model image.

(5) Setting items

Configure the model registration, the pattern region, and mask regions while checking the image in the preview area.
→ "Properties of [Edit Pattern Region] Dialog"

Properties of [Edit Pattern Region] Dialog

Model Image

The name of the selected model image is displayed.

Select

Clicking this button opens the [Select Model Image] dialog. Select an image from [Model Image List], and click [OK].

Reference
- You can change the size of the displayed thumbnail image in [Display Size].
- To delete a model image, click [Delete].
  → See "File" - "Manage Model Images".

Model Image Registration

Clicking this button opens the [Model Image Registration] dialog. Enter the name for the model image in [Registered Name], and then click [Register]. The registered model image is displayed in the preview area.

Pattern Region

Configure the shape and area of the pattern region. Setting items vary according to the specified [Shape].
→ "Region Settings"

Reference You can directly edit the pattern region by manipulating the graphic of the pattern region displayed in the preview area.
→ Drawing a Region

Mask

Configure the shape and area of the mask region.
→ "Mask"

Image Enhance

#E093

The [Image Enhance] tab has two setting items: [Color Extraction] for converting the current image to an image suitable for the measurement by the tool based on the color information of the current image and [Image Enhance] for setting the filter processing to apply to the image.

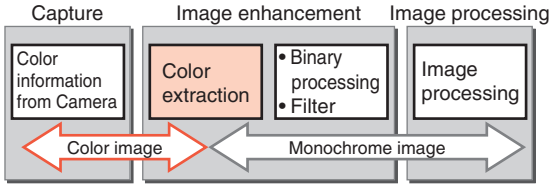
Processing Overview

Color Extraction

There are two methods for Color Extraction, depending on the input image.

(1) Color Extraction

This is the color extraction process when the image captured by the color camera is the Current Image.
The color extraction is a preprocessing which converts the captured raw color image to a monochrome (grayscale or binary) image that is suitable for image processing. All the image processing operations (excluding those in a Color Detection tool and a Defect tool which uses Fine Color) are performed on the monochrome image converted from the color image based on the color extraction settings.



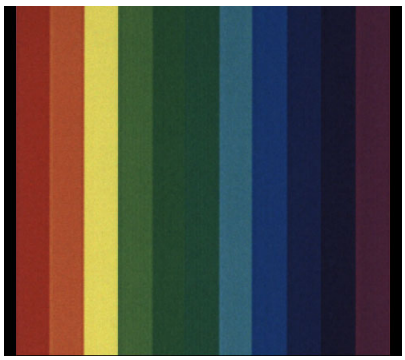
Color extraction setting is to be performed in each measurement tool.
→ Color Extraction

Point Color extraction cannot be set when a monochrome camera is used.

Available Color Extraction Functions

The VS Creator provides the following processing methods for extraction and conversion of color information.

Example of an image before color extraction

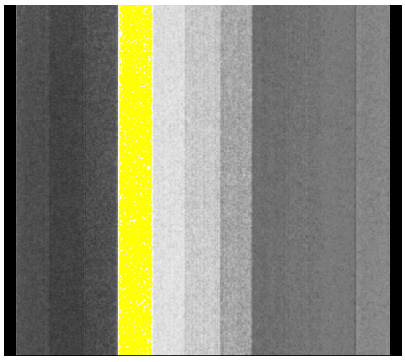


Color to Binary

This process creates a binary image by setting the pixels that fall within the specified color range to "white" (grayscale value 255). All pixels that fall out of the specified color range will be set to "black" (grayscale value 0). Since it is possible to extract only the color to detect, this can be used for operations such as comparison of areas and measurement of the center of gravity.

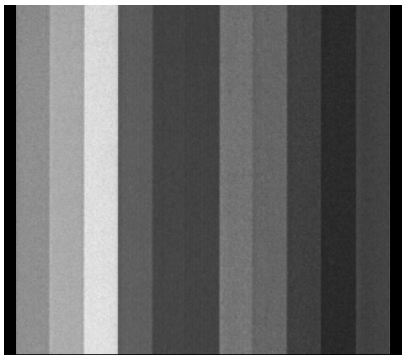
Color to Grayscale

This process converts the color image to a grayscale image where the pixels that fall within the specified color range become the maximum contrast level of 255 (white). Since it is possible to convert to a grayscale image that focuses on a specific color while maintaining the tone information, this can be used for performing high-accuracy image processing such as position measurement at sub-pixel level.



Grayscale, RGB Grayscale, R Grayscale, G Grayscale, B Grayscale

The color information is converted to RGB and the average is used to convert the color image to a 256-tone grayscale image. These options can be used to treat a color image as a monochrome image.



Fine Color

Intensity comparison is performed using each of the H (hue), S (saturation), and B (brightness) information as is without converting to a grayscale image. This can be used for detecting color change as a defect without specifying the color of the defect.

Reference For details about the color information parameters of the HSB format, see "What is the HSB color system?".

(2) MultiSpectrum Color Extraction

This is the color extraction process when the image captured in MultiSpectrum Mode is the Current Image.
The MultiSpectrum Color Extraction is a process which converts the image to a monochrome (grayscale or binary) image suitable for image processing based on each lighting color image captured in MultiSpectrum Mode.
→ MultiSpectrum Color Extraction

Available Color Extraction Functions

The VS Creator provides the [Color to Binary], [Color to Grayscale], [Average Grayscale], and [Fine Color] for extraction and conversion of color information.

Point
- [Color to Binary], [Color to Grayscale], and [Fine Color] are the same process as when using a color camera.
- [Average Grayscale] converts to a grayscale image by taking the average of the eight colors for each pixel.

Image Enhance

Configure the filter processing to apply to the image. When a color camera is used, the image enhancement is applied to the image converted by color extraction.

Point When [Fine Color] is selected in [Color Extraction], the configuration of [Image Enhance] is not possible.

Image enhancement functions and tools supporting them

The table below shows the available image enhancement functions and the tools that support them.

	Area	Intensity	Color Detection	Pattern Search	ShapeTrax3A	Edge Position	Edge Width	Edge Pitch	Edge Pairs	Profile Position	Profile Width	Profile Defect	Defect	Blob	Grayscale Blob	OCR2	2D/1D Code Reader	Shared Image Enhance	Shared Region	Image Region
Binary	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Blob Filter	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Convex Hull	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Expand	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Shrink	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Noise Isolation	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Average	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Median	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Blur	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓

	Area	Intensity	Color Detection	Pattern Search	ShapeTrax3A	Edge Position	Edge Width	Edge Pitch	Edge Pairs	Profile Position	Profile Width	Profile Defect	Defect	Blob	Grayscale Blob	OCR2	2D/1D Code Reader	Shared Image Enhance	Shared Region	Image Region
Shading Correction	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Image Extraction	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Scratch Defect Extraction	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Contrast Conversion	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Contrast Expansion	✓	✓	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Sharpen	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Sobel X	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Sobel Y	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Sobel	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Prewitt	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Roberts	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Laplacian	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
Custom	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓

Color Extraction

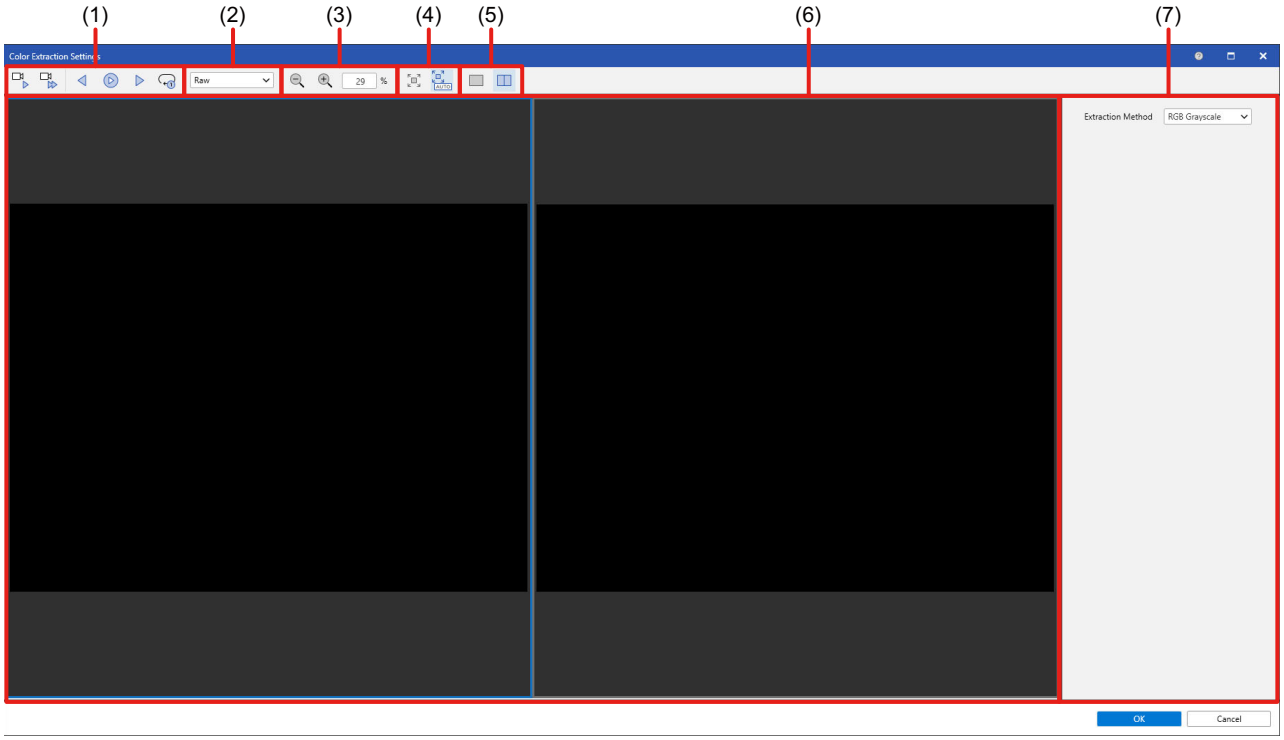
If a color image is used for the current image, the captured color image is converted to a monochrome image using any specified extraction method.

Point The displayed and configurable items vary by tool.

Settings

Click this button to open the [Color Extraction Settings] dialog. Make settings as necessary while comparing the images before and after color extraction.

Dialog details



(1) Trigger / Replay

- **(Trigger/Continuous Trigger)**: Click to input a trigger.
- **(Previous Image/Repeat Image/Next Image/1 Round)**: Click to replay the Archived Images/Simulation Images.

(2) Image Type

As types of the image displayed in the preview area, there are [Raw], [Extract Image 1], and [Extract Image 2].

- **Raw**: The current image before color extraction is displayed.
- **Extract Image 1** / **Extract Image 2**: The image is displayed in accordance with your selection for [Extraction Method].

Extraction Method	Extract Image 1	Extract Image 2
Color to Binary, Color to Grayscale	• Portions converted to white is displayed in yellow. • Other portions are displayed in the actual result of color extraction. • If color extraction was not made, the display will be the same as with "Raw"..	• Image of the actual result of color extraction • If color extraction was not made, the entire display area becomes black.
Grayscale, RGB Grayscale, R Grayscale, G Grayscale, B Grayscale, and Fine Color	Image of the actual result of color extraction	

(3) Zoom Settings

Zooms in/out the displayed image.

- : Zooms out the displayed image.
- : Zooms in the displayed image.

- Zoom Rate: Displays the current zoom rate. Enter a zoom rate (1 to 2500 (%)) to zoom in/out the image at the specified rate.

(4) Fit/Auto Fit

- : Clicking this button automatically adjusts the zoom rate so that the displayed image fits in the preview area.
- : When enabled, the zoom rate of the displayed image automatically changes in accordance with the size of the preview area.

Reference Auto Fit is canceled when you zoom in/out the displayed image by zoom setting.

(5) Selecting an image layout

Select a layout for the image to be displayed in the preview area.

- : Only the current image is displayed in the entire preview area.
- : The current image and the image after color extraction are displayed side by side in the preview area.

(6) Preview area

The image is displayed in accordance with the selection of an image layout.

(7) Setting items

Configure the color to be extracted/excluded.

Properties of [Color Extraction Settings] Dialog

Extraction Method

Select a color extraction method from [Color to Binary], [Color to Grayscale], [Grayscale], [RGB Grayscale], [R Grayscale], [G Grayscale], [B Grayscale], and [Fine Color].

Point
- [Fine Color] can only be selected in Defect tools.
- The setting items explained below can only be used when you select [Color to Binary] or [Color to Grayscale]. They are not displayed when you select [Grayscale], [RGB Grayscale], [R Grayscale], [G Grayscale], [B Grayscale], or [Fine Color].

HSB Display

The values of H (Hue), S (Saturation), and B (Brightness) at the point of the mouse cursor are displayed in the setting items (properties).

Pick

Clicking this item changes the shape of the mouse cursor in the preview area to a dropper shape, and you can select a target area of color extraction from the image. Clicking the target extraction area displays the region as a green square. Clicking it again extracts the next color of the one that you selected first, and color selection proceeds in turn as you click the extraction target area. To cancel the selection of [Pick], click [Pick] again or click [Omit], [Undo], or [Auto-Expand].

Omit

Clicking this item changes the shape of the mouse cursor in the preview area to a dropper shape, and you can select an omission target area from the image. Clicking the omission target area displays the region as a green square.
To cancel the selection of [Omit], click [Omit] again or click [Pick], [Undo], or [Auto-Expand].

Point If you use [Omit] many times when [Extraction Method] is [Color to Grayscale], the gradation information of the image is lost and the image becomes more like a binary image. This may degrade the accuracy of a measuring process (edge/pattern search, etc.) that references the gradation information.

Undo

Clicking this button cancels (undoes) a maximum of 10 operations (extraction, omission, auto-expansion, or clearing) made just before.

Extraction Sensitivity

You can adjust the selected range at each selection of extracted color.

Extraction Area

You can adjust the size of the reference region (green square at the tip of the dropper) for color extraction. If you set a large value, all colors in the reference region are extracted instead of just the color at the clicked cursor position.

Auto-Expand

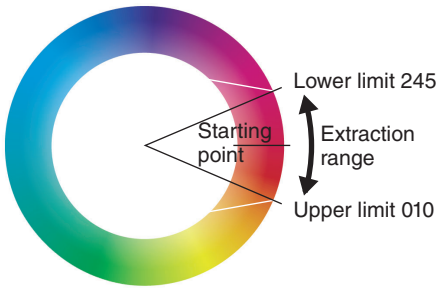
After entering the upper and lower limits of [Hue], [Saturation], and [Brightness], click this button to expand the extraction range for these parameters. For [Saturation] and [Brightness], [Lower Limit] is lowered down to 0 and [Upper Limit] is raised up to 255. For [Hue], [Lower Limit] jumps from 0 to 255, and [Upper Limit] jumps from 255 to 0. The range expands until the point where the difference between the values becomes 1.

Hue

A color bar that represents the extracted color range is displayed. If you enter values in [Upper Limit] and [Lower Limit], the values are marked at the corresponding positions on the color bar. For [Hue], you can enter a value outside the extraction range, or enter upper and lower limit values upside down.
When [Extraction Method] is [Color to Grayscale], you can also set an upper limit value and a lower limit value for [Slope]. The configured slope is indicated by a white straight line on the color bar.

Point

- Hues are clockwise circular values starting from red, so the lower limit value may be larger than the upper limit value.



- A slope indicates the gradation of the grayscale image converted from the original image.
- If you set a larger value for slope, intensities outside the selected range are converted in a lower gradation, making the gradation difference larger between the inside and outside of the selected range. An excessively large value may affect the accuracy of the measuring process that references the gradation information.
- If you set a smaller slope, intensities in the neighborhood of the selected range are converted in a relatively high gradation, so that the impact of external variation on the gradation variation is mitigated.
- H (Hue) is the most important parameter that determines the colors to be extracted. S and B are applied to the range specified by H, so configure it accurately.

Reference You can get an idea of how HSB values should be set if you measure the HSB values of the extraction target using the Color Detection tool.

Saturation

A color bar that represents the extracted color range is displayed. If you enter values in [Upper Limit] and [Lower Limit], the values are marked at the corresponding positions on the color bar. The explanation of [Slope] for [Hue] also applies here.

Point S (Saturation) is the parameter that determines the tolerance for object color variation and washed-out color due to halation. By excluding areas of lower saturation values from the selection range, you can exclude white areas caused by halation from the extraction range.

Brightness

A color bar that represents the extracted color range is displayed. If you enter values in [Upper Limit] and [Lower Limit], the values are marked at the corresponding positions on the color bar. The explanation of [Slope] for [Hue] also applies here.

Point B (Brightness) is the parameter that determines the tolerance for the overall variation of brightness. If you set a larger selection range, stable extraction is possible even in fluctuated brightness caused by a deteriorated light or other reasons.

Clear

Clears all extracted colors.

MultiSpectrum Color Extraction

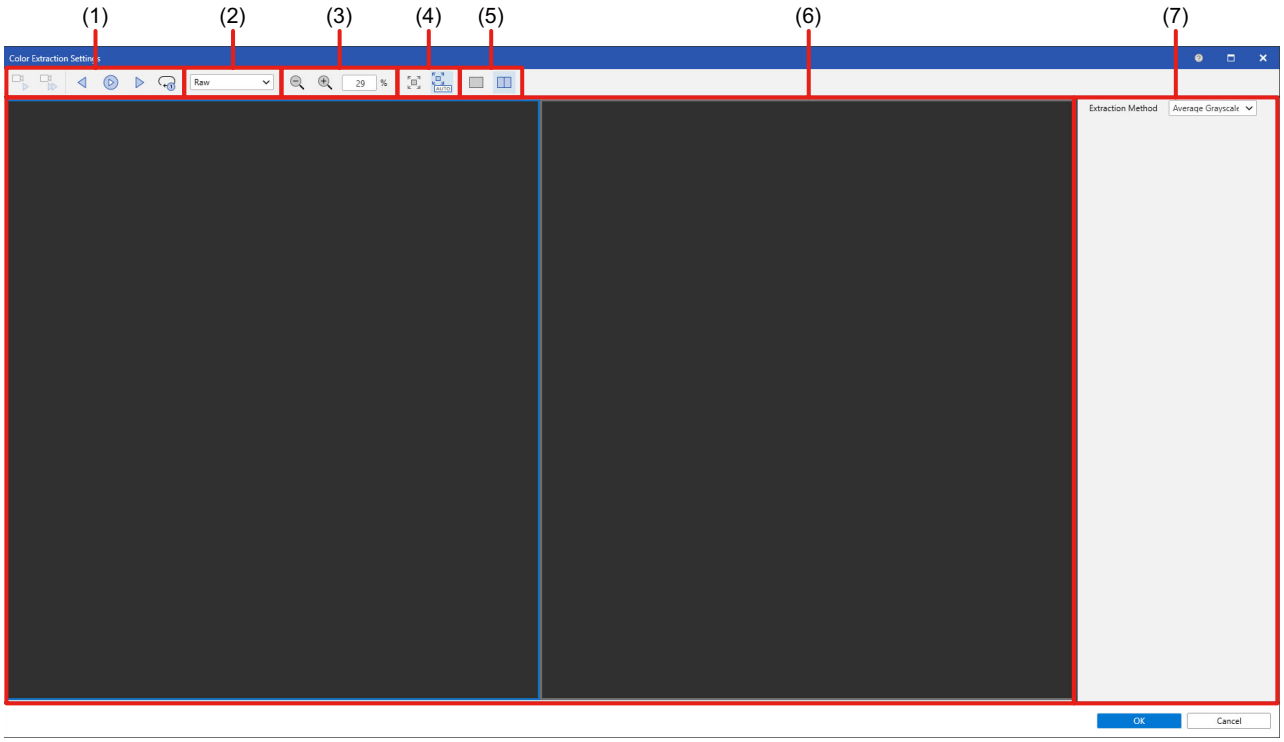
If the each lighting color image captured in MultiSpectrum Mode are used for the current image, the captured image is converted to a monochrome image using any specified extraction method.

Point The displayed and configurable items vary by tool.

Settings

Click this button to open the [Color Extraction Settings] dialog. Make settings as necessary while comparing the images before and after color extraction.

Dialog details



(1) Trigger / Replay

- **(Trigger/Continuous Trigger)**: Click to input a trigger.
- **(Previous Image/Repeat Image/Next Image/1 Round)**: Click to replay the Archived Images/Simulation Images.

(2) Image Type

As types of the image displayed in the preview area, there are [Raw], [Extract Image 1], [Extract Image 2], [Average Grayscale], and [Overexposure].

- **Raw**: The MultiSpectrum Color Image before color extraction is displayed.
- **Extract Image 1** / **Extract Image 2**: The image is displayed in accordance with your selection for [Extraction Method].

Extraction Method	Extract Image 1	Extract Image 2
Color to Binary*1	Displays a binary image in which the extracted portions are white and the rest are black.	Displays a binary image in which the extracted color portion is filled by yellow.

Extraction Method	Extract Image 1	Extract Image 2
Color to Grayscale*1	Displays the image of the actual result of color extraction.	Displays a grayscale image in which the extracted color portion is filled by yellow.
Average Grayscale, Fine Color	Displays the image of the actual result of color extraction.	

*1:If color extraction was not made, the entire display area becomes black.

- **Average Grayscale**: Displays the average grayscale image.
- **Overexposure**: Displays a MultiSpectrum Color Image in which the area of overexposure is filled in red.

(3) Zoom Settings

Zooms in/out the displayed image.

- : Zooms out the displayed image.
- : Zooms in the displayed image.
- Zoom Rate: Displays the current zoom rate. Enter a zoom rate (1 to 2500 (%)) to zoom in/out the image at the specified rate.

(4) Fit/Auto Fit

- : Clicking this button automatically adjusts the zoom rate so that the displayed image fits in the preview area.
- : When enabled, the zoom rate of the displayed image automatically changes in accordance with the size of the preview area.

Reference Auto Fit is canceled when you zoom in/out the displayed image by zoom setting.

(5) Selecting an image layout

Select a layout for the image to be displayed in the preview area.

- : Only the current image is displayed in the entire preview area.
- : The current image and the image after color extraction are displayed side by side in the preview area.

(6) Preview area

The image is displayed in accordance with the selection of an image layout.

(7) Setting items

Configure the conversion processing method used for color extraction in accordance with the [Extraction Method] setting.

Properties of [Color Extraction Settings] Dialog

Extraction Method

Select a color extraction method from [Color to Binary], [Color to Grayscale], [Average Grayscale], and [Fine Color].

Point
- [Fine Color] can only be selected in Defect tools.
- The setting items explained below can only be used when you select [Color to Binary] or [Color to Grayscale]. They are not displayed when you select [Average Grayscale] or [Fine Color].

Average

If this setting is enabled, the noise in each lighting color's image is eliminated by applying to the center pixel the average value of the surrounding pixels.

Size (pixel)

Set the size for performing Average processing (3 to 63).

Count

Set the number of times to perform Average processing (1 to 9).

Extracted Color Specification / Excluded Color Specification

Clicking [Add] displays the [Add Color] Dialog. After you specify extracted/excluded colors in the [Add Color] dialog, the specified extracted/excluded colors are displayed in a list.
A listed extracted/excluded color can be excluded from extracted/excluded colors by turning its toggle switch off.

Common Settings

Configure the [Color Range] and [Brightness Range (+/- %)] for all extracted/excluded colors.

Color Range

Configure the color range (0.001 to 999.999) subject to extraction/exclusion.

Brightness Range (+/- %)

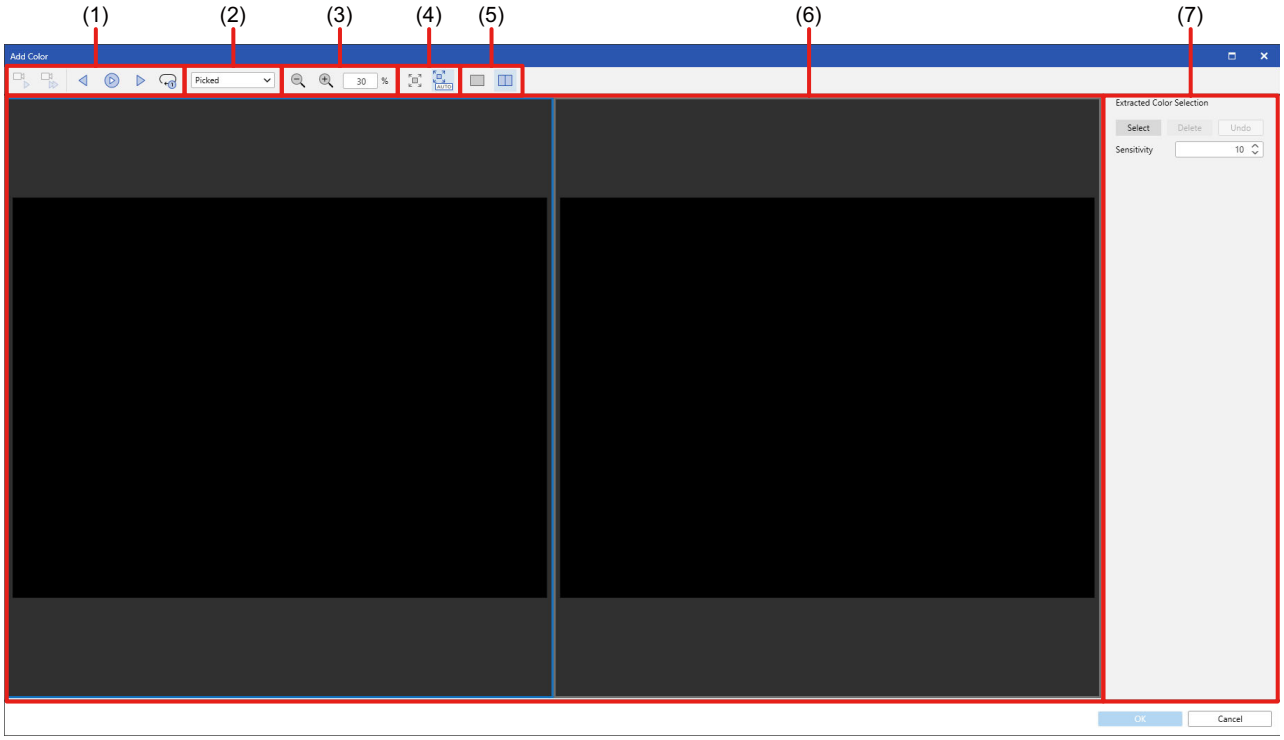
Configure the brightness range (0.0 to 50.0) subject to extraction/exclusion.

Measurement Color

You can check the lighting color images currently used for MultiSpectrum Color Extraction. The lighting color images turned on by their toggle switches are measurement colors currently used for multi-spectrum color extraction.

[Add Color] Dialog

This is a dialog for specifying the extracted colors/excluded colors in MultiSpectrum Color Extraction.



(1) Trigger / Replay

- **(Trigger/Continuous Trigger)**: Click to input a trigger.
- **(Previous Image/Repeat Image/Next Image/1 Round)**: Click to replay the Archived Images/Simulation Images.

(2) Image Type

As types of the image displayed in the preview area, there are [Raw], [Extract Image], [Picked], [Average Grayscale], and [Overexposure].

- **Raw**: The MultiSpectrum Color Image is displayed.
- **Extract Image**: The image is displayed in accordance with the selection for [Extraction Method] in the [Color Extraction Settings] dialog.

Extraction Method	Extract Image
Color to Binary*1	Displays a binary image in which the extracted color portion is filled by yellow.
Color to Grayscale*1	Displays a grayscale image in which the extracted color portion is filled by yellow.

*1:If color addition has not been made, the entire display area becomes black.

- **Picked**: Displays a MultiSpectrum Color Image in which the colors selected by [Extracted Color Selection] / [Excluded Color Selection] are replaced by yellow.
- **Average Grayscale**: Displays the average grayscale image.
- **Overexposure**: Displays a MultiSpectrum Color Image in which the area of overexposure is filled in red.

(3) Zoom Settings

Zooms in/out the displayed image.

- : Zooms out the displayed image.
- : Zooms in the displayed image.

- Zoom Rate: Displays the current zoom rate. Enter a zoom rate (1 to 2500 (%)) to zoom in/out the image at the specified rate.

(4) Fit/Auto Fit

- : Clicking this button automatically adjusts the zoom rate so that the displayed image fits in the preview area.
- : When enabled, the zoom rate of the displayed image automatically changes in accordance with the size of the preview area.

Reference Auto Fit is canceled when you zoom in/out the displayed image by zoom setting.

(5) Selecting an image layout

Select a layout for the image to be displayed in the preview area.

- : Only the current image is displayed in the entire preview area.
- : The current image and the image after color extraction are displayed side by side in the preview area.

(6) Preview area

The image is displayed in accordance with the selection of an image layout.

(7) Setting items

Configure a color to be extracted/excluded.

Properties of [Add Color] Dialog

In the [Color Extraction Settings] dialog, clicking [Add] of [Extracted Color Specification] adds a color to extract, and clicking [Add] of [Excluded Color Specification] adds a color to exclude.

Select

Clicking this item changes the shape of the mouse cursor in the preview area to a dropper shape, and you can select an extraction/exclusion color from the image. Clicking on the image selects the color that was clicked as an extraction/exclusion color. Clicking it again selects the adjacent color of the one that you selected first, and color selection proceeds in turn as you continue to click. To cancel a color selection, click [Delete] and cancel it or click [Undo].

Delete

Clicking this item changes the shape of the mouse cursor in the preview area to a dropper shape, and you can remove an extraction/exclusion color from the image. Clicking on the image removes the color that was clicked from the list of extraction/exclusion colors. Clicking it again removes the adjacent color of the one that you selected first, and color removal proceeds in turn as you continue to click. To reselect the removed color, click [Select] and select the color or click [Undo].

Undo

Clicking this button cancels (undoes) the operation (selection or removal) made just before.

Sensitivity

Configure the range of color to be extracted at a click upon the image for color selection.

Image Enhance

Specify the image enhancements to be applied to the image. You can apply multiple image enhancements to an image. You will get different results depending on the order of application of image enhancements.

If there are multiple image enhancements, these buttons change the position of the selected image enhancement among them. Image enhancements are applied sequentially from the top one.

Add

Click the button to display the [Add Image Enhance] dialog. When you select an image enhancement and click [OK], it is added at the end of the image enhancement list. You can add a maximum of 16 image enhancements.

Point

- The [Binary] filter is set by default for the [Area] and [Blob] tools.
- In the Defect tool, if [Fine Color] is selected for [Color Extraction] - [Extraction Method], you cannot add an image enhancement.

Reference See "List of Image Enhancements" for details on the effect and setting of each image enhancement filter.

Image Enhancement ON/OFF Toggle Switch

Turning this switch OFF temporarily disables the corresponding image enhancement.

× (Delete)

Clicking it deletes the corresponding image enhancement.

List of Image Enhancements

Point The displayed and configurable items vary by tool.

Binary	Blur	Sobel Y
Blob Filter	Shading Correction	Sobel
Convex Hull	Image Extraction	Prewitt
Expand	Scratch Defect Extraction	Roberts
Shrink	Contrast Conversion	Laplacian
Noise Isolation	Contrast Expansion	Custom
Average	Sharpen	
Median	Sobel X	

Binary

Converts the image to binary.

Point Only one [Binary] filter can be added to a tool.

Upper Limit Value

Configure the upper limit value (0 to 255, default: 255) of binarization. You cannot specify a value smaller than [Lower Limit Value].

Lower Limit Value

Configure the lower limit value (0 to 255, default: 128) of binarization. You cannot specify a value larger than [Upper Limit Value].

Histogram

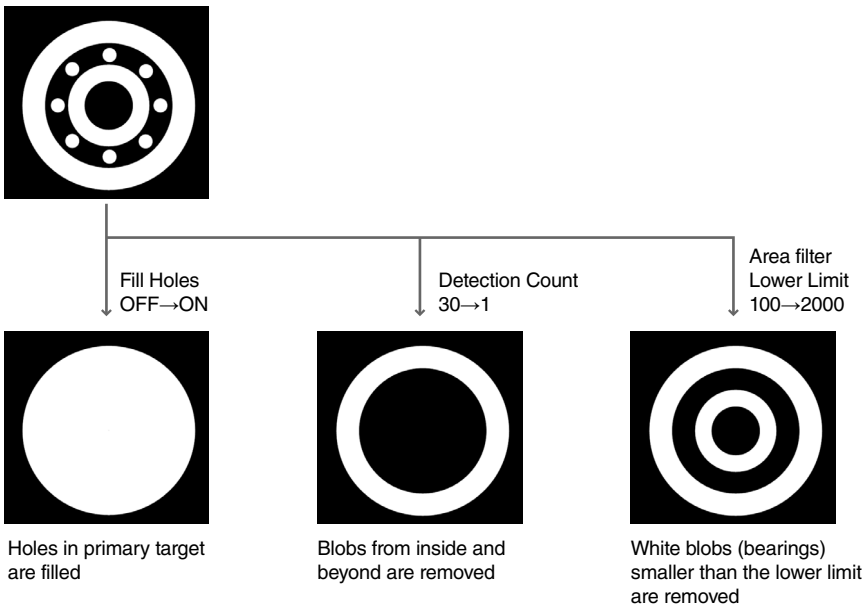
Displays the distribution of pixel values in the image. When you drag to the left or right the [LO] (blue line) bar, which indicates the lower limit value, or the [UP] (green line) bar, which indicates the upper limit value, the value of [Lower Limit Value] or [Upper Limit Value] changes accordingly.

Blob Filter

The Blob Filter enables the extraction of only the desired parts of a binary image based on size, shape and other characteristics, while at the same time filling in holes and allowing for the inclusion / exclusion of blobs on the border. With regard to the detection color and the background color, the pixel values are converted to the specified values.

Point Convert the image to a binary image using the [Binary] filter before setting the Blob Filter. Otherwise, the Blob Filter will not function properly.

Processing image



Detection Color

Specify the color of pixels (black/white) to be detected in the binary (monochrome) image.

- **White** (default): Sets white blobs to be the target of detection.
- **Black**: Sets black blobs to be the target of detection.

Detection Count

Specify the maximum number of blobs to be detected from 1 to 30000. For example, when [3] is set, up to 3 blobs are detected (default: 30).

Fill Holes

Specify whether to fill the inside of blobs with the color specified in [Detection Color]. If the inside of a blob has an area different in color to the [Detection Color] color, the area, center of gravity, or roundness value referenced by the blob filter may be affected. In order to prevent this, the inside of blobs can be filled using the [Detection Color] color as follows.

Fill Holes: OFF Fill Holes: ON

- **OFF**: Does not fill the inside of blobs with the detection color.
- **ON** (default): Fills the inside of blobs with the detection color.

Active Border

Specify whether to detect blobs located on the border of the inspection region.

- **OFF** (default): Blobs existing on top of the frame lines of the inspection region are also included as detected targets.
- **ON**: Excludes blobs located on the frame lines of the inspection region from detection.

Point The Active Border ON/OFF setting can only be specified if the inspection region is a rectangle and no mask or image regions have been set. If any other inspection region is selected, the Active Border will be processed as if set to OFF.

Label Specification

Label Specification Type

This specifies the blob(s) to be converted.

– **All** (default): The blobs measured from all labels of the specified detection count are subject to conversion processing.
– **Specified**: Only the specified blob is converted.

Label Number

If [Label Specification Type] is [Specified], specify the number (0 to 29999, default: 0) of the blob to set as the conversion target.

Detection Order

Select from the following methods the way to sort and number the blobs.

– **Y>X: Ascending**: Sorts blobs in ascending Y order. Those whose Y values are close in range are sorted in ascending X order.
– **X>Y: Ascending**: Sorts blobs in ascending X order. Those whose X values are close in range are sorted in ascending Y order.
– **X: Ascending**: Sorts blobs from lowest X coordinate value to highest.
– **X: Descending**: Sorts blobs from highest X coordinate value to lowest.
– **Y: Ascending**: Sorts blobs from lowest Y coordinate value to highest.
– **Y: Descending**: Sorts blobs from highest Y coordinate value to lowest.
– **Area: Ascending**: Sorts blobs from smallest area to largest.
– **Area: Descending** (default): Sorts blobs from largest area to smallest.
– **Roundness: Ascending**: Sorts blobs from lowest roundness value to highest.
– **Roundness: Descending**: Sorts blobs from highest roundness value to lowest.
– **Clockwise**: Sorts blobs clockwise beginning from the angle specified in [Starting Angle].
– **Counterclockwise**: Sorts blobs counter-clockwise beginning from the angle specified in [Starting Angle].

Starting Angle

Specify the angle from where to begin assigning numbers to blobs when [Detection Order] is set to [Clockwise] or [Counterclockwise].

Point

- [Starting Angle] is ignored when [Detection Order] is not [Clockwise] or [Counterclockwise].
- The label cannot be specified if [Label Specification Type] is set to [All].

Pixel Value After Conversion

Detection Color

Specify the pixel value to assign to the conversion processing target pixels after conversion (0 to 255 levels, default: 255).

Background Color

Specify the pixel value to assign after conversion to the pixels (the background) which are not targets of the conversion processing (0 to 255 levels, default: 0).

Filter Settings

Set threshold values for including blobs as conversion targets. Enable or disable and set upper and lower limits for each filter item. Blobs that exceed the upper or lower limit value of any filter item are excluded from conversion targets.

Area

This filter ignores blobs that are larger than the specified Upper Limit value or smaller than the specified Lower Limit value (Area filter).

Roundness

This filter ignores the blobs that have roundness values higher than the specified Upper Limit value (their shapes are closer to a perfect circle) and the blobs that have roundness values lower than the specified Lower Limit value (Roundness filter).

Major Axis

This filter ignores the blobs that have major axis values higher than the specified Upper Limit value and the blobs that have major axis values lower than the specified Lower Limit value (Major axis filter).

Axes Ratio

This filter ignores the blobs that have axes ratios higher than the specified Upper Limit value (elongated blobs) and the blobs that have axes ratios lower than the specified Lower Limit value (Axes ratio filter).

Equivalent Oval Major Axis

This filter ignores the blobs that have equivalent oval major axis values higher than the specified Upper Limit value and the blobs that have equivalent oval major axis values lower than the specified minimum value (Equivalent oval major axis filter).

Equivalent Oval Aspect Ratio

This filter ignores the blobs that have equivalent oval aspect ratios higher than the specified Upper Limit value (elongated equivalent ovals) and the blobs that have equivalent oval aspect ratios lower than the specified Lower Limit value (Equivalent oval aspect ratio filter).

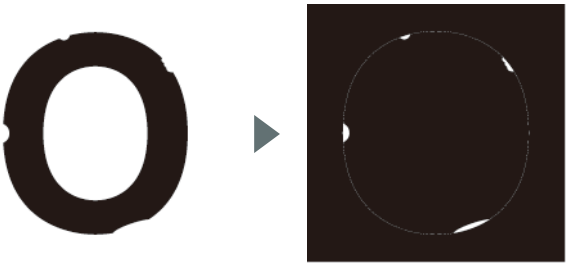
Point Each filter enabled adds to the total processing time.

Convex Hull

Fills the holes for any missing parts or extracts only the missing parts in binary images.

Fill holes

Extract only missing parts



Point The Current Image is a binary image. If necessary, apply [Color to Binary] for color extraction or the [Binary] filter of Image Enhance to convert the Current Image to a binary image.

Detection Color

Select the color to detect from the image.

- **White** (default): Detects the white parts in an image.
- **Black**: Detects the black parts in an image.

Fill Holes

Specify whether to fill the inside of the convex hull with the detection color (default: Enabled).

Difference Detection

Specify whether to detect the difference between the convex hull region and detection color region (default: Disabled).

Noise Cut

Eliminates slight noises from the background when [Difference Detection] is ON (0 to 99, default: 0). Removes noises equal to or smaller than the specified size.

Expand

Removes dark noise by adjusting pixels to the highest grayscale intensity from a group of pixels.

Processing Shape

Select [Circle] or [Square] (default) as the processing shape.

Size

Set the size of the processing filter (an odd number from 3 to 31, default: 3).

Processing Direction

Set a processing direction when [Processing Shape] is [Square] (X, Y, or XY; default: XY).

Border

Set the processing method at the region border when referencing surrounding pixels.

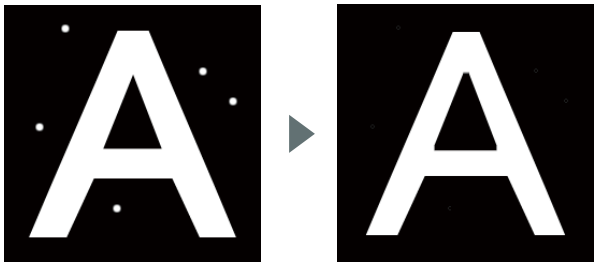
- **ON** (default): Processes by referencing the pixel tone data outside of the region.
- **OFF**: Processes by deeming the pixel tone data outside of the region to be of the same tone as the region border.

Count

Set the number of times of processing (1 to 9, default: 1).

Shrink

Removes bright noise by adjusting pixels to the lowest grayscale intensity from a group of pixels.



Processing Shape

Select [Circle] or [Square] (default) as the processing shape.

Size

Set the size of the processing filter (an odd number from 3 to 31, default: 3).

Processing Direction

Set a processing direction when [Processing Shape] is [Square] (X, Y, or XY; default: XY).

Border

Set the processing method at the region border when referencing surrounding pixels.

- **ON** (default): Processes by referencing the pixel tone data outside of the region.
- **OFF**: Processes by deeming the pixel tone data outside of the region to be of the same tone as the region border.

Count

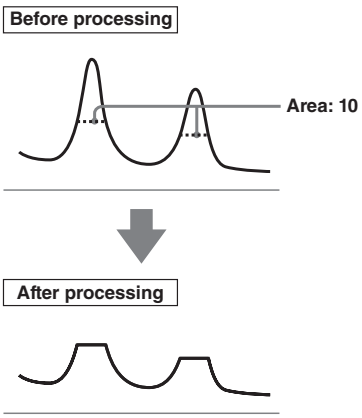
Set the number of times of processing (1 to 9, default: 1).

Noise Isolation

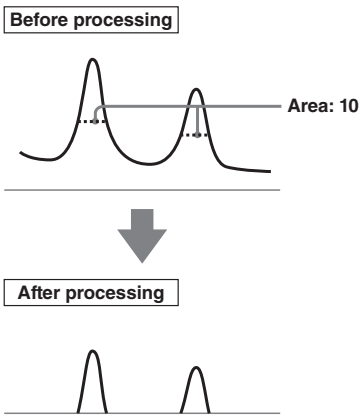
Extracts or removes bright pixel clusters or dark pixel clusters. You can generate a reduced image from the current image for speedup and noise removal and convert the gradation values of the target tone according to the set area value. The clusters of pixels of the specified size or smaller will be regarded as processing targets.

Processing image

Example 1
- Process Type: Remove
- Target Tone: Bright
- Area: 10
- Image profile



Example 2
- Process Type: Extract
- Target Tone: Bright
- Area: 10
- Image profile



Target Tone

Specifies the clusters of pixels of the specified tone as processing targets.
- **Bright**: Specifies the clusters of bright pixels as processing targets.
- **Dark** (default): Specifies the clusters of dark pixels as processing targets.

Process Type

Select how to process the specified clusters of pixels.
- **Remove** (default): Removes the specified clusters of pixels.
- **Extract**: Extracts only the specified clusters of pixels.

Area

Regards the clusters of pixels of the specified size (1 to 99999999) or smaller as processing targets (default: 10).

Reduction

Increasing the reduction level (1 to 32) will reduce the calculation accuracy of the processing target area, but the processing speed will be faster.

Point When a camera that is greater than 5 megapixels in size is set, the minimum value of [Reduction] is 2.

Average

Eliminates noise by taking the average intensity across a group of pixels.

Count

Set the number of times of processing (1 to 9, default: 1).

Median

Eliminates noise yet maintains definition by taking the median (most common) intensity across a group of pixels.

Processing Shape

Select [Circle] or [Square] (default) as the processing shape.

Size

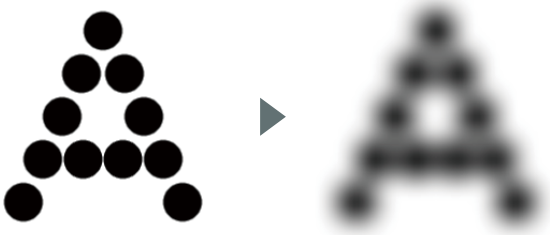
Set the size of the processing filter (an odd number from 3 to 31, default: 3).

Count

Set the number of times of processing (1 to 9, default: 1).

Blur

Applies a softening (blur) filter.



Filtering Level

Set a filtering level (1 to 99, default: 1).

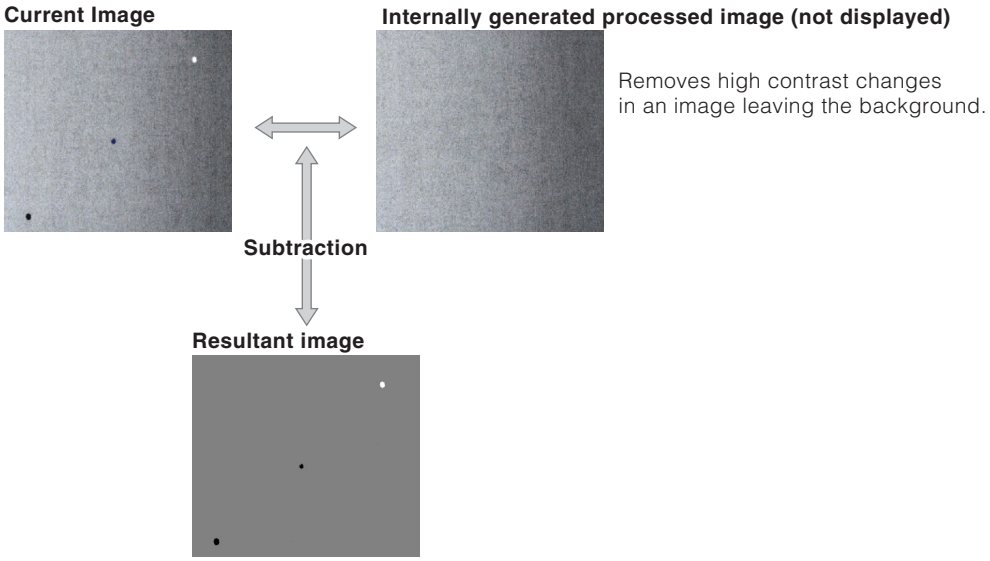
Processing Direction

Set a processing direction (X, Y, or XY; default: XY).

Shading Correction

The mild shading variation across an image can be neutralized with the Shading Correction filter by subtracting the current image from an internally processed version. Using this filter leaves areas where there is a sharp contrast while the rest of the background is set to a constant value. In addition, it is also possible to uniformly correct the contrast of the image as a whole by using the intensity average value or median value within the region.

Processing image



Correction Method

The [Shading Correction] filter calculates the difference between the current image and an internally processed image that is created by removing sharp contrast changes and leaving the mild intensity changes of the background. With this parameter, set the type of internally processed image to use for this subtraction process.

- **Correction by Average**: This method takes the average shade from the entire inspection region and uses it as the reference to calculate the differences with the current image and correct the image.
- **Correction by Median**: This method takes the median shade from the entire inspection region and uses it as the reference to calculate the differences with the current image and correct the image.
- **Shading Correction** (default): This method extrapolates a shading curve based on the value of Extract Size, and uses it as the reference to calculate the differences with the current image and correct the image.
- **Shading Correction (High Speed)**: This method suppresses a portion of the shading elimination effect to perform correction faster than [Shading Correction].

Extract Size (pixel)

When [Correction Method] is set to [Shading Correction] or [Shading Correction (High Speed)], set this to the size of the defect (such as black points, white points, or nicks) to extract (a multiple of four from 4 to 2000; default: 16).

Point The smaller the extract size is, the better detailed shading could be followed. (However, it will also lengthen the processing time.)

Processing Direction

When [Correction Method] is set to [Shading Correction] or [Shading Correction (High Speed)], set the processing direction (X, Y, XY) of the filter (default: XY).

Emphasis Setting

Extract Tone

Select the tone to extract as a defect.

- **Bright**: Select this to extract only defects that are brighter than the background.
- **Dark**: Select this to extract only defects that are darker than the background.
- **Bright/Dark**: Select this to extract both bright and dark defects.
- **Individual**: Select this to extract defects with different extraction sensitivities set individually for the bright and dark defects.

Point

- When [Bright] is selected, the background of the processed image becomes black (0 tone). When [Dark] is selected, the background of the processed image becomes white (255 tone).
- When [Bright / Dark] or [Individual] is selected, the background of the processed image becomes gray (128 tone).

Gain (times)

Set a gain for the corrected image when [Extract Tone] is other than [Individual] (0.0 to 10.0, default: 2.0). Set a larger number if you want stronger contrast.

Noise Cut (tone)

Eliminates slight noises from the background when [Extract Tone] is other than [Individual] (0.0 to 255.0, default: 0.0). Removes noises equal to or smaller than the specified tone.

Gain (Bright) (times)

Set a gain for the corrected bright image when [Extract Tone] is [Individual] (0.0 to 10.0, default: 2.0). Set a larger number if you want stronger contrast.

Noise Cut (Bright) (tone)

Eliminates slight noises from the bright background when [Extract Tone] is [Individual] (0.0 to 255.0, default: 0.0). Removes noises equal to or smaller than the specified tone.

Gain (Dark) (times)

Set a gain for the corrected dark image when [Extract Tone] is [Individual] (0.0 to 10.0, default: 2.0). Set a larger number if you want stronger contrast.

Noise Cut (Dark) (tone)

Eliminates slight noises from the dark background when [Extract Tone] is [Individual] (0.0 to 255.0, default: 0.0). Removes noises equal to or smaller than the specified tone.

Advanced

Uniform Contrast

Specify whether to even the contrast or not (default: OFF). Use this option to compensate for backgrounds with large shading variations. This also helps to keep the contrast in the filtered image uniform and is useful for dealing with background brightness fluctuations.

Point If [Uniform Contrast] is turned ON and the tone value of each pixel exceeds 500 in the calculation process, correct processing might not be possible. Set the gain and other settings so that the tone value does not exceed 500.

Border

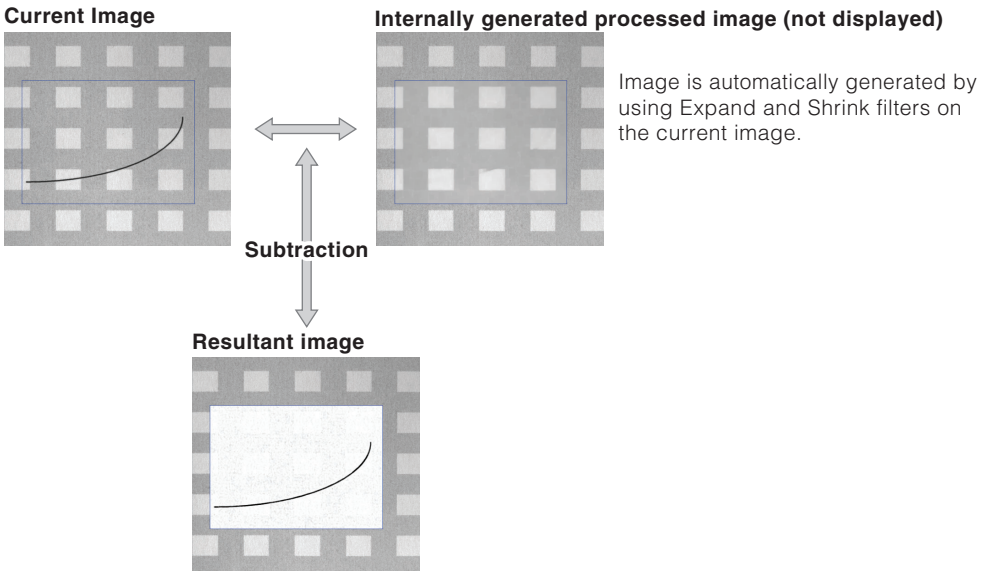
When [Correction Method] is set to [Shading Correction] or [Shading Correction (High Speed)], select whether to reference the image outside of the inspection region for processing (default: OFF).

Image Extraction

The background of a target can be removed with the Image Extraction filter by subtracting the current image from an internally processed version. This filter is very useful for extracting targets with a relatively small area such as points or thin lines from a fluctuating background.

Point
- Unlike the Subtraction Filter which requires a registered image tailored to the background, the reference image for subtraction is automatically generated by image processing from the current image. Thus this filter works in real-time accounting for any changes in the target.
- Increasing the extraction size will lengthen the processing time.

Processing image



Extract Tone

Select the tone to extract from [Bright] or [Dark] (default).

Extract Size (pixel)

Set the extracted area size by an odd number.

Processing Direction

Set a processing direction (X, Y, or XY; default: XY).

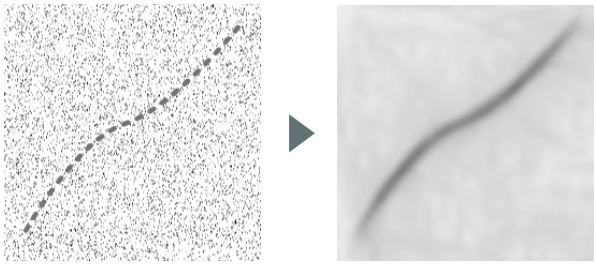
Border

You can set the processing method used at the region border for when the internally processed image that will serve as the reference is created.

- **ON**: The processed image is created with reference to the tone outside the region.
- **OFF** (default): The processed image is created deeming the tone outside the region to be the same as the tone at the region border.

Scratch Defect Extraction

Eliminates the shading variation in the background and extracts only the line-like defects. A reduced image is generated from the current image for speedup and noise removal and a background image that shows the gradual shading change in the background is also created. An image enhancement that highlights only scratch defects is applied on the image after background removal (in which gradual shading change has been removed), which has been obtained by calculating the differences between the background image and the original reduced image.



Processing Method

Select the method to perform the scratch defect extraction operation.

- **Scratch Defect Extraction**: Even if there are a lot of image noises, scratch defects can be stably extracted, but processing takes a great deal of time.
- **High-Speed Scratch Defect Extraction** (default): While processing can be performed much faster, this setting is susceptible to negative effects from image noise.

Reduction

Increasing the reduction level will improve the processing speed, but thin scratch defects will become more difficult to extract.

Extract Size

Specify the extracted area size by an even number when [Processing Method] is [Scratch Defect Extraction].
Increasing the value will make it easier to extract thick scratch defects.

Extraction Method

Extract Tone
Select the tone to be extracted as scratch defects.
- **Bright**: Only extracts the scratch defects that are brighter than the background.
- **Dark** (default): Only extracts the scratch defects that are darker than the background.
- **Bright/Dark**: Extracts both bright and dark scratch defects.

Gain (times)
Specify the factor (0.0 to 99.9) of gain. A larger gain provides a stronger contrast of the image. Processing is made on the image obtained by erasing the background.

Linearity
Specify the linearity (1 to 4). Increase the value to extract straight scratch defects. Reducing the value will make it easier to extract, curved scratch defects.

Linear Length
Set a linear length (1 to 8) when [Processing Method] is [Scratch Defect Extraction] (default: 2). With a larger value, it tends to be easier to extract long scratch defects. Set a smaller value if you want to extract short scratch defects.

Noise Cut (tone)
Set a tone for noise cut (0.0 to 255.0) when [Processing Method] is [High-Speed Scratch Defect Extraction] (default: 0.0). Slight noises are eliminated.

Extraction Method Settings

Extraction Direction
Specify the direction of the scratch defects to be extracted.
- **All Angles** (default): Extracts scratch defects in all directions.
- **Specify Angle**: Limits the direction of the scratch defects to be extracted. You can increase the processing speed by limiting the direction of the scratch defects to be extracted. The range of directions is [Starting Angle ± Angle Range].

Starting Angle
Set a reference angle when [Extraction Direction] is [Specify Angle].

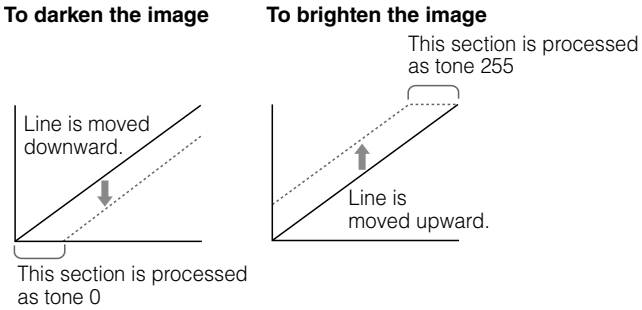
Angle Range
Set an angle range when [Extraction Direction] is [Specify Angle].

Contrast Conversion

Adjusts the brightness of the entire image.

Offset

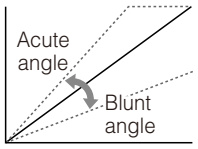
Specify the [Offset] value (-255 to +255; default: 0).
To darken the image, set a negative value. This will move the gain downward as a whole. The part that falls below the minimum value on the Y-axis is processed as 0 (black). To brighten the image, set a positive value. This will move the gain upward as a whole. The part that exceeds the maximum value on the Y-axis is processed as 255 (white).



Reference Depending on one's purposes, this can also be used to homogenize details of bright or dark parts above/below certain values to either 255 or 0.

Span

Specify a value for [Span] (0.0 to 7.9; default: 1.0). To increase the contrast in images, use a high value so there is a greater rate of change. To decrease the contrast in images, use a low value so there is a lesser rate of change.



Point The part that falls below the minimum value on the Y-axis is processed as 0 (black), and the part that exceeds the maximum value is processed as 255 (white).

Contrast

The tone gradation based on the [Offset] and [Span] settings is shown as a graph.

Contrast Expansion

Improves the image contrast by correcting the brightness distribution in the image.

Point The Contrast Expansion filter cannot be selected for the Pattern Search tool and the ShapeTrax3A tool.

Expansion Width

Set the intensity of the contrast expansion (0 to 30; default: 15). Increasing the value will expand the brightness distribution correction width.

Noise Cut

Set the extent to which to reduce the noise (0 to 30; default: 0). Noise occurs especially in the dark areas of the image. Increasing the value will reduce the noise, but the image may become less sharp.

Sharpen

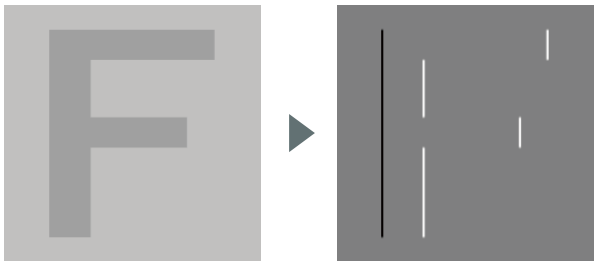
Extracts the borderline where there is a change in intensity.

Count

Set the number of times of processing (1 to 9, default: 1).

Sobel X

Applies a Sobel filter and extracts borderlines of intensity changes in the X horizontal direction.

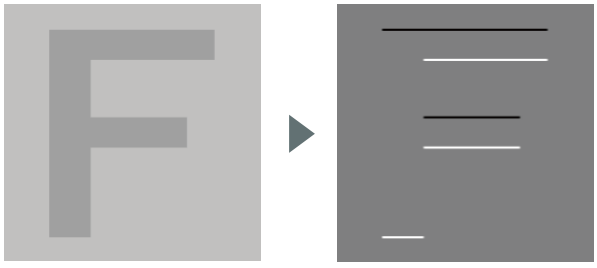


Count

Set the number of times of processing (1 to 9, default: 1).

Sobel Y

Applies a Sobel filter and extracts borderlines of intensity changes in the Y vertical direction.



Count

Set the number of times of processing (1 to 9, default: 1).

Sobel

This filter extracts edges. This filter is more effective at emphasizing and extracting low-contrast intensity changes than the Prewitt filter.

Count

Set the number of times of processing (1 to 9, default: 1).

Prewitt

This is an edge extraction process which extracts intensity changes in the X and Y directions separately and then combines the results of the two.

Count

Set the number of times of processing (1 to 9, default: 1).

Roberts

This filter extracts edges. This filter is weaker for the X and Y directions than a Prewitt filter, but superior at extracting intensity changes in an angular direction.

Count

Set the number of times of processing (1 to 9, default: 1).

Laplacian

This filter extracts edges. It does not focus on any direction but rather uniformly extracts edges in all directions.

Count

Set the number of times of processing (1 to 9, default: 1).

Custom

The Custom filter applies a filter coefficient to the pixel intensity in the range (minimum of 3x3 to maximum of 21x21) centered on the area of interest and converts the images based on a specific range or direction. The processing method can be selected from Convolution, Expand, or Shrink. An original filtering process unlike normal filters can be set.
When you click the [Settings] button, the [Custom] dialog will appear.

Size

Set a filter reference range (an odd number from 3x3 to 21x21, default: 3x3) centering around the designated pixel.

Operation

Specify the processing method of the filter.

- **Convolution** (default): Applies the set filter coefficient (1.0 = 100%) to the pixel intensity in the range to convert the images based on a specific range or direction.
- **Expand**: Applies the Expand filter by referencing the pixel value of only the pixels with a coefficient of 1.
- **Shrink**: Applies the Shrink filter by referencing the pixel value of only the pixels with a coefficient of 1.

Point If you change from [Convolution] to other processing, the convolution-related settings will also be cleared.

Filter Coefficient

Set the filter coefficients. Clicking [Coefficient Setting] opens the [Coefficient Setting] dialog. You can set a coefficient in each cell of the list, whose size was specified by [Size]. Configurable values vary by [Operation].

- In the case of [Convolution]: -128 to 127
- In the case of [Expand] and [Shrink]: 0 to 1

By clicking [Reference], you can copy a set of cells from the Vision Dashboard of the main screen. Clicking [Reset] resets the filter coefficient values.

Point As referenced cells, prepare cells in a quantity equal to or larger than the filter size. (For example, in the case of 15x15, the number of elements should be 225 or larger.) Coefficient setting is not completed until you enter proper cells.
For the definition of referenced cells, see "Vision Dashboard".

Divisor

When [Operation] is [Convolution], specify the number to divide the calculation result by (default: 1.000). The result is divided before applying the offset and the division applies to all pixels.

Offset

When [Operation] is [Convolution], specify a value to add to the calculation result (default: 0). This value is added to all pixels.

Negative Pixel Correction

When [Operation] is [Convolution], this specifies how pixel values that become negative after calculation are handled.

- **Fixed to 0** (default): Caps values less than 0 to 0.
- **Absolute Value**: Converts values less than 0 to a positive value.

Border

Specify whether to apply the filter by referencing the image outside the inspection region (default: ON). When [Border] is ON, the image outside the region affects the filtering process.

Count

Set the number of times of applying the filter (default: 1).

Detailed Settings

#E094

[Detailed Settings] provides three setting items: [Origin Offset] for setting the origin coordinates used for processing and measurement results, [Scaling] for correcting result data and setting parameters to any desired unit, and [Coordinate Value] after position adjustment. The set content of [Detailed Settings] is common within a tool.

Reference Some tools have their own detailed settings. For tool-specific detailed settings, see the explanation of Detailed Settings of each tool.

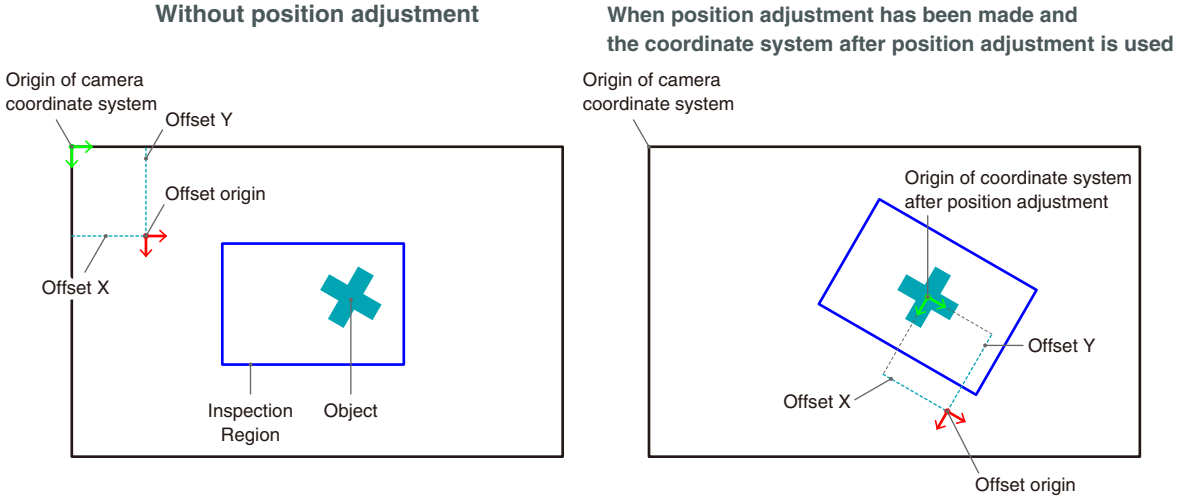
Origin Offset

By default, the origin is set to the top left corner (0, 0) of the screen, but it can be set to any position. Click [Edit], and then enter the X and Y coordinates of the origin (-9600.000 to 9600.000, default: 0.000). You can also directly configure [Origin Offset] by clicking a point in the [Image Viewer].

Reference The origin can also be set outside the processing region.

Point

- Display of origin in [Image Viewer]
  The origin is indicated by the combination of a downward arrow and a rightward arrow.
  –Origin after position adjustment: Green
  –Offset origin: Red
- If position adjustment has been configured and [After Adjustment] is selected for [Coordinate Value], the origin moves from the origin of the camera coordinate system (0, 0) to the tool detected position (origin of the coordinate system after position adjustment) referenced by position adjustment. The offset value configured in [Origin Offset] is added to the origin of the coordinate system after position adjustment.



Scaling

The VS Creator processes images in pixel units. However, the result data and setting parameters used for screen display, judgment, and calculation can be converted to values in any desired unit (mm, μm, etc.). This conversion is called Scaling.
The factor used for scaling (scaling coefficient) is configured by tool reference (Scaling tool or Calibration tool) or individual value specification (referencing).

Reference For details on the result data for which scaling can be used, see "Results Data List".

Specify Individually

Configure whether to make scaling for X, Y, and lengthwise individually (default: OFF).

– **OFF**: Select a Scaling tool or a Calibration tool to be referenced from the [Specify] drop-down list.
– **ON**: Select the check boxes of [X], [Y], and/or [Lengthwise], and set the scaling coefficients.

Specify

Specify a Scaling tool or a Calibration tool to be referenced when [Specify Individually] is OFF.

– **None** (default): [X], [Y], and [Lengthwise] are set to 1.000000 (default).
– **Referable Tools**: Names of referable tools are displayed. The scaling coefficient of the selected tool is applied.

Point

- When [Specify by Direction] of the Scaling tool is OFF: The [Scale] setting value is applied to [X], [Y], and [Lengthwise].
- When [Specify by Direction] of the Scaling tool is ON: Setting values of [X], [Y], and [Lengthwise] are applied individually.
- In the case of a Calibration tool: Values of [X], [Y], and [Lengthwise] are applied individually.

X/Y

Set a scaling coefficient (-9999.999999 to 9999.999999, default: 1.000000).

Lengthwise

Set a scaling coefficient (0.000001 to 9999.999999, default: 1.000000).

Chapter 6 Task

Overview

#F001

A task is a series of tools combined and executed. (See "Task".) With the VS Creator, you can build a program setting by creating tasks on the [Task] view.

[Task] view

The [Task] view is the view for creating tasks (main task and subtasks) by placing a Capture tool, measurement tool, and other tools. After placing tools in the [Task] view, you can edit the settings of the tools and tasks in the [Properties] view. Also, you can view the execution result of a tool in [Tool Results] View, and the execution result of a task in [Results Overview] View.
There are two task tabs : the [Main Task] tab for creating a main task and the [Subtask] tab for creating subtasks.

[Main Task] tab

In the [Main Task] tab by placing tools, you can create a basic flow (main task) of capturing, inspection, and then output. Only one main task can be created in one program setting. If a subtask is invoked by an event, processing control returns to the main task when the subtask finishes. For details of creating a main task, see "Creating a Main Task".

[Subtask] tab

In the [Subtask] tab, by placing tools, you create processes (subtasks) that are different from the main task such as update of data that the main task refers to and calibration. You can create multiple subtasks in the [Subtask] tab. Subtasks are added to the execution queue when their events occur, and are executed when the main task finishes. When subtasks finish, the processing control returns to the main task. For details of creating a subtask, see "Creating Subtasks".

Point In the initial condition, the [Subtask] tab is displayed when Free Layout is selected, but is not displayed in Step Layout. When a subtask is added to the [Subtask] tab in Free Layout, the [Subtask] tab also becomes visible in Step Layout.

Task

A task is a single or set of tools, which execute processes such as capturing and measurement. You can execute a series of processes automatically or manually by placing multiple tools in a task.

Features

Tasks have the following features:

- From the tool list of the [Task] view, you can add a tool to a task.

- The execution order of tools is determined automatically.
- By grouping multiple tools in a task, you can handle them as if they are one tool. (See "Grouping/Ungrouping Tools".)
- The result of a tool can be referenced by other tools. If a referenced tool belongs to a different task, the tool result at the time that different task was last executed is retrieved.
- A task-specific judgment can be configured based on the result of a tool or a value of the Vision Dashboard. (See "Options".)
- You can configure multiple independent subtasks in addition to the main task. (See "Adding a Subtask".)
- If events are configured for subtasks, subtasks are added to the execution queue when their events occur, and are executed when the main task finishes. (See "Event Settings".) You can handle various situations by configuring multiple subtasks.
- When using a simulator, if the subtasks are set to be executed by events, an execution confirmation dialog will be displayed for each subtask. (See "Event Settings".) Click [OK] to execute the subtasks. Select the check box to set the subtask not to be executed by events until the next connection.

Point When using a simulator, if the event type of the subtask is set to "Loading of Program Setting", the subtask will not be executed.

Example of Combination of Main Task and Subtask

By combining the main task and subtasks, you can configure a variety of processing. In the example described here, a subtask executes checkup before starting operation.

- Main task: Capturing and measuring works
- Subtask: Capturing and measuring the master jig

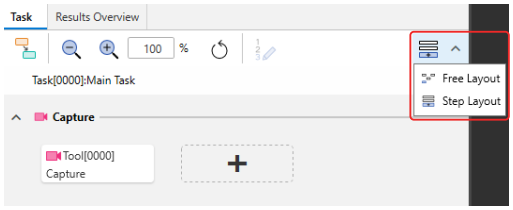
Flow

1. Triggered by an external event assigned to the subtask, processing control moves from the main task to the subtask.
2. The master jig is placed, and a trigger is entered.
3. The subtask is executed, and the control moves to the main task.
4. The result is checked, and if it is OK, inspection of works starts.
5. A work is placed, and a trigger is entered.
6. The main task is executed.

Screen Details

#F002

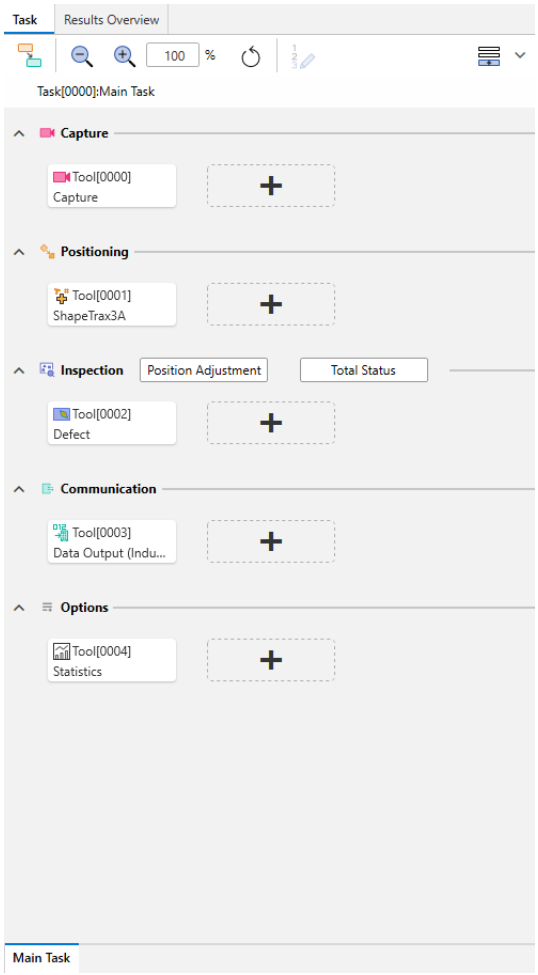
In the [Task] view, you can select "Step Layout" or "Free Layout", whichever you like. You can switch layouts as necessary by the [Switch Layouts] drop-down menu at the upper-right corner of the [Task] view.



This section explains the screen configuration and functions of the Step Layout and the Free Layout.

Step Layout

The [Task] view is segmented to different areas called “classifications”. Only predetermined tools can be placed in each classification. This helps you create a task easily by just adding tools in accordance with the UI. The Step Layout is displayed when the VS Creator is started for the first time. The figure below shows the screen configuration of the Step Layout.



(1) Toolbar

On the toolbar, there are functions for display configuration (Show Links, Zoom Out/Zoom In, Reset, Renumber Tool ID, and Switch Layouts).

Show Links

Clicking the button switches whether or not to highlight the tools that the selected tool refers to and the tools that refer to the selected tool (default: OFF). With this switch ON, the tools that the selected tool refers to are highlighted in orange, and the tools that refer to the selected tool are highlighted in pale green. If the tool refers to the Vision Dashboard or a subtask, you can view the data in a reference relationship detail in the [Link Details Display] dialog that appears by a click of the icon at the upper-right corner of the tool.

Zoom Out/Zoom In

Clicking one of these buttons scales the zoom ratio of the [Task] view.

- Zoom Out: Clicking the button zooms out the [Task] view display by 1%.
- Zoom Ratio Display/Change: Displays the current zoom ratio. You can enter a value (25% to 200%) directly in this box.
- Zoom In: Clicking the button zooms in the [Task] view display by 1%.

Reset

Clicking the button on the toolbar resets the zoom ratio to 100% (default).

Renumber Tool ID

By clicking the button on the toolbar, you can renumber the tool IDs of the selected tools. (See "Renumbering the Tool ID".)

Switch Layouts

Selecting [Step Layout] or [Free Layout] from the [Switch Layouts] drop-down menu on the toolbar switches layouts.

(2) [Task] view

The [Task] view is segmented into areas called "Classification". Tools are placed according to classification.

Classification

A classification is an area (Capture, Positioning, Inspection, Communication, Options) to place the tool in. For each classification, there is a predetermined set of tools that can be placed in the classification. When you add a tool, it is displayed in the position of the dotted frame. For details of how to add a tool, see "The Case of Step Layout".

Point If you group multiple tools of different classifications in Free Layout, the group of tools is displayed in the [Unclassified] classification when you switch to Step Layout. The [Unclassified] classification is not displayed in the initial condition.

Position Adjustment

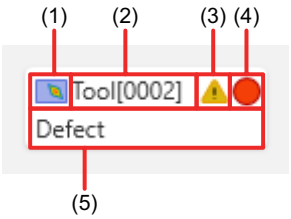
Button displayed in the [Inspection] classification (See "Position Adjustment Reference Settings".)

Total Status

Button displayed in the [Inspection] classification (See "Judgment Settings".)

Tool

For each tool placed in the [Task] view, the tool information is displayed.



(1) Tool type icon
(2) Tool ID
(3) Execution error icon
(4) Judgment icon / Setting error icon
(5) Tool Name

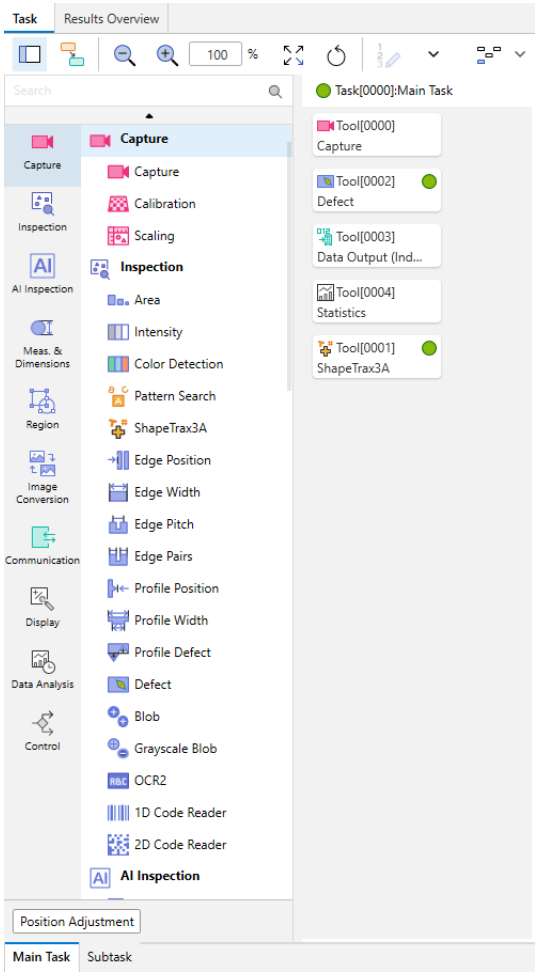
Added tools are placed at a fixed interval from left to right and then to the next row.

Group

By grouping multiple tools (up to 128), you can handle them as a single handling object. On the [Task] view, a group is displayed as a frame that contain tools. You can close a frame to minimize it. You can also group a set of tools within a group. For details, see "Grouping/Ungrouping Tools".

Free Layout

You can place a tool at any point in the [Task] view. In Free Layout, you can add a tool by dragging a tool from the tool list, and dropping it in the [Task] view. You can also create a subtask in the [Subtask] tab. The figure below shows the screen configuration of the Free Layout.



(1) Toolbar

On the toolbar, there are functions for display configuration (Show Tool List, Show Links, Zoom Out/Zoom In, Fit, Reset, Renumber Tool ID, Show/Hide Memo, and Switch Layouts).

Show Tool List

Clicking the button switches whether or not to display the Tool List in the [Task] view (default: OFF). When it is ON, the Tool List is displayed on the left of the [Task] view. (See "Tool List".)

Show Links

Clicking the button switches whether or not to highlight the tools that the selected tool refers to and the tools that refer to the selected tool (default: OFF). With this switch ON, the tools that the selected tool refers to are highlighted in orange, and the tools that refer to the selected tool are highlighted in pale green. If the tool refers to the Vision Dashboard or a subtask, you can view the data in a reference relationship detail in the [Link Details Display] dialog that appears by a click of the icon at the upper-right corner of the tool.

Zoom Out/Zoom In

Clicking one of these buttons scales the zoom ratio of the [Task] view.

- Zoom Out: Clicking the button zooms out the [Task] view display by 1%.
- Zoom Ratio Display/Change: Displays the current zoom ratio. You can enter a value (25% to 500%) directly in this box.
- Zoom In: Clicking the button zooms in the [Task] view display by 1%.

Fit

Clicking the button adjusts the scope of display so that all tools fit inside the [Task] view.

Reset

Clicking the button resets the scope of display to the initial condition.

Renumber Tool ID

Clicking the button renumbers the tool IDs of the selected tools (See "Renumbering the Tool ID".)

Show/Hide Memo

Clicking the button switches whether or not to display memos in the [Task] view. (See "Creating a Memo".)

Switch Layouts

Selecting [Step Layout] or [Free Layout] from the [Switch Layouts] drop-down menu on the toolbar switches layouts.

(2) Tool List

The Tool List is displayed when the (Show Tool List) button is clicked. Its width can be changed.

Category

Icons that indicate the tool categories are displayed on the left (1st column) of the Tool List. Clicking an icon scrolls the list to the position at which the tools of the icon's category are displayed on the right (2nd column). Dragging and dropping a tool places the tool in the [Task] view. For details, see "Adding a Tool".

Search

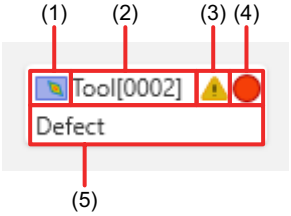
Entering a string in the text box filters the displayed tools. Clicking the [▲] button closes the text box for search.

(3) [Task] view

Place tools at any positions.

Tool

For each tool placed in the [Task] view, the tool information is displayed.



(1) Tool type icon
(2) Tool ID
(3) Execution error icon

(4) Judgment icon / Setting error icon

(5) Tool Name

Group

By grouping multiple tools (up to 128), you can handle them as if they are a single tool. In the [Task] view, a group is displayed as a frame that contain tools. You can close a frame to minimize it. You can also group a set of tools within a group. For details, see "Grouping/Ungrouping Tools".

Position Adjustment

Clicking this button displays the [Default Position Adjustment Reference at Adding Measurement Tools] dialog. You can enable automatic tool position adjustment so that position adjustment is automatically applied to measurement tools when they are added. (See "Position Adjustment Reference Settings".)

(4) Tab

Clicking a tab switches between the [Main Task] tab and the [Subtask] tab display.

Creating a Main Task

#F003

A main task is created by placing and configuring tools in the [Main Task] tab. Here are the steps of creating a main task:

1. Add the necessary tools in the [Main Task] tab. (See "Adding a Tool".)
   The order of tool execution is analyzed by the VS Creator, so you do not have to pay attention to the positions of tools.

2. Configure the tools. (See "Measurement".)
   Configure such that the reference relation and the input/output coordination between different tools and between tools and cells are established.

3. Configure the properties of the main task. (See "Editing a Task".)

Creating Subtasks

#F004

You can create multiple subtasks in the [Subtask] tab. A subtask is created by placing and configuring tools in the subtask. Here are the steps of creating a subtask:

1. Add a subtask to the [Subtask] tab in Free Layout. (See "Adding a Subtask".)

2. Add the necessary tools in the subtask. (See "Adding a Tool".)
   The order of tool execution is analyzed by the VS Creator, so you do not have to pay attention to the positions of tools.

3. Configure the tools. (See "Measurement".)
   Configure such that the reference relation and the input/output coordination between different tools and between tools and cells are established.

4. Configure the properties of the subtask. (See "Editing a Task".)

5. Repeat steps 1 to 4 as required.

Editing Tools

#F005

This section explains how to add a tool in a task and how to edit an added tool.

- Adding a Tool: Add a tool in a task.
- Handling a Tool: Move, copy, paste, and delete a tool that has been placed.
- Renumbering the Tool ID: Renumber the tool ID of the tool that is selected.
- Grouping/Ungrouping Tools: Group a set of tools to handle them as a [Group].

Reference In most cases, a tool can be edited from the context menu that is displayed when right-clicking the tool.

Adding a Tool

To add a tool in a task, there are two ways for The Case of Step Layout and two ways for The Case of Free Layout. Multiple tools that you added are placed at a fixed interval in the [Task] view.

Point

- Tools can be added in Setup Mode. Tools cannot be added in Run Mode.
- A maximum of 2000 tools can be added for one program setting. If the memory space is not enough, a tool cannot be added even if the number of tools is less than 2000.
- Only one Capture tool can be added to each task.
- In Step Layout, you can only add tools to their predetermined classifications. If you switch to Free Layout, added tools are displayed at the bottom left of existing tools. In Free Layout, you can place tools at any position. But when you switch to Step Layout, the tools are placed in predetermined classifications.
- In order to add tools in a subtask, you have to add a subtask in the [Subtask] tab in Free Layout beforehand. (See "Adding a Subtask".) You can add tools to a subtask only in Free Layout.

The Case of Step Layout

In Step Layout, there are two ways: Adding a Tool From the Context Menu and Adding a Tool by Dialog.

Adding a Tool From the Context Menu

To add a tool in a task, right-click the task, and select [Add Tool] - <category> - <tool> from the context menu that is displayed.

Adding a Tool by Dialog

1 Left-click inside the dotted frame in the classification of the tool that you want to add.

The [Tool List] dialog appears. The classification name is displayed at the top of the dialog, and the tool categories are displayed on the left side.

2 Select a tool category.

On the right side of the dialog, the tools of the category are displayed.

3 Select a tool.

4 Click the [Add] button.

The tool is added at the position of the dotted frame in the classification.

The Case of Free Layout

In Free Layout, there are two ways: Adding a Tool From the Context Menu and Adding a Tool from Tool List.

Adding a Tool From the Context Menu

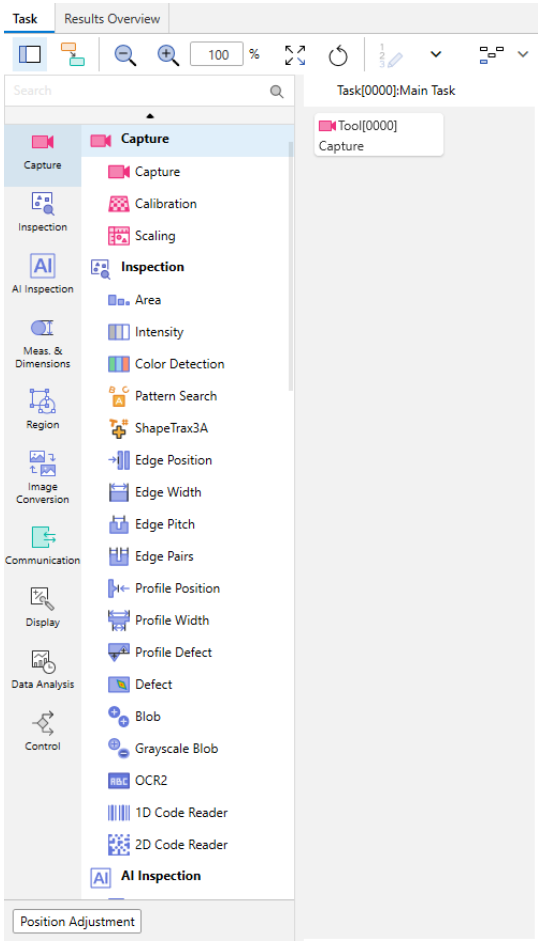
To add a tool in the [Task] view, right-click the task, and select [Add Tool] - <category> - <tool> from the context menu that is displayed.

Point To add a tool to a subtask, right-click inside the frame of the subtask. You cannot place a tool outside a subtask in the [Subtask] tab.

Adding a Tool from Tool List

1 Click the (Show Tool List) button on the toolbar of the [Task] view.

The Tool List is displayed on the left side of the [Task] view. Icons that indicate the tool categories are displayed on the left (1st column) of the Tool List.



2 Click a category icon.

On the right side (2nd column) of the Tool List, the tools of the category are listed.

3 Drag and drop a tool into the task.

The tool is added in the task.

Handling a Tool

Use the context menu for tool handling other than selection and movement. The same applies to group handling.

Selecting a tool

To select a tool, left-click it. To select multiple tools, left-click them with the Ctrl key pressed, or select the area that include the tools.

Moving a tool

Drag and drop the target tool. The tools that have been moved are automatically positioned to be at a constant interval in the [Task] view. In Step Layout, you can move a tool to a different classification.

Cutting a tool (Ctrl + X)

You can move a tool by selecting [Cut] from the context menu and then pasting the tool at a different place.

Copying a tool (Ctrl + C)

You can duplicate a tool by selecting [Copy] from the context menu and then pasting the tool at a different place.

Pasting a tool (Ctrl + V)

After cutting or copying a tool, you can move or duplicate the tool by selecting [Paste] from the context menu at a different place.

Pasting a tool multiple times

After copying a tool, you can display the [Multi-Paste] dialog by opening the context menu at a different place and selecting [Multi-Paste]. The tool is duplicated the number of times (1 to 1999, default: 1) specified in [Number of Times to Paste].

Partially pasting a tool

Partial Paste means copying the setting items of a tool to a different tool. After copying a tool, you can display the [Partial Paste] dialog by selecting a different tool and selecting [Partial Paste] from the context menu. Make the following settings.

Point Partial pasting can be made when a single tool is selected and copied. Partial pasting cannot be made when multiple tools are selected and copied.

Name
The setting items (setting properties) whose names are selected by their check boxes are copied (maximum of 256 items).

Value
When the value of a setting item is a numerical value, the value is displayed in black. When the setting item refers to a cell or result data, the value is displayed in blue.

Sequential Paste
If a setting item of the copy source tool refers to a cell or setting parameter, a check box is displayed for the setting item. If the check box is selected, the number of the referenced cell, or the tool ID or array element number of the referenced setting parameter is incremented when the setting item is pasted.

Means
If you have selected the [Sequential Paste] check box, configure the means of incrementing.
- When the setting item refers to a cell: [Downward Increment] (default) or [Rightward Increment]
- When the setting item refers to a setting parameter with an array: [Array Element No.] (default) or [Tool ID]
- When the setting item refers to a setting parameter without an array: [Tool ID]

Increment by
If you have selected the [Sequential Paste] check box, specify the amount of each increment (1 to 100).

Deleting a tool
Selecting [Delete] from the context menu of a tool deletes the tool.

Point
- If you delete a tool in Step Layout, other tools are relocated to occupy the space of the deleted tool. When you switch to Free Layout, you find a vacant space at the place of the deleted tool and other tools in the same places.
- If you delete a tool in Free Layout, the place of the deleted tool becomes vacant. When you switch to Step Layout, you find the other tools relocated to occupy the place of the deleted tool.

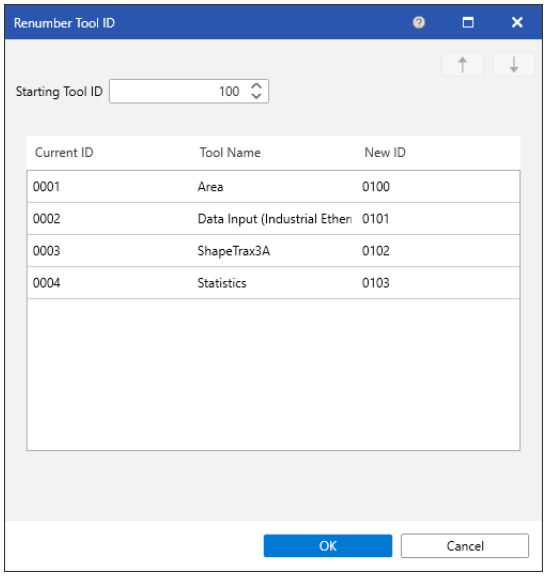
Renumbering the Tool ID
You can renumber the tool ID of one or more tools that you selected.

1 Select one or more tools.

2 Select [Renumber Tool ID] from the context menu.
The [Renumber Tool ID] dialog appears.

Reference The dialog also appears when you click the (Renumber Tool ID) button on the toolbar of the [Task] view.

In the dialog, the tools selected in step 1 are displayed in the ascending order of [Current ID]. [Current ID] changes to [New ID] after you renumber tool IDs.



3 Select the tool that you want to change the ID of, and click the [↑] or [↓] button.
The position of the tool changes.

4 Set the smallest value (0 to 1999) for the tool ID in [Starting Tool ID].
The specified value will be set as the smallest ID number in the [New ID] column.

Point
- Values in [New ID] are incremented by 1.
- If you specify 1999, which is the maximum number for a tool ID, the tool IDs of the other tools cannot be renumbered.

5 Click the [OK] button.
While the IDs are being renumbered, a progress bar is displayed.

Grouping/Ungrouping Tools

By grouping a set of tools (maximum of 128 tools) of a certain function or purpose, you can handle them as a single handling object in a task. When you select one or more tools and then select [Group] from the context menu, a frame is displayed indicating the group. When you select a group and then select [Ungroup] from the context menu, the grouping is released and the frame that indicates the group disappears.

Point
- In Step Layout, you can only group tools in the same classification. Grouping made in Step Layout is also effective in Free Layout. In Free Layout, you can group tools that belong to different classifications in Step Layout. When you switch to Step Layout, you will find the group and its tools moved to the [Unclassified] classification.
- When you ungroup a group in the [Unclassified] classification of Step Layout, the tools of the group remain in the [Unclassified] classification. Even if you ungroup such a group in Free Layout, the tools of the group remain in the [Unclassified] classification in Step Layout.

For group operations that are the same as those for tools, see "Editing Tools". This section explains operations that are specific to groups.

Creating a group in a group

You can furthermore group a set of tools within a group. A child group can be manipulated (moved, put in/out, etc.) independently from its parent group.

Switching display modes

Groups have two display modes: Always Display and Auto-hide.

Always Display mode

A group is in this mode when it is created in a task. In this mode, the tools are displayed in the frame of the group. The group switches to Auto-hide mode when you select [Auto-hide] from the context menu that appears when you right-click the title bar of the group.

Auto-hide mode

In this mode, only the title bar of the group is normally displayed. When you click the [V] button, the group frame expands to show the tools inside. The group returns to the title-bar-only presentation when you click a point outside the group. The group switches to Always Display mode when you select [Always Display] from the context menu that appears when you right-click the title bar of the group.

Reference Other tools in the area of the expanded frame of a group in Auto-hide mode are hidden behind the frame of the group.

Changing the size

You can change the size of a group frame by dragging and dropping the bottom-right corner of the group frame. When you change the size of a child group, the size of the parent group is also changed accordingly.

Changing properties

Clicking the title bar of a group displays the properties of the group in the [Properties] view. You can configure the name (maximum of 100 characters), background color, and letter color of the group.

Editing a Task

#F006

This section explains how to configure task properties.

Properties

Use the [Properties] view to configure a task. The [Properties] view of a task consists of the tabs below. Change the settings as required.

Properties	Settings
General	The task information is displayed. You can also enter the task name and comments. For a subtask, also configure the background color and the letter color.
Task	You can configure the event that triggers the execution of a subtask and the judgment settings for the main task or subtask.

General

General

Configure the information of the selected task.

Task ID

The task ID is displayed. The ID of the main task is 0000. IDs from 0001 to 0199 are allocated to subtasks sequentially as they are added.

Task Name

The task name is displayed. The initial setting for the main task is “Main Task”. The initial setting for subtasks is “Subtask000”, and the numerical suffix is incremented by 1 as subtasks are added. You can also enter any name within 128 characters (64 double-byte characters).

Background Color

For a subtask, configure the color of the background of the task name.

Font Color

For a subtask, configure the letter color of the task name.

Comment

Displays the comment on the task. You can enter any comment within 512 characters. It helps if you enter information that you want to refer to at a later time such as the reason and notes for the task setting.

Task

Event Settings

Point [Event Settings] is an item that is displayed only for subtasks.

Select from the [Initiate Subtask on...] drop-down list the event that will trigger the execution of the subtask. You may need to make additional setting depending on the event that you selected.

- None
- Soft Event (additional setting required)
- Occurrence of System Error
- Transition to Run Mode
- Transition to Setup Mode
- Loading of Program Setting
- Timer (Time Specification) (additional setting required)
- Timer (Interval Specification) (additional setting required)

None

No execution trigger is configured (default). Subtask execution is not triggered by an event.

Soft Event

The subtask is executed when the soft event specified by [Event ID] occurs.

Event ID

Select a value from 0 to 31 (default: 0).

Occurrence of System Error

The subtask is executed when a system error occurs.

Transition to Run Mode

The subtask is executed when transition from Setup Mode to Run Mode occurs.

Transition to Setup Mode

The subtask is executed when transition from Run Mode to Setup Mode occurs.

Loading of Program Setting

The subtask is executed when a program setting is loaded. This event setting can be used to execute initialization processing immediately after startup.

Timer (Time Specification)

The subtask is executed at the [Time] specified in the 24-hour format.

Time

Specify an execution time (00:00:00 to 23:59:59, initial setting: 00:00:00). The subtask is executed at the specified time.

Timer (Interval Specification)

The subtask is executed at the specified time interval.

Interval

Specify an execution interval (00:00:01 to 23:59:59, default: 00:01:00). The timer starts when the system enters Run Mode. When the system transitions to Setup Mode, the timer stops at the timer value at the time of transition, and resumes from there when the system transitions to Run Mode once again.

Options

With options, you can configure the task judgment targets and specify the tools to be used for the Tool Overall Error output.

Judgment Settings

Clicking the [Settings] button displays the [Judgment Settings] dialog. Configure the judgment target (tool/cell) for the task.

Judge Using Both Tools in Task and Cell in Vision Dashboard

Use the check box to configure whether to use both tools and a cell as judgment targets (default: OFF).

- OFF: Judgment is made only by the target selected by the [Judgment Targets] drop-down menu.
- ON: Judgment is made by the logical sum (OR) of the tools selected by [Judge Using Tools in Task] and the cell specified by [Judge Using a Cell in the Vision Dashboard].

Point If you have set this item to ON, select [Judge Using Tools in Task] and [Judge Using a Cell in the Vision Dashboard] from the [Judgment Targets] drop-down menu and configure the settings for each of them.

Judgment Targets

Select the judgment target from the drop-down menu for the task.

- **Judge Using Tools in Task**: The list of tools for which judgment conditions have been configured is displayed. The logical sum (OR) of the judgment results of the tools selected by their check boxes becomes the judgment result of the task. Tools without a configured judgment condition are ignored. If no judgment is made by any of the selected tools, no judgment is made and the judgment icon is not displayed.
- **Judge Using a Cell in the Vision Dashboard**: Click [Specify Cell], and specify a cell that holds a judgment result. The judgment result of the cell becomes the judgment result of the task. If the value of the specified cell is “TRUE” or a number other than “0”, the judgment result of the task becomes “Pass”. If the value of the cell is “FALSE” or “0”, the judgment result of the task becomes “Fail”.

Tool Overall Error Settings

Clicking the [Settings] button displays the [Tool Overall Error Settings] dialog. Select the check boxes of the tools to use for the Tool Overall Error output. The logical sum (OR) of the tool errors of the tools becomes the result of the system property.

Adding a Subtask

You can create multiple subtasks in the [Subtask] tab. You can add up to 199 subtasks in one program setting. This section explains how to add a subtask.

Point

- You cannot add a main task. Only one main task can be constructed in one program setting.
- You cannot add a subtask in Run Mode.
- By default, the [Subtask] tab is not displayed in the step layout. If you add a subtask in the free layout, the [Subtask] tab will also appear in step layout.

1 Click [Go to Setup Mode].

2 In the [Task] view, select [Free Layout].

3 Click the [Subtask] tab.
The [Subtask] tab is displayed.

4 Right-click in the [Subtask] tab, and select [Add Subtask] from the context menu.
A new subtask frame appears.

5 Add tools in the subtask by one of the following ways:
- Selecting [Add Tool] - <category> - <tool> from the context menu
- Dragging and dropping a tool from the tool list

For details of editing tools, see "Measurement".

Creating a Memo

In Free Layout, you can add a memo (sticky note) on the [Task] view by selecting [Add Memo] from the context menu. A memo can be closed and hidden as necessary, so it does not disturb task operation. You can make the following operations on a memo.

- Move: You can move a memo by dragging it by its title bar and dropping it.
- Change the size: Drag the bottom right-hand corner of a memo to zoom in or out.
- Change the colors of the letters and the background: You can change the colors of the letters and the memo.
- Unminimize/Minimize: Double-clicking the title bar alternately shows and hides the text part of the memo.
- Show/Hide: Clicking the (Show/Hide Memo) button on the toolbar of the [Task] view simultaneously displays or hides all memos alternately.
- Delete: Clicking the [x] button on the title bar of the memo deletes the memo.

Chapter 7 Image Viewer

The [Image Viewer] displays the images associated with the selected tool. You can also overlay the inspection region and measurement results on top of it.

Overview of Functions

#G001

The [Image Viewer] is used to display images associated with the tool selected on the [Task] view, as well as graphics such as the inspection region and measurement results. You can edit the region directly on the screen, or change the display image type to check the processing result. It can be operated in either Run Mode or Setup Mode.

Point

- After the main screen is launched, it displays a black image until you perform an image capture.
- If no tool is selected or if a tool with no input image (input/output or control tool) is selected on the [Task] view, the previous image will be displayed as is.
- When you range-select multiple tools on the [Task] view or select a group, the input image of the tool with the largest tool ID is displayed.

How to Use

You can use the [Image Viewer] in the following ways:

- Display graphics such as the inspection region and measurement results (→ "Screen Layout").
- Display the raw image and the filtered image side by side (→ "Screen Layout").
- Edit the inspection and pattern regions (→ "Drawing a Region").

Point

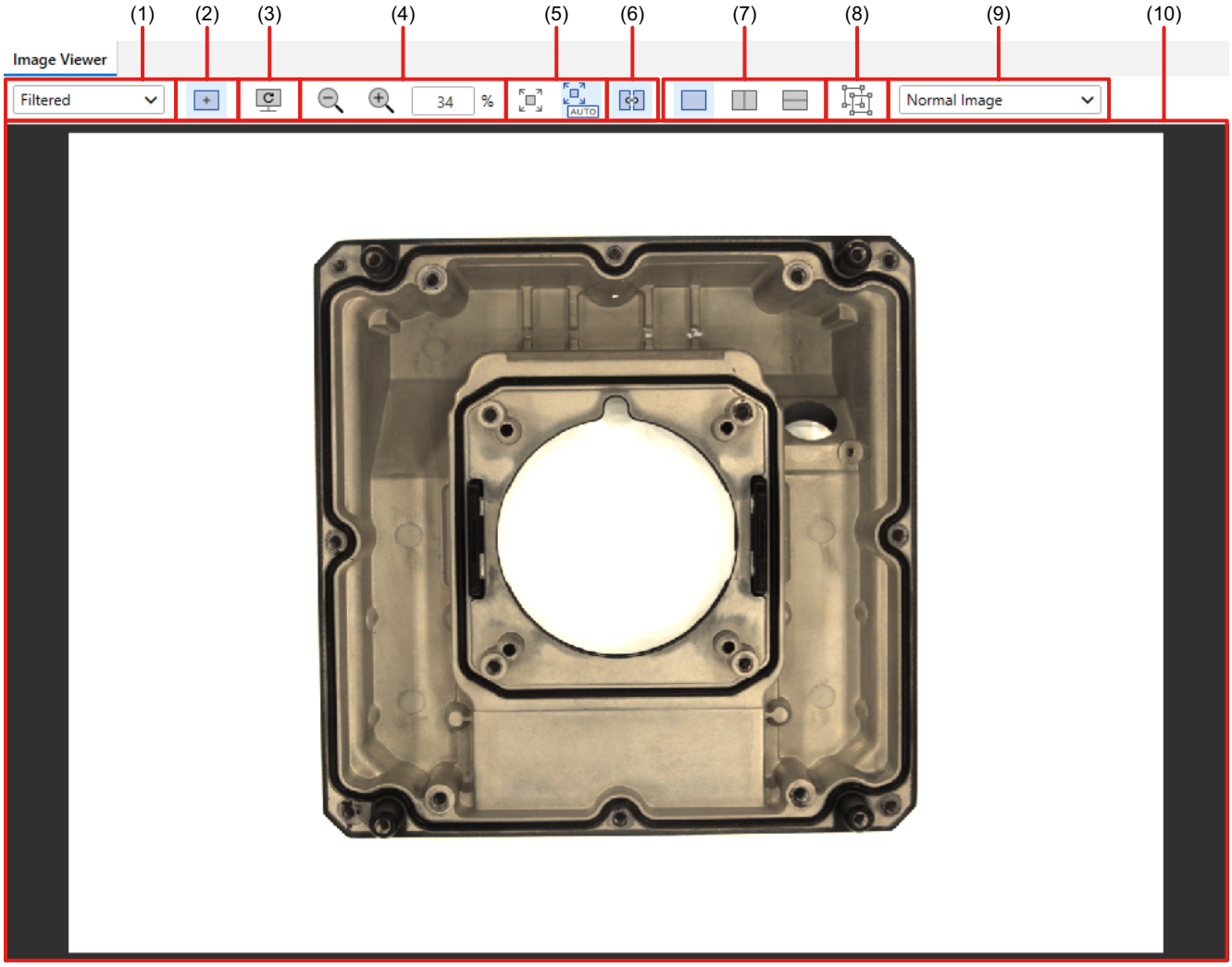
- The inspection region of some tools can only be edited when [Edit Inspection Region] Dialog is displayed.
- The pattern region can only be edited when the [Edit Pattern Region] Dialog is displayed.

- Align multiple inspection regions (→ "Align Inspection Regions").
- Move multiple inspection regions at once (→ "Move Multiple Inspection Regions at Once").

Screen Layout

#G002

A toolbar is always displayed at the top of [Image Viewer]. Buttons and drop-down menus (1) to (9) on the toolbar allow you to perform operations related to the camera image display (10).



(1) Image Type

From the drop-down menu, select the type of image to be displayed in Camera Image.

- **Raw** (default): Displays the input image associated with the tool selected on the [Task] view as it is.
- **Filtered**: Displays the filtered image of the selected tool. If you have configured Color Extraction or Image Enhance, the filtered image will only be displayed in the region.
- **Contrast**: The image display will vary depending on the tool selected.
  - [Defect] tool, [Grayscale Blob] tool: Displays the defect level and intensity difference detected within the inspection region in hue.
  - Other than the above: Same as [Filtered].

When "2-screen Display" is selected in "Screen Display", you can set the display type for each of the split screens.

(2) Graphics

Graphics are the "frames" that make up the inspection/search/pattern/mask regions and the results of processing (such as the defect position, detected line, detected circle, and so on). You can set whether to display the graphics on Camera Image (default: ON). When set to ON, the displayed graphics can be edited on the camera image (→"Drawing a Region", "Align Inspection Regions", "Move Multiple Inspection Regions at Once").

(3) Live Image

If you click this button while in Setup Mode, Camera Image will be updated as needed (default: OFF). If you open a dialog that displays an image ([Color Extraction Settings] dialog, for example) while this option is set to ON, it will switch to OFF automatically.

(4) Zoom

Sets the zoom ratio for Camera Image.

- (Zoom out): The image is zoomed out by 1% each time the button is clicked. Press and hold the button to zoom out faster. You can also zoom out of the image by rotating the mouse wheel toward you.
- (Zoom in): The image is zoomed in by 1% each time the button is clicked. Press and hold the button to zoom in faster. You can also zoom in on the image by rotating the mouse wheel away from you.
- Change/Display Zoom Ratio: Displays the current zoom ratio. You can also enter a value between 1 and 2500 (%) directly.

(5) Fit/Auto Fit

Sets whether to display the image fitted into the entire Camera Image frame.

- (Fit): Click the button to fit the image into the entire camera image frame. You can also fit the image into the entire frame by pressing and holding the mouse wheel.
- (Auto Fit): Sets whether to fit the image into the entire frame at all times (default: ON). If you change the zoom ratio while this option is set to ON, it will switch to OFF automatically.

(6) Zoom Link

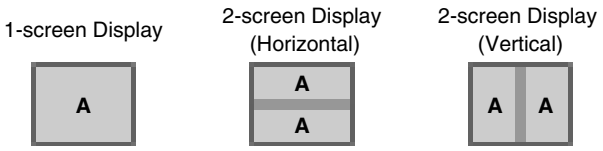
Sets whether to apply the zoom ratio of the currently displayed image to all Camera Image (default: ON). When this option is set to ON, [Auto Fit] ON/OFF will also be applied to all camera images. Setting it to OFF allows you to set the zoom ratio of each camera image individually.

(7) Screen Display

Switches the display format of the Camera Image. Only one image is displayed in the case of "2-screen Display", but you can compare patterns by setting different "Image Type" for the split screens.

- (1-screen Display) (default): Displays one image in one screen.
- (2-screen Display (Horizontal)): Displays the same image on the left-right split screens.

• (2-screen Display (Vertical)): Displays the same image on the top and bottom split screens.



(8) Display All Regions

Toggles whether or not to display all the inspection regions of the tools that take the current Camera Image as the input image (default: OFF). When this switch is ON, clicking on an inspection region on the camera image selects its corresponding tool in the [Task] view. When this switch is turned off, the inspection regions of other tools are hidden.

Reference At the time of adding a tool, this switch is automatically turned OFF when the navigation dialog is displayed. The condition before tool addition is restored when you close the navigation dialog.

Point When [Display All Regions] in ON and multiple inspection regions are displayed, clicking one of them selects its tool in the [Task] view. On [Image Viewer], you can change the position and the size of the inspection region that you clicked.

(9) Display Image

The [Display Image] drop-down list appears when you are in LumiTrax Mode or MultiSpectrum Mode.
The type of image displayed in the drop-down list will vary depending on the image selected in the tool properties.

• **Current Image**: Displayed when the tool for current image is the Capture tool.

(10)Camera Image

Displays the input image of the selected tool with the above settings applied. You can zoom in/out and move the camera image with the mouse.

Mouse action	Operation
Rotate the mouse wheel towards you	Zoom out of the image
Rotate the mouse wheel away from you	Zoom in on the image
Press and hold the mouse wheel	Fit
Move the mouse while clicking the left/right button	Move the camera image

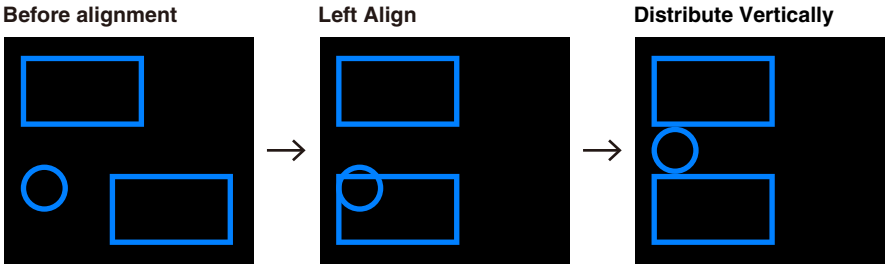
When an image is zoomed in/out using the mouse wheel, the image is zoomed in 1.1x increments with the mouse cursor tip as the center.

Point
- Nothing will be displayed if the image could not be obtained due to a measurement failure, setting error, etc.
- Scroll bars will not be displayed even if the image extends beyond the camera image frame.

Align Inspection Regions

#G003

Multiple inspection regions displayed in Camera Image can be aligned, for example, to the left.



Point

- The inspection region is displayed when [Graphics] is ON.
- The mask region will move to match the inspection region of the same tool.
- Pattern regions and pre-correction shapes cannot be aligned.

1 Select multiple tools on the [Task] view.

The inspection region of the selected tools are displayed in the camera image.

Reference The properties are not displayed in the [Properties] view because multiple tools are selected.

2 Select an alignment type from the submenu.

Alignment types: [Left Align] [Center Align] [Right Align] [Top Align] [Middle Align] [Bottom Align] [Distribute Horizontally] [Distribute Vertically]

The inspection regions are the type of alignment selected.

Move Multiple Inspection Regions at Once

#G004

You can move the inspection regions displayed in Camera Image collectively.

Point

- The inspection region is displayed when [Graphics] is ON.
- Pattern regions and pre-correction shapes cannot be moved.
- The mask region will move to match the inspection region of the same tool.

1 Select multiple tools on the [Task] view.

The inspection regions of the selected tools are displayed in the camera image.

Point

- The inspection region cannot be resized when multiple tools are selected.
- To deselect the inspection region, deselect the tool on the [Task] view.
- The inspection regions of the AI Inspection tools cannot be moved all at once.

Reference

- The properties are not displayed in the [Properties] view because multiple tools are selected.
- When you select a group, it is treated as a single tool. Tools in a group can be selected individually (→ "Grouping/Ungrouping Tools").

2 Drag & drop the inspection regions.

The selected inspection regions are moved collectively.

Chapter 8 Vision Dashboard

The Vision Dashboard has *spreadsheet calculation functions*, which are like those provided by common spreadsheet software, as well as *functions specific to the VS Creator*, which enable data sharing with other views. You can use these functions for purposes of collecting results and monitoring, including the following examples:

- Creating a spreadsheet that aggregates judgment results of multiple tools and using this spreadsheet for the control of current production.
- Creating a spreadsheet that aggregates measurement results that you want to monitor for debugging and using this spreadsheet as a watch window.

Overview of Functions

#H001

As with general spreadsheet software, you can change the display format of the Vision Dashboard of the VS Creator according to cell values and execute operations between cells using functions and formulas. Also, you can display the list of measurement items and insert images and charts to make the data more understandable. (→ "Spreadsheet Calculation Functions")
Furthermore, by referencing result items of the [Results] view from cells, you can aggregate and display the measurement results of multiple tools on the Vision Dashboard. You can also reference any cell of the Vision Dashboard as a parameter from a setting parameter of a tool placed on the [Task] view. (→ "Linkage with Other Views")

Spreadsheet Calculation Functions

The spreadsheet calculation functions of the Vision Dashboard include those equivalent to functions provided by common spreadsheet software, and those unique to the VS Creator. For details, see the linked sections.

Format Settings

Setting the formats of numbers and strings (number of digits of the decimal part, font, alignment, etc.) and the cell format (border, fill color, etc.)
(→ "Functions related to cell formats")

Cell Condition Settings

- Setting a conditional format on a cell to enable dynamic change of the cell display according to its value (→ "Setting a Conditional Format")
- Prohibiting the entry of a value that violates the data input rule (→ "Configuring Data Validation")

Editing the Vision Dashboard

- Placing an image object (→ "Inserting an Image")
- Executing a process (editing a region, executing a task, executing a soft event, or issuing a command) by a button that has been placed (→ "Inserting a Button")
- Jumping to a specific cell or opening an external content using a configured link (→ "Inserting a Link")
- Displaying the values of a specified range of cells as a chart (→ "Inserting a Chart")
- Displaying the reference relation of cells by arrows (→ "Show Links")
- Setting and displaying a comment on a cell (→ "Memo")
- Changing selected cells using a shortcut (→ "Shortcut key")
- Entering a formula while checking contents of functions and arguments (→ "Entering a Function")
- Performing auto fill (→ "Auto Fill function")
- Displaying/Hiding the cell's borders (→ "Show/Hide Gridlines")

Find and Replace

Searching for cells that match the condition and replacing values as necessary (→ "Find and Replace / Show/Hide Gridlines")

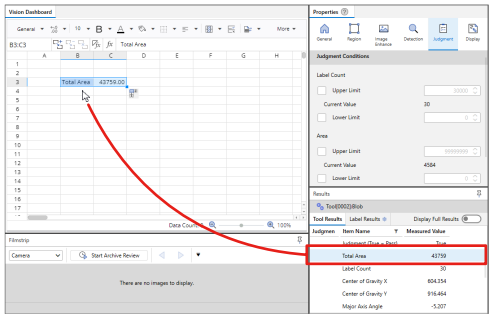
Linkage with Other Views

The Vision Dashboard enables the following functions by linkage with views of results and properties. For details, see the linked sections.

Linking from result data to a cell

Referencing a result data item from a cell and displaying its value in the cell. (→ "Referencing a result data item from a cell (linking from a result data item to a cell)")

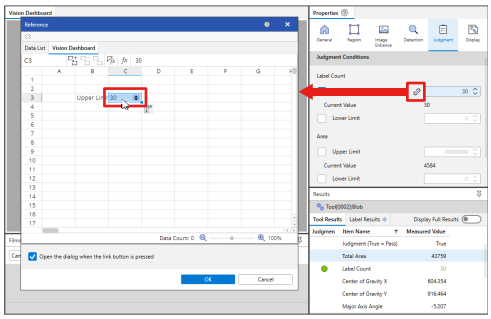
- Dragging and dropping a result data item from the [Results] view to the Vision Dashboard to display the measured value



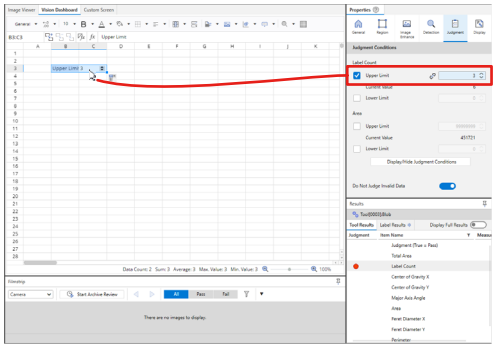
- Referencing a result data item from a cell of the Vision Dashboard in the format of "=@XXXXXX" to reflect changes of the measured value on the Vision Dashboard
- Dynamically changing the result data items to be referenced by setting a formula (e.g., @XXXXXX[A1+3]) on the label of an array of results

Linking from a cell to a setting parameter

Referencing a cell of the Vision Dashboard from a setting parameter to edit the setting parameter using the Vision Dashboard as the UI. (→ "Referencing a cell from a setting parameter (linking from a cell to a setting parameter)")



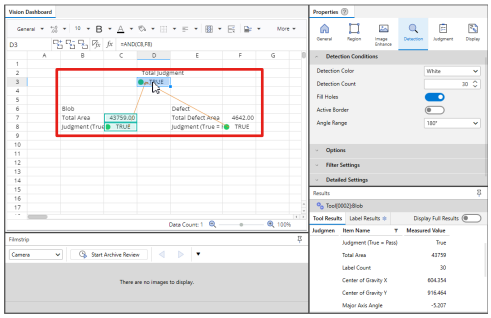
- Dragging and dropping a setting parameter from the [Properties] view or the [Data List] view to the Vision Dashboard to interlock the setting parameter and a control on the Vision Dashboard



Linkage relation between a cell and a setting parameter or result data item

Display the linkage relation between a cell and a setting parameter or result data item. (→ "Show Links")

- Displaying the relation between a cell and a setting parameter or result data item by an arrow

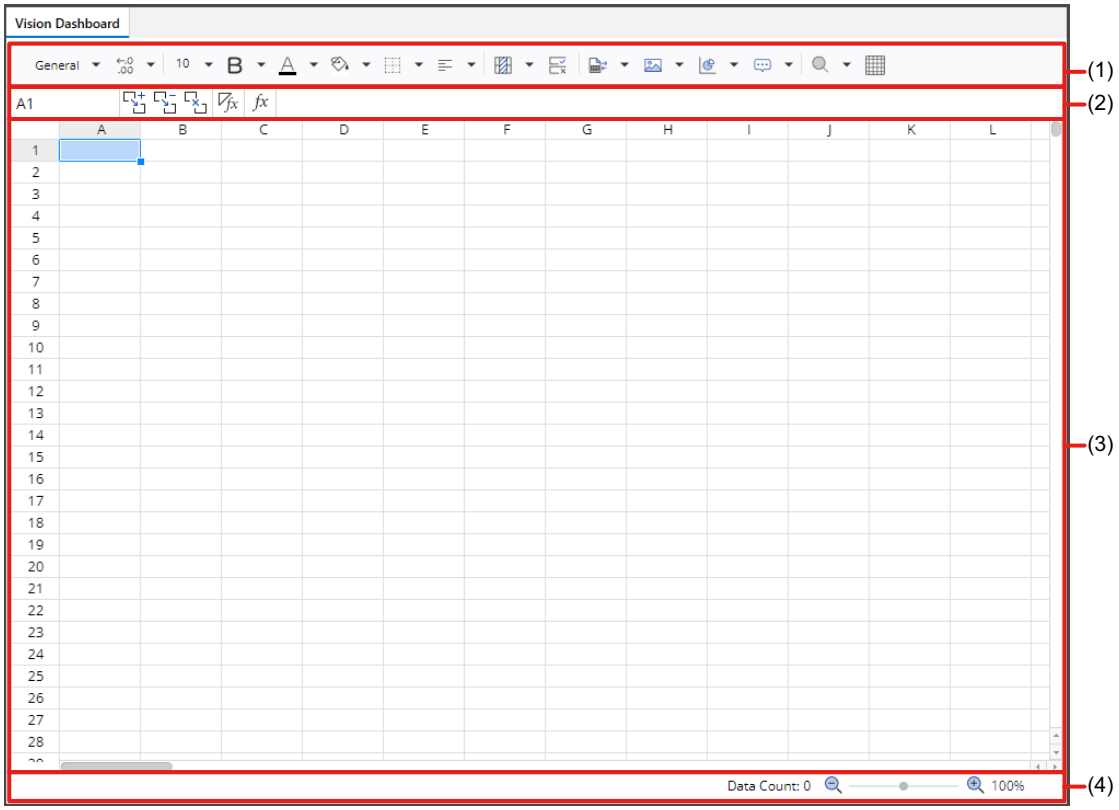


- Setting the level of the linkage relation between a cell and a setting parameter or result data item

Screen Details

#H002

The Vision Dashboard consists of a toolbar, a cell input area, and auxiliary bars.



(1) Toolbar

The Toolbar lists icons of functions. You can execute a function by clicking the corresponding icons.

(2) Top auxiliary bar

The Top auxiliary bar displays the cell number of the selected cell and the formula bar.

(3) Cell input area

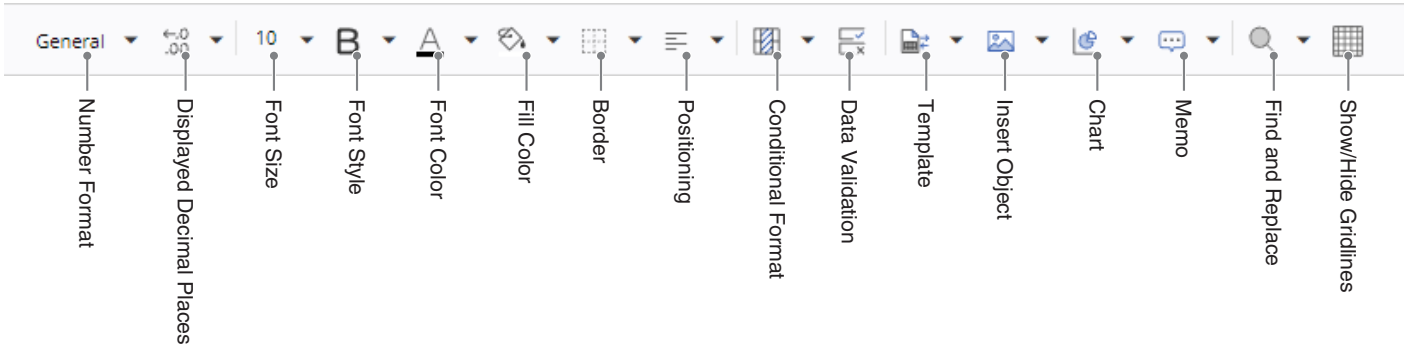
The Cell input area displays cells like a worksheet of common spreadsheet software.

(4) Bottom auxiliary bar

You can check the statistical information of the selected range of cells and change the magnification of the Vision Dashboard.

Toolbar

The toolbar is displayed at the top of the [Vision Dashboard] view, and lists icons of functions. You can execute a function by selecting a cell and then clicking the icon of the function.



Functions related to cell formats

This segment of the toolbar lists functions for setting cell formats such as the number format, font, and font style.

Number Format

You can select a format for the number entered into a cell from the following:

- **General**: Displayed in the most suitable format based on the automatic analysis of the value.
- **Text**: Displayed in the string format. It is left-aligned by default.
- **Number**: Displayed in the number format and is right-aligned. The decimal part is rounded.
- **Percentage**: Displayed in the percentage format with "%" and is right-aligned. The decimal part is rounded. To display the decimal part, click [Displayed Decimal Places]-[Increase Decimal Places].
- **Scientific**: Displayed in the exponential form. The decimal part is rounded. It is right-aligned by default.
- **Date**: Displayed in the date format (yyyy-mm-dd).
- **Time (24H)**: Displayed in the 24-hour format (hh:mm:ss).
- **Date & Time (24H)**: Displayed in the format of "yyyy-mm-dd hh:mm:ss".

Displayed Decimal Places

Increase/Decrease the number of digits of the decimal part.

- **Increase Decimal Places**: Increases the digit count in the decimal part of the number or percentage in the cell. A maximum of 80 digits can be displayed.
- **Decrease Decimal Places**: Decreases the number of digits in the decimal part if the number or percentage in the cell has a decimal part.

Font Size

The value in the cell is displayed in the selected size (1 to 409).

Font Style

You can set the following font styles:

- **Bold**: Displays the cell content in the bold style. Clicking it again changes the style back to the original.
- **Italic**: Displays the cell content in the italic style. Clicking it again changes the style back to the original.
- **Strikethrough**: Displays the cell content with strikethrough. Clicking it again changes the style back to the original.

- **Underline**: Displays the cell content with underline. Clicking it again changes the style back to the original.

Font Color

Select the color of characters.

Fill Color

Select the fill color of the cell.

Border

Make settings related to the cell border.

- **Border**: Sets the border of the selected cell.
- **Border Color**: Selects a color for the border.
- **Border Style**: Selects the style of the border.

Positioning

- Horizontal Alignment: Select the horizontal alignment style of the cell content from [Left], [Center], and [Right].
- Vertical Alignment: Select the vertical alignment style of the cell content from [Top], [Middle], and [Bottom].
- Wrap: Configure the display style for the case when the cell content is longer than the cell width.
  - **Overflow**: When the cell to the right is empty, the content is displayed beyond the right border of the cell. If the cell to the right has a content, the overflowed portion is not displayed. If the cell content has multiple lines, the content is wrapped.
  - **Wrap**: The content is wrapped within the cell. The cell height is automatically adjusted.

Cell Condition Settings

This segment of the toolbar lists functions related to cell input conditions.

Conditional Format

You can configure a rule for a cell so that the format for the rule is applied when the cell content matches the rule. (→ "Setting a Conditional Format")

- **Judgment Indicator**: Applies an icon set, i.e., a "Judgment Indicator (green and red circles)," to the selected cell.
- **New Rule**: Displays the dialog for configuring conditions and formats.
- **Clear Rule**: Deletes the conditional formatting rule.
  - **Clear Rules for Selected Range**: Deletes the conditional formatting rules configured in the selected range.
  - **Clear Rules for Entire Sheet**: Deletes the conditional formatting rules configured in the Vision Dashboard.
- **Manage Rules**: Displays the list of configured rules. You can create, edit, and delete rules.

Data Validation

Configure cell input rules such as valid value types and conditions. (→ "Configuring Data Validation")

Spreadsheet Calculation Functions

This segment of the toolbar lists functions available in common spreadsheet software.

Template

Register a reusable range of cells as a template for later use. (→ "Using a Template")

- **Insert Template**: Selects a template from the list of registered templates and inserts it.
- **Register to Template List**: Registers the selected range of cells to the list as a template.
- **Template File**: Reads or writes a template file stored in a folder.
  - **Export**: Exports the selected range of cells to any desired folder as a template file.
  - **Import**: Loads a stored template file.

Insert Object

Insert an image, button, or link.

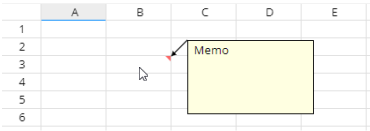
- **Image**: Inserts an image object selected by Explorer with the upper-left corner of the cell as the origin. (→ "Inserting an Image")
- **Button**: Inserts a button that executes a certain process (editing a region, executing a task, executing a soft event, or issuing a command) in the cell. (→ "Inserting a Button")
- **Insert Link**: Sets a hyperlink in the cell. You can set a link to a cell in the Vision Dashboard or an external address. (→ "Inserting a Link")

Chart

Displays the cell content as a chart. (→ "Inserting a Chart")

Memo

You can add a memo to a cell. A cell having a memo is marked by a red triangle at the upper-right corner. Placing the mouse cursor on the cell displays a memo pop-up.



- **Insert Memo**: Adds a memo to the selected cell. A memo pop-up appears and you can enter a text in the pop-up.
- **Edit Memo**: Edit the memo of the selected cell.
- **Delete Memo**: Deletes the memo of the selected cell.
- **Show/Hide All Memos**: Shows/Hides memos set on the Vision Dashboard.
- **Show/Hide Memo**: Shows/Hides the memo set on the selected cell. When the memos of the Vision Dashboard are hidden, you can choose to display only the memo of a particular cell.

Find and Replace / Show/Hide Gridlines

Find and Replace

You can search or replace a formula, or move to the cell that matches the condition.

Point Before selecting a menu item, you can specify the range of search or replacement.
- If you select zero or one cell, the entire Vision Dashboard is subject to the search or replacement.
- If you select a range of multiple cells, that range is subject to the search or replacement.

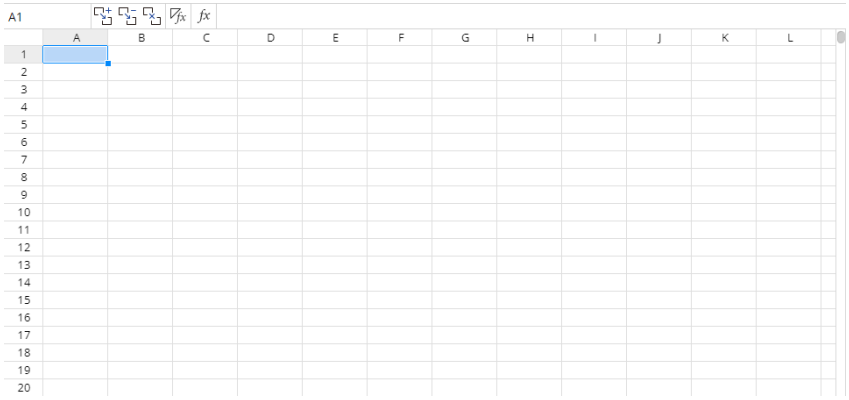
- **Find**: Finds the target formula.
  - **Search for**: Enter the search target formula (maximum of 255 characters). Clicking displays the search history.
  - **Match Case**: Selecting the check box makes the search operation case-sensitive.
  - **Find Cells with Exact Matching Content**: Selecting the check box searches for cells that exactly match the target formula.
  - **Find All**: Lists all cells and their content that were found in the Vision Dashboard.
  - **Find Next**: The found cell is displayed highlighted on the Vision Dashboard. The next found cell is displayed highlighted every time you click this button.
  - **Search Result List**: The list of found cells, formulas, and values is displayed when you click [Find All].
- **Replace**: Finds the target formula and replaces it with the specified formula.
  - **Search for**: Enter the formula to search for. Clicking displays the search history.
  - **Replace with**: Enter the replacing formula. Clicking displays the history of replacement strings.
  - **Match Case**: Selecting the check box makes the search operation case-sensitive.
  - **Find Cells with Exact Matching Content**: Selecting the check box searches for cells that exactly match the target formula.
  - **Find All**: Lists all cells and their content that were found in the Vision Dashboard.
  - **Find Next**: The found cell is displayed highlighted on the Vision Dashboard. The next found cell is displayed highlighted every time you click this button.
  - **Replace All**: All formulas of the cells found by the search are replaced all at once. The number of replaced cells is displayed.
  - **Replace**: The replaced cell is displayed highlighted on the Vision Dashboard. The next replaced cell is displayed highlighted every time you click this button.
  - **Search Result List**: The list of found cells and their values is displayed when you click [Find All].

Show/Hide Gridlines

Clicking the button toggles between showing and hiding the grid lines (borders) of the Vision Dashboard. This button is effective in both Setup Mode and Run Mode.

Cell input area

In the cell input area, you can edit cells like you do on a worksheet of common spreadsheet software. The information of the cell being edited is displayed on the Top auxiliary bar.



Top auxiliary bar

Above the cell input area, the following items are displayed.

Cell number display

The cell number of the selected cell is displayed.

Show Links

A link is a reference relation between cells or between a cell and a setting parameter or result data. For details on links, see "Configuring References".

Show Formula

For a cell whose content is a formula, clicking this toggles the cell display (between the calculation result (default display) and the formula).

Formula bar

The formula bar displays the *fx* (Insert Function) icon and the value or the formula set in the selected cell. For details on how to insert a function, see "Finding a function by search, and then inserting it".

Specifications on cell input

This section explains specifications and functions related to cell input. For details, see the linked sections.

Range of input

Maximum of 1000 rows x 100 columns

Entering a number/string

You can enter a number or string as you do with common spreadsheet software.

Point

- In Run Mode, you can only edit cells that have numbers or strings. You cannot edit a cell that has a formula.
- For a cell configured with a data validation rule, the numbers or strings that can be entered are restricted by the rule. (→ "Configuring Data Validation")

Entering a formula

When the content entered into the cell begins with "=", it is treated as a formula. (→ "Entering a Function")

Inserting an object

You can insert a chart, button, or image. (→ "Inserting a Chart", "Inserting a Button", and "Inserting an Image")

Editing by context menu

Right-clicking a target displays a context menu, as it is with common spreadsheet software. Perform any editing operation such as cutting and pasting from the context menu. Items listed in the context menu vary depending on the target (cell or chart) that you right-click. (→ "Editing by Context Menu")

Auto Fill function

You can use the Auto Fill function in the same manner as with common spreadsheet software. By dragging the handle at the lower-right corner of a selected cell along the column or row, you can automatically fill the cells in the dragging path with incremented values starting with the value of the origin cell.

When the origin cell refers to a different cell

After dragging, you can select [Copy] or [Auto Fill] from the menu displayed at the lower right of the last cell.

When the origin cell refers to a setting parameter or a result data item

The tool ID or the array element index of the referenced setting parameter or result data is incremented. After dragging, you can select [Copy], [Auto Fill (Tool ID)], or [Auto Fill (Array)] from the menu displayed at the lower right of the last cell. With the default setting, Auto Fill increments the tool ID, but you can select [Auto Fill (Array)] from the menu to increment the array element index.

When the origin cell does not make reference

- If the cell contains a number: Dragging increments the number. The number will be incremented in the same way for formulas containing functions. After dragging, you can select [Copy] or [Auto Fill] from the menu displayed at the lower right of the last cell.
- If the cell does not contain a number: Dragging copies the cell content as is. After dragging, you can select [Copy] from the menu displayed at the lower right of the last cell.

Shortcut key

The Vision Dashboard provides shortcut keys similar to those provided by common spreadsheet software.

Editing cells

Shortcut	Description
Ctrl+C	Copy
Ctrl+V	Paste
Ctrl+Z	Undo
Ctrl+Y	Redo
Ctrl+X	Cut
Del	If a cell is selected, its content is deleted. If a cell is being edited, the character on the right of the cursor is deleted. The font style and memo are retained.
Backspace	If a cell is selected, its content is deleted. If a cell is being edited, the character on the left of the cursor is deleted. The font style and memo are retained.
Enter	If a cell is being edited, the edited content is confirmed and the cell immediately below is selected.
Esc	The edited content is canceled.
Alt + Enter	A line feed is inserted in the cell.
F2	Moves the cursor to the end of the text of the selected cell.
Application (Menu) or context key	You can also open it by the context menu.

Moving between cells

Shortcut	Description
↑	Moves to the cell above.
↓	Moves to the cell below.
← or Shift +Tab	Moves to the cell on the left.
→ or Tab	Moves to the cell on the right.
Ctrl + ↑	Moves to the top cell in the same column of the selected cell.
Ctrl + ↓	Moves to the bottom cell in the same column of the selected cell.
Ctrl + ←	Moves to the left end cell in the same row of the selected cell.
Ctrl + →	Moves to the right end cell in the same row of the selected cell.
Enter	Moves to the row below if a cell is selected.
Page Up	Scrolls up by one screen in the Vision Dashboard.
Alt + Page Up	Scrolls left by one screen in the Vision Dashboard.
Page Down	Scrolls down by one screen in the Vision Dashboard.
Alt + Page Down	Scrolls right by one screen in the Vision Dashboard.
Rotating the mouse wheel while pressing Ctrl + Shift	Rotating the mouse wheel away from you scrolls the screen to the left, and rotating it toward you scrolls the screen to the right.

Selecting cells

Shortcut	Description
Ctrl + A or Ctrl + Shift + Space	Selects the entire Vision Dashboard.
Shift + a direction key	Extends the cell selection range upward, downward, left, or right by one cell.
Ctrl + Shift + a direction key	Extends the cell selection range upward, downward, left, or right to the end of the sheet. If there is a cell that has an entered value in between, extension is made to that cell.
Ctrl + Enter	Enters the value of the active cell in the selected cell range.
Shift + Enter	Finishes the cell edition, and selects the above cell.

Shortcut	Description
Ctrl + Space	Selects the whole column.
Shift + Space	Selects the whole row.

Editing the formula bar

Shortcut	Description
Backspace	Deletes the character on the left of the cursor.
Del	Deletes the character on the right of the cursor.
Enter	The edited content is confirmed and the cell below is selected.
Esc	The edited content is canceled.
F4	If the cell reference or cell range in the formula is selected, it is changed to a different combination of absolute reference and relative reference of every possible combination there are in turn each time you press F4.

Menu operations

Shortcut	Description
↓ or ↑	Selects the next or previous command if a menu or submenu is displayed.
Esc	Closes the menu, submenu, or message window that is open.

Dialog operations

Shortcut	Description
Direction key	Moves in the active drop-down list box or option group.
Enter	Executes the processing of a command button (button in a bold frame such as [OK]).
Esc	Closes the open dialog. If a floating type navigation is displayed, control returns to the standard navigation.

Format settings

Shortcut	Description
Ctrl + : (colon)	Enters the current time.
Ctrl + ; (semicolon)	Enters the current date.
Ctrl + I or Ctrl + 3	Makes the text italic or cancels the italic style.
Ctrl + B or Ctrl + 2	Makes the text bold or cancels the bold style.
Ctrl + U or Ctrl + 4	Underlines the text or removes the underline.
Ctrl + 5	Puts a strikethrough on the text or removes the strikethrough.
Ctrl + K	Opens the [Insert/Edit Link] dialog.
Esc	If a format is copied, the copy status is cleared.

Editing by Context Menu

#H003

Right-clicking a target (cell, button, or chart) on the Vision Dashboard displays a context menu. Use the context menu for any editing operation of a target. Items listed in the context menu vary depending on the type of the target (cell, button, or chart) that you right-click.

When the right-clicked target is a cell

The context menu contains editing items for the cell content, comment, and link.

Operations for cell editing

- **Cut**: Cuts the cell content.
- **Copy**: Copies the cell content.
- **Paste**: Pastes the cell content that was cut or copied.
- **Paste with Selected Format**: Pastes the cell content that was cut or copied with the selected format.
  - **Paste**: Pastes the cell content regardless of the format.
  - **Value**: Pastes the cell content as a number.
  - **Formula**: Pastes the cell content as a formula.
  - **Format**: Paste formatting only.
  - **Swap Row/Column**: Pastes cells with the rows and columns swapped.
- **Insert**: Insert a cell to the selected position. Select how to insert a cell from the context menu.
  - **Shift Right**: Shifts the cells in the same row in the right direction by the number of inserted cells.
  - **Shift Down**: Shifts the cells in the same coulmn in the downward direction by the number of inserted cells.
  - **Entire Row**: Inserts the row(s) by the number of selected cells.
  - **Entire Column**: Inserts the column(s) by the number of selected cells.
- **Delete**: Delete the selected cells. Select how to delete a cell from the context menu.
  - **Shift Left**: Shift the cells in the same row to the left by the number of deleted cells.
  - **Shift Up**: Shift the cells in the same column upward by the number of deleted cells.
  - **Entire Row**: Deletes the row(s) by the number of selected cells.
  - **Entire Column**: Deletes the column(s) by the number of selected cells.

Operations for row/column

- **Insert Row/Column**: Insert a row/column to the selected position.
- **Delete Row/Column**: Delete a row/column.
- **Row Height**: Configure the row height in the dialog box.
- **Column Width**: Configure the column width in the dialog box.

Operations for functions and data

- **Insert Function**: Displays the [Insert Function] dialog. (→ "Finding a function by search, and then inserting it")
- **Clear Formula and Value**: Deletes the data in the cell.

Operations related to template

- **Register to Template List**: Registers the selected range of cells as a template in the list of templates. (→ "Registering a Template")
- **Template File**: Reads or writes a template file stored in any folder.
  - **Export**: Exports the selected range of cells as a template file to any desired folder. (→ "Exporting a Template File")
  - **Import**: Loads a saved template file. (→ "Importing a Template File")

Operations related to sharing cell values

- **Export Values to File (CEV)**: Exports the selected range of cells as a cell values shared file (*.vdcv).
  - **New File**: Create a new cell values shared file and export it (maximum of 100).

> **Point** A two-digit number is added to the beginning of the file name. If all numbers from 00 to 99 already exist, the OK button will be disabled.

  - **Overwrite**: Selects an existing cell values shared file and overwrites it.
- **Import Values from File (CIV)**: Imports the saved cell values shared file.

Operations for memo

- **Insert Memo**: Inserts a comment to the cell when the cell has no comment set to it.
- **Edit Memo**: Edits the comment of the cell.
- **Delete Memo**: Deletes the comment of the cell.
- **Show/Hide Memo**: Shows or hides the comment of the cell.

Operations for link

- **Link**: Inserts a link in the cell when the cell does not have a link set in it.
  - **Display String**: Enter the string to be displayed on the cell.
  - **Link Type**: Select between [External Link] and [Internal Link].
  - **Address/Cell**: "Address" is displayed when [Link Type] is [External Link], and "Cell" is displayed when [Link Type] is [Internal Link]. Set the link destination in [Address] or [Cell].
- **Edit Link**: Edit the link configured for the cell.
- **Open Link**: Opens the link configured for the cell.
- **Delete Link**: Deletes the link configured for the cell.

When the right-clicked target is a button

The context menu contains menu items of operations such as cutting, pasting, and editing the button.

- **Cut**
- **Copy**
- **Paste**: Pastes the button that was cut or copied at the position of the selected cell.
- **Edit Button**: Displays the [Button Settings] dialog. For the inserted button, configure a name and an event to be executed when clicked. (→ "Configuring a Button")
- **Delete Button**: Deletes the button configured for the cell.

When the right-clicked target is a chart

The context menu contains menu items for cutting, pasting, and format setting of the chart.

- **Cut**
- **Copy**
- **Paste**: Pastes the chart that was cut or copied at the position of the selected cell.
- **Select Data**: Displays the [Data] tab of the [Chart Properties] dialog. (→ "Data")
- **Format Settings**: Displays the [Format] tab of the [Chart Properties] dialog. (→ "Format")

Configuring References

#H004

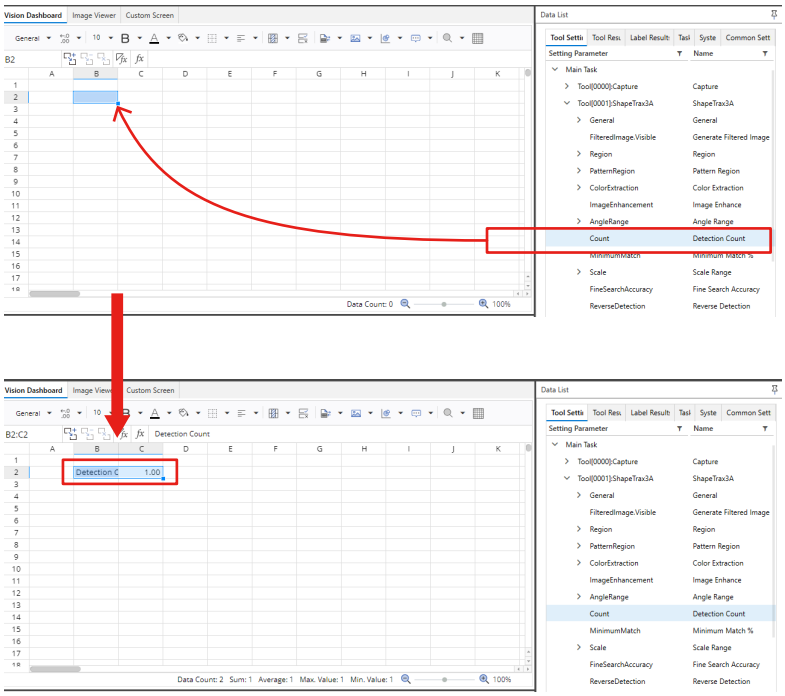
With the VS Creator, you can configure links, which represent reference relations between cells or between a cell and a setting parameter or result data. This section explains "Referencing a result data item from a cell (linking from a result data item to a cell)" and "Referencing a cell from a setting parameter (linking from a cell to a setting parameter)". You can show or hide the reference relation that you configured. (→ "Show Links")

Referencing a result data item from a cell (linking from a result data item to a cell)

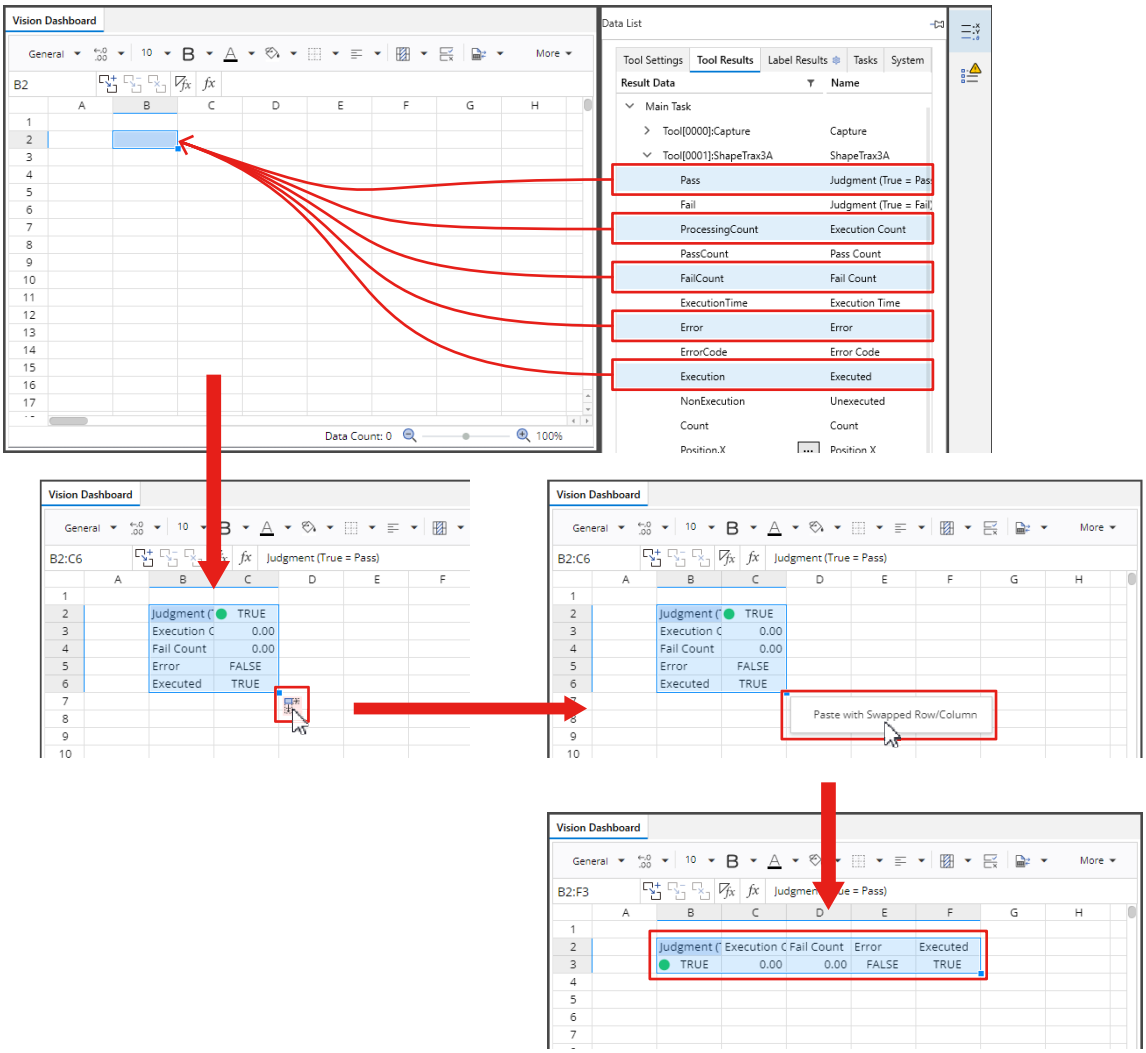
You can make reference from a cell to a result data item by "Referencing by dragging and dropping" or "Referencing by function".

Referencing by dragging and dropping

When you drag and drop a tool result or a label result from the [Data List] view or an item of the [Results] view to the Vision Dashboard, its name and value are placed in two cells side by side. Clicking the cell that displays the value shows the function for obtaining the value from the selected result data item on the Formula bar of the top auxiliary bar.



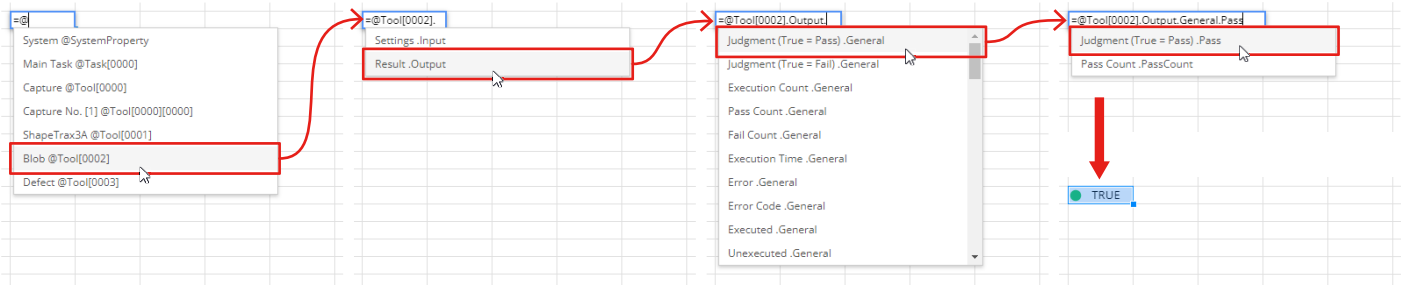
Reference When you select and drag and drop multiple items, the items are placed vertically in the Vision Dashboard. You can swap the rows and columns by selecting [Paste with Swapped Row/Column] from the menu displayed by clicking the right-bottom corner of the selected range of cells.



Referencing by function

You can directly enter a function of the form "=@<result data>" in a cell to reference a result data item. The actual expression for <result data> above starts from the tool name and item name separated by a dot (.), which are followed by a label number in brackets ([ ]).

Input example: =@Tool[0002].Output.General.Pass

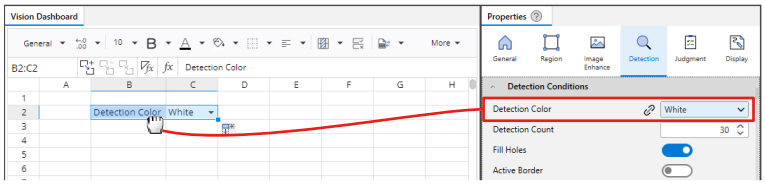


Referencing a cell from a setting parameter (linking from a cell to a setting parameter)

Reference To set a reference from a setting parameter to a cell, open the [Properties] view and the [Vision Dashboard] view beforehand for ease of your task.

Referencing by dragging and dropping

When you drag and drop a setting item (for which reference setting is possible) from the [Properties] view to the Vision Dashboard, its name and value (or function) are placed in two cells side by side.



When you click the cell that displays the value, the Formula bar of the top auxiliary bar shows the value before dragging and dropping the setting item.

Point In this case, because the setting parameter refers to the cell, the tooltip of the setting item in the [Properties] view displays the cell number.

Referencing by [Reference] dialog

1 Place the mouse cursor over the text box of a setting parameter.

The (Link) icon appears to the left of the text box.

2 Click the icon.

The [Reference] dialog appears.

3 Click the [Vision Dashboard] tab.

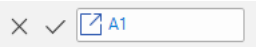
The Vision Dashboard is displayed in the [Reference] dialog.

4 Click the cell to reference.

The number of the selected cell is displayed in the text box.

Point
- You can also enter the cell number directly in the number box.
- You can set a series of text boxes all at once by selecting multiple cells. You can also select non-adjacent cells.

Reference If you deselect the [Open the dialog when the link button is pressed] check box, the [Reference] dialog does not appear the next time you click the icon. The text box will appear as shown below.



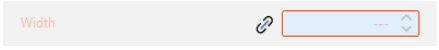
In this case, you set a reference by directly selecting a cell in the [Vision Dashboard] view.

- Select the item you wish to reference and click the icon to confirm the setting.
  - –If you have referenced a constant cell, the text box will appear in light blue and the cell value will be shown in black. A change to either the cell or setting parameter is reflected to each other.
  - –If you have referenced a formula cell, the text box will appear in light blue and the cell calculation result will be shown in gray.
- Click the icon to cancel the setting.
- Click the icon in the text box to open the [Reference] dialog.

5 Click the [OK] button.

The reference relationship is now confirmed. The text box turns light blue and displays the content of the cell.

Point
- In the following tools, the text box will not appear in light blue even if you set the reference relationship. The name of the setting parameter or result data, or the cell number is displayed instead the value.
  - –Data Input (Industrial Ethernet) Tool
  - –Data Output (Industrial Ethernet/Non-Procedural/FTP/Storage) Tool
  - –Statistics Tool/Yield Rate Tool/Data History Tool
- After the reference relation has been confirmed, clicking the icon that appears when the mouse cursor is placed over the text box cancels the reference relation.
- If the cell content is a number, a change to either the cell or setting parameter is reflected to each other.
- If the cell content is a formula, a change to the cell is reflected to the setting parameter but you cannot change the setting parameter.
- A setting error will occur when the data types do not match. The name of the setting item is displayed in red, and "-" appears in red in the text box.



- Numbers shown in gray cannot be changed. Any change to the referenced item is reflected to the setting parameter.
- Click the icon to the left of the text box to return to step 2.

Reference After the reference relation has been confirmed, placing the mouse cursor over the text box displays the referenced cell number in a tooltip.

Show Links

In the Vision Dashboard, reference relations are indicated by arrows. The root (•) of an arrow indicates the referenced side, and the tip of the arrow (arrowhead) indicates the referencing side.

You can display or hide reference relation arrows in the Vision Dashboard by raising and lowering the dependency level. An arrow is not displayed if the dependency level is 0 (initial display). An arrow is displayed if dependency level is 1 or higher.

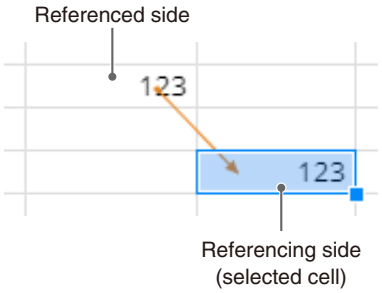
- Raise Dependency Level: All arrows from/to the selected cell are displayed. You can raise the dependency level up to 10.
- Lower Dependency Level: Every time you click this button, the dependency levels of all cells are lowered.
- Reset Dependency Level: The dependency levels of all cells are set to 0.

Point

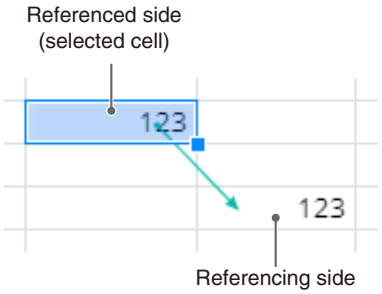
- If you wish to display arrows for multiple cells, select the cells simultaneously.
- The dependency level is uniformly applied to the selected multiple cells.
- Arrows are hidden when you set the dependency level to 0.

Referencing within the Vision Dashboard

An arrow that represents a reference relation between cells of the Vision Dashboard extends from the right of the referenced cell to the left of the referencing cell. If the selected cell is the referencing cell, the arrow is displayed as an orange solid line.

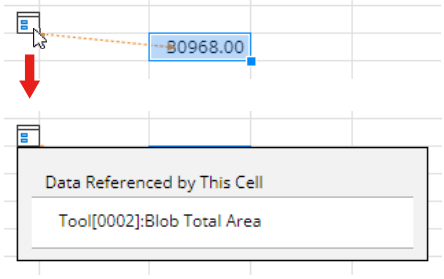


If the selected cell is the referenced cell, the arrow is displayed as a light green solid line.



Referencing a result data item (link from a result data item to a cell)

If the selected cell is a referencing cell (if the result data item is referenced), the (Reference) icon is placed toward the upper left of the cell. The arrow is represented by an orange dotted line that extends from the bottom-right corner of the icon to the left of the cell.



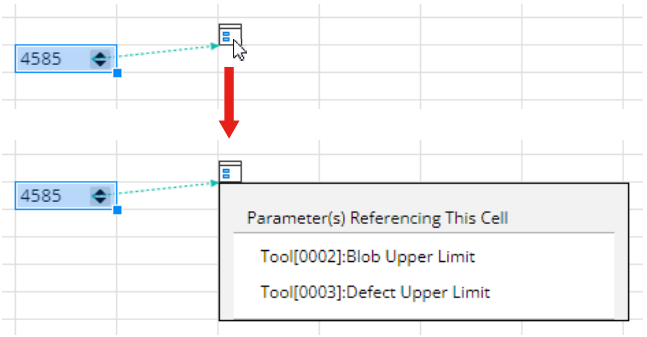
Point

The icon and the arrow are not displayed when you select multiple cells.

Reference
- Clicking the icon displays a pop-up box showing the result data name (the tool ID, tool name, and result data name).
- The tool containing the referenced result data is highlighted in orange in the [Task] view.

Referencing from a setting parameter (link from a cell to a setting parameter)

If the selected cell is the referenced side (if the setting parameter is the referencing side), the icon is placed toward the upper right of the cell. The arrow is represented by a light green dotted line that extends from the right of the cell to the bottom left of the icon.



Point
The icon and the arrow are not displayed when you select multiple cells.

Reference
- Clicking the icon displays a pop-up box showing the setting parameter name (the tool ID, tool name, and setting parameter name).
- The tool containing the referencing setting parameter is highlighted in aqua in the [Task] view.

Entering a Function

#H005

Functions of arithmetic operations and judgment on measurement results are provided for the Vision Dashboard. Using these functions, you can process measurement data into a comprehensible representation, or monitor judgment results on the Vision Dashboard.
The following functions are available for the Vision Dashboard. For the formats and details of these functions, see the linked sections.

- Operator
- Date/Time Functions
- Math/Trigonometry Functions
- Statistics Functions
- Lookup/Reference Functions
- String Operation Functions
- Logical Functions
- Information Functions
- Engineering
- 2D Geometric Operation Functions

In the event of an error of a function

The following errors can occur with functions. If an error occurs, find the condition causing the error, and then correct the function or change the setting. For function-specific error conditions, see "Error condition" in the description of the relevant function.

- #VALUE! error
  - When there is a missing or excessive argument
  - When the type of an argument is different from the specification
  - When the value of an argument is beyond the lower/upper limit or the number of characters of an argument exceeds the upper limit
- #NUM! error
  When the usable range of data is exceeded
- #REF! error
  When it is not possible to reference the specified cell, setting parameter, or result data
- #DIV/0! error
  When the denominator of division is 0 or an empty cell
- #NAME? error
  When the specified function does not exist
- #CODE! error
  When an invalid mathematical expression is entered
- #MEMORY! error
  When the internal memory is exhausted during calculation
- #INVALID! error
  When the value of the referenced setting parameter or result data is invalid

Ways of Entering a Function

You can enter a function into a cell in one of the two ways: "Entering a function directly" and "Finding a function by search, and then inserting it".

Entering a function directly

Enter a function directly in a cell. By entering "=" first and then a string after that, the string is recognized as a function.

Finding a function by search, and then inserting it

When you are not sure of the name of the target function, you can find it by entering a part of the name or selecting the category of the function.

1 Select the cell that you want to insert a function in.

2 Click the *fx* (Insert Function) icon on the top auxiliary bar.
The [Insert Function] dialog appears.

3 Enter the entire function name or a part of it in [Function Search].

4 Click [Find].
Functions that match the string that you entered in [Function Search] are listed in [Function Name].

5 If you want to narrow down the displayed functions, select the category of the target function from [Function Category].
Here are the categories of functions.
- **Date/Time**
- **Math/Trigonometry**
- **Statistics**
- **Lookup/Reference**
- **String Operation**
- **Logical**
- **Information**
- **Engineering**
- **2D Geometric Operation**

6 Select the function that you want to insert.
The name and description of the selected function are displayed.

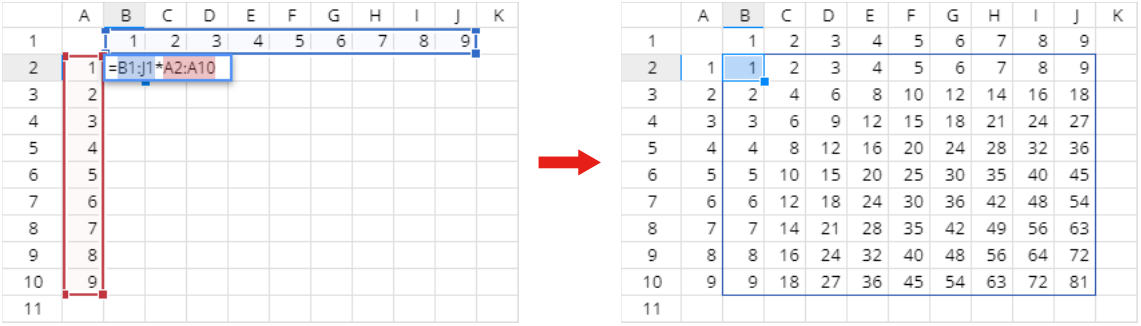
7 Click [OK].
The function is inserted in the selected cell.

Spill

Vision Dashboard supports spill. A spill is a feature that extends the result of a formula from the input cell to adjacent cells.

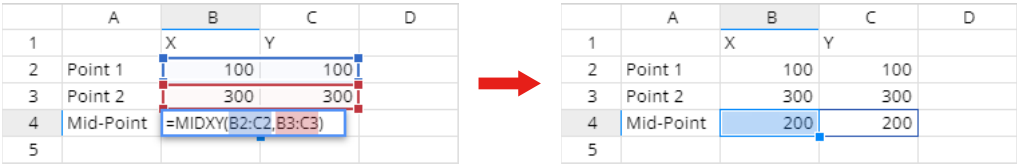
Spill usage example ① When specifying multiple cells and multiplying them

When multiple cells are specified in B2 and multiplication is entered, the result of the calculation extends starting from B2.

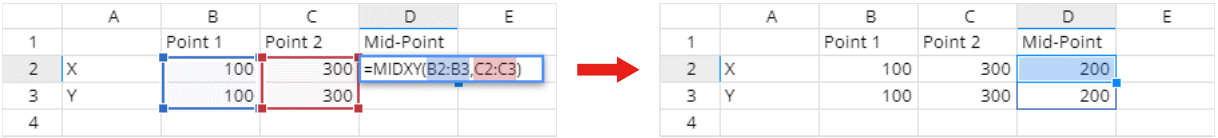


Spill usage example ② When finding the midpoint from the XY coordinates of two points using the MIDXY function

When the MIDXY function is entered to B4, the X coordinate is placed in B4 and the Y coordinate is expanded to C4.



The direction in which the calculation results of the function are expanded is the same as the direction specified in the cell range. If a range of cells is specified vertically, the calculation results of the function are also expanded vertically.



If a cell within the range where the calculation results of the function are expanded contains a value, a #SPILL! error occurs.

Operator

Function Name	Description
Operator_Reference (@)	@A (Refers to A)

Function Name	Description
Arithmetic Operator_Addition (+)	A+B (Adds B to A)
Arithmetic Operator_Subtraction (-)	A-B (Subtracts B from A)
Arithmetic Operator_Multiplication (*)	A*B (Multiplies A by B)
Arithmetic Operator_ Division (/)	A/B (Divides A by B)
Arithmetic Operator_Percent Presentation (%)	A% (Presents A by percentage)
Arithmetic Operator_Exponentiation (^)	A^B (Raises A to the Bth power)
Comparative Operator_Equal to or Less Than (<=)	A<=B (TRUE if A is equal to or less than B)
Comparative Operator_Equal to or Larger Than (>=)	A>=B (TRUE if A is equal to or larger than B)
Comparative Operator_Equal to (=)	A=B (TRUE if A is equal to B)
Comparative Operator_Not Equal to (<>)	A<>B (TRUE if A is not equal to B)
Comparative Operator_Smaller than (<)	A<B (TRUE if A is smaller than B)
Comparative Operator_Larger than (>)	A>B (TRUE if A is larger than B)
Character String Operator_Concatenation (&)	A&B (Concatenates A and B)

Operator_Reference (@)

"@A" references A.

Argument 1

Specify <alphabetic string>, <alphabetic string>.<alphabetic string>, or <number>[number]

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Setting parameter / Result data	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String Number Logical value Error value	Not relevant	Not relevant	Result of referencing Argument 1

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	20

- Formula 1
  =@A1
  → Return value: 20
- Formula 2
  =@Tool[0001].Output.Area

→ Return value: Tool 1 area value

Arithmetic Operator_Addition (+)

"A+B" adds B to A.

Argument 1

Specify the values to be summed.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Result of addition

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	20

- Formula 1
  =A1+10
  → Return value: 30
- Formula 2
  =A1+A1
  → Return value: 40
- Formula 3
  ={10,20}+A1
  → Return value:

30	40

Arithmetic Operator_Subtraction (-)

"A-B" subtracts B from A.

Argument 1

Specify the values for subtraction.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Result of subtraction

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	20

- Formula 1
  =A1-10
  → Return value: 10
- Formula 2
  =A1-A1
  → Return value: 0
- Formula 3
  ={10,20}-A1
  → Return value:

-10	0

Arithmetic Operator_Multiplication (*)

"A*B" multiplies A by B.

Argument 1

Specify the values for multiplication.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Result of multiplication

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	20

- Formula 1
  =A1*10
  → Return value: 200
- Formula 2
  =A1*A1
  → Return value: 400
- Formula 3
  ={10,20}*A1
  → Return value:

200	400

Arithmetic Operator_ Division (/)

"A/B" divides A by B.

Argument 1

Specify the values for division.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Result of division

Error condition

#DIV/0! error

– When zero division occurs

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	20

- Formula 1
  =A1/10
  → Return value: 2
- Formula 2
  =A1/A1
  → Return value: 1

- Formula 3
  ={10,20}/A1
  → Return value:

0.5	1

Arithmetic Operator_Percent Presentation (%)

"A%" presents A by percentage.

Argument 1

Specify a value for percentage presentation.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Percentage

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	20

- Formula 1
  =100%
  → Return value: 1
- Formula 2
  =A1%
  → Return value: 0.2
- Formula 3
  ={10,20}%
  → Return value:

0.1	0.2

Arithmetic Operator_Exponentiation (^)

"A^B" raises A to the power of B (A: argument 1; B: argument 2).

Argument 1

Specify the value for the base (A) to be raised.

Argument 2

Specify the value for the exponent (B) in the exponentiation.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Applicable	Not relevant	Not relevant	A: Value for the base
Argument 2	Number	Applicable	-2147483648	2147483647	B: Value for the exponent in the exponentiation

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Result of exponentiation

Error condition

#DIV/0! error

– When zero division occurs
– When argument 1 is 0 and argument 2 is a negative value. Or when argument 1 is a value greater than or equal to 0 and smaller than 1, and argument 2 is a large negative value

#VALUE! error

When argument 2 is beyond the upper or lower limit

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	2

- Formula 1
  =10^2
  → Return value: 100
- Formula 2
  =A1^B1
  → Return value: 400
- Formula 3
  ={10,20}^2
  → Return value:

100	400

Comparative Operator_Equal to or Less Than (<=)

"A<=B" returns TRUE if A is equal to or less than B.

Argument 1

Specify the values to be compared.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	Result of comparison

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	10

- Formula 1
  =10<=20
  → Return value: TRUE
- Formula 2
  =A1<=B1
  → Return value: FALSE
- Formula 3
  ={10,20}<=10
  → Return value:

TRUE	FALSE

Comparative Operator_Equal to or Larger Than (>=)

"A>=B" returns TRUE if A is equal to or larger than B.

Argument 1

Specify the values to be compared.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	Result of comparison

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	10

- Formula 1
  =10>=20
  → Return value: FALSE
- Formula 2
  =A1>=B1
  → Return value: TRUE
- Formula 3
  ={10,20}>=10
  → Return value:

TRUE	TRUE

Comparative Operator_Equal to (=)

"A=B" returns TRUE if A is equal to B.

Argument 1

Specify the values to be compared.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	Result of comparison

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	10

- Formula 1
  =10=10
  → Return value: TRUE
- Formula 2
  =A1=B1
  → Return value: FALSE
- Formula 3
  ={10,20}=10
  → Return value:

TRUE	FALSE

Comparative Operator_Not Equal to (<>)

"A<>B" returns TRUE if A is not equal to B.

Argument 1

Specify the values to be compared.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	Result of comparison

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	10

- Formula 1
  =10<>10
  → Return value: FALSE
- Formula 2
  =A1 <> B1
  → Return value: TRUE
- Formula 3

={10,20} <> 10
→ Return value:

FALSE	TRUE

Comparative Operator_Smaller than (<)

"A<B" returns TRUE if A is smaller than B.

Argument 1

Specify the values to be compared.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	Result of comparison

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	10

- Formula 1
  =10<10
  → Return value: FALSE
- Formula 2
  =A1 < B1
  → Return value: FALSE
- Formula 3
  ={10,20} < 10
  → Return value:

FALSE	FALSE

Comparative Operator_Larger than (>)

"A>B" returns TRUE if A is larger than B.

Argument 1

Specify the values to be compared.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	Result of comparison

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	10

- Formula 1
  =10>10
  → Return value: FALSE
- Formula 2
  =A1>B1
  → Return value: TRUE
- Formula 3
  ={10,20}>10
  → Return value:

FALSE	TRUE

Character String Operator_Concatenation (&)

"A&B" concatenates A and B.

Argument 1

Specify the strings to be concatenated.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	Result of string concatenation

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	10

- Formula 1
  =10&"h"
  → Return value: 10h
- Formula 2
  =A1&B1
  → Return value: 2010
- Formula 3
  ={10,"h"}&10
  → Return value:

1010	h10

Date/Time Functions

Function Name	Description
DATE(argument 1, argument 2, argument 3)	Calculates a date from year, month, and day
DATEVALUE(argument 1)	Calculates a serial number from a string representing a date
DAY(argument 1)	Extracts the day from a date
EDATE(argument 1, argument 2)	Calculates a date that is several months earlier or later
HOUR(argument 1)	Extracts the hour from a time
MINUTE(argument 1)	Extracts the minute from a time
MONTH(argument 1)	Extracts the month from a date
NOW()	Gets the current date and time
SECOND(argument 1)	Extracts the second from a time
TIME(argument 1, argument 2, argument 3)	Calculates a time from hour, minute, and second
TIMEVALUE(argument 1)	Calculates a serial number from a string representing a time
TODAY()	Gets the current date
YEAR(argument 1)	Extracts the year from a date

DATE(argument 1, argument 2, argument 3)

Returns the date created from three values.

Argument 1

Specify the value of year.

Argument 2

Specify the value of month.

Argument 3

Specify the value of day.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	0	100000	
Argument 2	Number	Not applicable	0	100000	
Argument 3	Number	Not applicable	0	100000	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1900-1-1	9999-12-31	Date (serial number)

Error condition

#NUM! error

– When all arguments refer to empty cells
– When the value of day is specified so that the resulting year is later than 9999
– When the value of month is specified so that the resulting year is later than 9999
– When the value of day is specified so that the resulting year is earlier than 1900
– When the value of month is specified so that the resulting year is earlier than 1900
– When the value of month is 32767 or larger
– When the value of year is 10000 or larger

#VALUE! error

– When referencing a cell containing an error type value
– When a value exceeding the upper or lower limit is specified for an argument

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	2024	6	15
2	1999	15	32

- Formula 1
  =DATE(A1,B1,C1)
  → Return value: 2024-6-15
- Formula 2
  =DATE(A2,B2,C2)
  → Return value: 2000-4-1

DATEVALUE(argument 1)

Converts a string representing a date to a serial number.

Argument 1

Specify a string representing a date in date format.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	1	2958465	The value of the day counted from day 1, which is January 1, 1900

Error condition

#VALUE! error

When argument 1 cannot be interpreted as a date

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	2024-12-15

Formula
=DATEVALUE(A1)
→ Return value: 45641

DAY(argument 1)

Extracts the day from a serial number that represents a date. Specify a serial number using the DATE function or the result of other formula or function. You may get an error if you specify a string as the date (the #NUM! error occurs for a value equal to or larger than 2958466).

Argument 1

Specify the date wherein to search the day.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	31	Date

Error condition

#NUM! error

When the value of argument 1 is beyond the upper or lower limit

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	2024-12-15

- Formula
  =DAY(A1)
  → Return value: 15

EDATE(argument 1, argument 2)

Returns the serial number corresponding to the date calculated from the starting date by the specified number of months before or after that date. You can calculate the date of payment or maturity whose day value is the same as that of the date of issue of the invoice.

Argument 1

Specify the starting date. Specify a date using the DATE function or the result of other formula or function.

Argument 2

Specify the number of months from the starting date. If you specify a positive number for the month, you will get a date later than the starting date, and if you specify a negative number for the month, you will get a date earlier than the starting date.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	0	2958465	
Argument 2	Number	Not applicable	-97199	97199	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	2958465	Serial number

Error condition

#NUM! error

– When argument 1 exceeds the lower limit or upper limit
– When argument 2 exceeds the lower limit or upper limit
– When the return value exceeds the lower limit or upper limit

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	2024-12-15	1

Formula
=EDATE(A1,B1)
→ Return value: 2025/1/15

HOUR(argument 1)

Extracts the hour from a serial number.

Argument 1

Specify a serial number that contains an hour value by a string (e.g., "6:45 PM"), a decimal (e.g., 0.78125 which represents 6:45 PM), or the result of other formula or function (e.g., TIMEVALUE("6:45 PM")).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	24	Hour

Error condition

#NUM! error

When the value of argument 1 is beyond the upper or lower limit

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	12:34:56

Formula
=HOUR(A1)
→ Return value: 12

MINUTE(argument 1)

Extracts the minute from a serial number.

Argument 1

Specify a serial number that contains a minute value by a string (e.g., "6:45 PM"), a decimal (e.g., 0.78125 which represents 6:45 PM), or the result of other formula or function (e.g., TIMEVALUE("6:45 PM")).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	59	Minute

Error condition

#NUM! error

When the value of argument 1 is beyond the upper or lower limit

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	12:34:56

Formula
=MINUTE(A1)
→ Return value: 34

MONTH(argument 1)

Extracts the month from a serial number that represents a date.

Argument 1

Specify a serial number using the DATE function or the result of other formula or function. You may get an error if you specify a string as the date.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1	12	Month

Error condition

#NUM! error

When the value of argument 1 is beyond argument 1 is beyond the upper or lower limit

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	2024-12-15

Formula
=MONTH(A1)
→ Return value: 12

NOW()

Return the serial number that corresponds to the date and time when the measurement was started.

Point You can use this function only in a formula in a cell (you cannot use it for data input rules, conditional formats, etc.).

Argument

None

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1900/1/0 0:00:00	2958466	Date and time

Error condition

#INVALID! error

When no measurements have been performed after resetting or restarting the device

For errors common among functions, see "In the event of an error of a function".

Example

NOW()=YYYY-MM-DD hh:mm:ss (the date and time when the measurement was started)

SECOND(argument 1)

Extracts the second from a time.

Argument 1

Specify a serial number that contains a second value by a string (e.g., "6:45:27 PM"), a decimal (e.g., 0.7815625 which represents 6:45:27 PM), or the result of other formula or function (e.g., TIMEVALUE("6:45:27 PM")).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	59	Second

Error condition

#NUM! error

When the value of argument 1 is beyond the upper or lower limit

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	12:34:56

Formula
=SECOND(A1)
→ Return value: 56

TIME(argument 1, argument 2, argument 3)

Returns a decimal serial number from the values of hour, minute, and second representing a time.

Argument 1

Specify the value of hour. If the specified value is 24 or larger, the remainder of division by 24 is used.

Argument 2

Specify the value of minute. A value of 60 or larger automatically increments the hour value. A negative value decrements the hour value.

Argument 3

Specify the value of second. A value of 60 or larger automatically increments the minute value. A negative value decrements the minute value.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	0	100000	
Argument 2	String	Not applicable	0	100000	
Argument 3	String	Not applicable	0	100000	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	0	0.99988426	Time from 00:00:00 (00:00:00 AM) to 23:59:59 (11:59:59 PM)

Error condition

#NUM! error

– When the value of argument 1, argument 2, or argument 3 is beyond the upper limit
– When the calculation result is smaller than 0

#VALUE! error

When a value exceeding the upper or lower limit is specified for an argument

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	12	34	56
2	26	91	68

- Formula 1
  =TIME(A1,B1,C1)
  → Return value: 12:34:56
- Formula 2
  =TIME(A2,B2,C2)
  → Return value: 3:32:08

TIMEVALUE(argument 1)

Returns a decimal serial number from a string representing a time.

Argument 1

Specify a string of a time. Although it is not a number, each part of hh:mm:ss is recognized as a value of time if it does not exceed 9999. You cannot specify a negative value. If the specified hour value is 24 or larger, the remainder of division by 24 is applied. A minute or second value that is 60 or larger increments the hour or minute value, respectively.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	00:00:00	Hour: 9999 Minute: 9999 Second: 9999	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	0.99988426	Time from 00:00:00 (00:00:00 AM) to 23:59:59 (11:59:59 PM) (Serial number)

Error condition

#VALUE! error

When incrementation occurs in multiple portions of hh:mm:ss

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	12:34:56

Formula
=TIMEVALUE(A1)
→ Return value: 0.524259259259259

TODAY()

Return the serial number that represents the date when the measurement was started.

Point You can use this function only in a formula in a cell (you cannot use it for data input rules, conditional formats, etc.).

Argument

None

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Date (Serial number)

Error condition

#INVALID! error

When no measurements have been performed after resetting or restarting the device

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

TODAY()=YYYY-MM-DD (the date and time when the measurement was started)

YEAR(argument 1)

Extracts the year from a serial number that represents a date.

Argument 1

Specify a serial number using the DATE function or the result of other formula or function. You may get an error if you specify a string as the date.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1900	9999	Year

Error condition

#NUM! error

When the value of argument 1 is beyond the upper or lower limit

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	2024-12-15

Formula
=YEAR(A1)
→ Return value: 2024

Math/Trigonometry Functions

Function Name	Description
ABS(argument 1)	Calculates the absolute value
ACOS(argument 1)	Calculates the arccosine
ASIN(argument 1)	Calculates the arcsine
ATAN(argument 1)	Calculates the arctangent
ATAN2(argument 1, argument 2)	Calculates the arctangent from the X and Y coordinates
CEILING(argument 1, argument 2)	Rounds up a number to a multiple of a base number
CEILING.MATH(argument 1, [argument 2], [argument 3])	Rounds up a number to a multiple of a base number
COS(argument 1)	Calculates the cosine
DEGREES(argument 1)	Converts radians to degrees
EVEN(argument 1)	Rounds up a number to the nearest even number
EXP(argument 1)	Calculates the power of the base of natural logarithm e
FLOOR(argument 1, argument 2)	Rounds down a number to a multiple of a base number
FLOOR.MATH(argument 1, [argument 2], [argument 3])	Rounds down a number to a multiple of a base number
INT(argument 1)	Rounds off the decimal part
LN(argument 1)	Calculates the natural logarithm
LOG(argument 1, [argument 2])	Calculates the logarithm to the base of any number
LOG10(argument 1)	Calculates the common logarithm
MOD(argument 1, argument 2)	Calculates the remainder
MROUND(argument 1, argument 2)	Rounds a number to a multiple of the specified number
ODD(argument 1)	Rounds a number up to the nearest odd number
PI()	Obtains an approximate value of the circumference ratio π
POWER(argument 1, argument 2)	Calculates the result of a number raised to a power
PRODUCT(argument 1, [argument 2], ...[argument 32])	Calculates the product

Function Name	Description
QUOTIENT(argument 1, argument 2)	Calculates the integer quotient
RADIANS(argument 1)	Converts degrees to radians
RAND()	Generates a random number (a decimal equal to or larger than 0 and smaller than 1)
ROUND(argument 1, argument 2)	Rounds a number to the specified number of digits
ROUNDDOWN(argument 1, argument 2)	Rounds down a number to the specified number of digits
ROUNDUP(argument 1, argument 2)	Rounds up a number to the specified number of digits
SIGN(argument 1)	Checks whether the number is positive or negative
SIN(argument 1)	Calculates the sine
SQRT(argument 1)	Calculates the square root
SUM(argument 1, [argument 2], ...[argument 32])	Sums numbers
SUMIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n]], ...)	Sums numbers with multiple conditions specified
TAN(argument 1)	Calculates the tangent
MDETERM(argument 1)	Returns the determinant of an array
MINVERSE(argument 1)	Returns the inverse matrix for the matrix stored in an array
MMULT(argument 1, argument 2)	Returns the matrix product of two arrays
ACOSD(argument 1)	Returns the degree value of the arccosine (inverse cosine) of a number
ASIND(argument 1)	Returns the degree value of the arcsine (inverse sine) of a number
ATAND(argument 1)	Returns the degree value of the arctangent (inverse tangent) of a number.
ATAN2D(argument 1, argument 2)	Returns the degree value of the arctangent (inverse tangent) of specified X and Y coordinates
COSD(argument 1)	Returns the cosine of an angle specified in degrees (angle notation)
SIND(argument 1)	Returns the sine of an angle specified in degrees (angle notation)
TAND(argument 1)	Returns the tangent of an angle specified in degrees (angle notation)

ABS(argument 1)

Returns an absolute value or unsigned number.

Argument 1

Specify a number that you want to get the absolute value of.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Absolute value

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	20
2	-25

- Formula 1
  =ABS(A1)
  → Return value: 20
- Formula 2
  =ABS(A2)
  → Return value: -25

ACOS(argument 1)

Returns the arccosine (inverse cosine) of the number. The arccosine of a number is the angle that the number is the cosine of. The return value is a radian in the range from 0 to pi.

Argument 1

Specify the cosine value of the angle to obtain in the range from -1 to 1.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-1	1	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	3.14159265359	Arccosine of the number

Error condition

#NUM! error

When a value exceeding the upper or lower limit is specified for argument 1

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ACOS(0.5)=1.04719755119659
- Formula 2: ACOS(-1)=3.14159265358979

ASIN(argument 1)

Returns the arcsine (inverse sine) of the number. The arcsine of a number is the angle that the number is the sine of. The return value is a radian in the range from -pi/2 to pi/2.

Argument 1

Specify the sine value of the angle to obtain in the range from -1 to 1.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-1	1	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	-1.57079632679	1.57079632679	Arcsine of the number

Error condition

#NUM! error

When a value exceeding the upper or lower limit is specified for argument 1

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ASIN(0.5)=0.523598775598299
- Formula 2: ASIN(-1)=-1.57079632679489

ATAN(argument 1)

Returns the arctangent (inverse tangent) of the number. The arctangent of a number is the angle that the number is the tangent of. The return value is a radian in the range from -pi/2 to pi/2.

Argument 1

Specify the tangent value of the angle to obtain.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	-1.57079632679	1.57079632679	Arctangent of the number

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ATAN(0.5)=0.463647609000806
- Formula 2: ATAN(-1)=-0.785398163397448

ATAN2(argument 1, argument 2)

Returns the arctangent (inverse tangent) of the specified X coordinate and Y coordinate. The return value is the angle formed by the X axis and the line that passes through the origin (0, 0) and the coordinate point (x, y). The return value is a radian in the range from -pi to pi (excluding -pi).

Argument 1

Specify the X coordinate of the point.

Argument 2

Specify the Y coordinate of the point.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	-3.141592654	-3.141592654	Arctangent of the number

Error condition

#VALUE! error

When any argument value is not of the numerical type

#DIV/0! error

When all arguments are 0

For errors common among functions, see "In the event of an error of a function".

Example

ATAN2(1,2)=1.10714871779409

CEILING(argument 1, argument 2)

Rounds a number up to the nearest integer or to the nearest multiple of the reference value.

Argument 1

Specify the number to be rounded.

Argument 2

Specify a reference value.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	A number rounded up to a multiple of the specified reference value.

Error condition

#NUM! error

When the value of argument 2 is negative

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: CEILING(30,8)=32
- Formula 2: CEILING(30,-8)=#NUM!
- Formula 3: CEILING(-30,8)=-24
- Formula 4: CEILING(-30,-8)=-32

CEILING.MATH(argument 1, [argument 2], [argument 3])

Rounds a number up to the nearest integer or to the nearest multiple of the reference value.

Argument 1

Specify the number that you want to round up.

Argument 2

Specify a reference value.

Argument 3

When argument 1 is negative, it is rounded to the furthest value from 0 if this argument is set to TRUE or a number other than 0. It is rounded to the nearest value to 0 if argument 1 is set to FALSE or 0.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	
Argument 3	Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	A number rounded up to a multiple of the specified reference value.

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: CEILING.MATH(30,8)=32
- Formula 2: CEILING.MATH(30,-8)=32
- Formula 3: CEILING.MATH(-30,8,TRUE)=-32
- Formula 4: CEILING.MATH(-30,8,FALSE)=-24

COS(argument 1)

Returns the cosine of the specified angle.

Argument 1

Specify an angle in radian that you want to get the cosine of.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-134217727.999	134217727.999	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Cosine

Error condition

#VALUE! error

When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: COS(1)=0.540302
- Formula 2: COS(0.1)=0.995004

DEGREES(argument 1)

Converts radians to degrees.

Argument 1

Specify an angle in radian to be converted to a degree.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Converted degree

Error condition

#VALUE! error

When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

DEGREES(3.14)=179.9087

EVEN(argument 1)

Rounds up the specified number to the nearest even number. The absolute value of the rounded-up value is larger than the specified number.

Argument 1

Specify the number to be rounded up.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Even number

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: EVEN(21)=22
- Formula 2: EVEN(-21)=-22

EXP(argument 1)

Returns the result of raising the base "e" to the power of the specified number. The constant "e" is the base of natural logarithm, and its value is approximately 2.71828182845904.

Argument 1

Specify the exponent by which to raise the base "e".

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Result of exponentiation with "e" as the base

Error condition

#VALUE! error

When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

EXP(2)=7.389056

FLOOR(argument 1, argument 2)

Rounds down the specified number to the multiple of the base number that is nearest to the specified number and nearer to 0.

Argument 1

Specify the number to be rounded down.

Argument 2

Specify a reference value.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Multiple of the reference value that is nearest to argument 1 and nearer to 0

Error condition

#DIV/0! error

When the cell referred to from argument 2 is empty

#VALUE! error

– When a cell range that includes multiple cells is specified for argument 1
– When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: FLOOR(30,8)=24
- Formula 2: FLOOR(30,-8)=#NUM!
- Formula 3: FLOOR(-30,8)=-32
- Formula 4: FLOOR(-30,-8)=-24

FLOOR.MATH(argument 1, [argument 2], [argument 3])

Rounds a number down to the nearest integer or to the nearest multiple of the reference value.

Argument 1

Specify the number to be rounded down.

Argument 2

Specify a reference value.

Argument 3

If this argument is set to TRUE or a number other than 0, argument 1 is rounded down to a value nearer to 0 regardless of whether argument 1 is positive or negative. If this argument is set to FALSE or 0, argument 1 is rounded down to a value smaller than argument 1.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	
Argument 3	Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Multiple of the reference value that is nearest to argument 1 and nearer to 0

Error condition

#VALUE! error

– When a cell range that includes multiple cells is specified for argument 1
– When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: FLOOR.MATH(30,8)=24
- Formula 2: FLOOR.MATH(30,-8)=24
- Formula 3: FLOOR.MATH(-30,8,TRUE)=-24
- Formula 4: FLOOR.MATH(-30,8,FALSE)=-32

INT(argument 1)

Rounds off the decimal part of the specified number to the nearest integer.

Argument 1

Specify the number to be rounded off.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Integer resulting from rounding off

Error condition

#VALUE! error

– When a cell range that includes multiple cells is specified for argument 1
– When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: INT(3.14)=3
- Formula 2: INT(3.64)=3

LN(argument 1)

Calculates the natural logarithm.

Argument 1

Specify a positive real number of which to calculate the natural logarithm. The #VALUE! error is returned if this argument is not a number.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Natural logarithm

Error condition

#VALUE! error

– When a cell range that includes multiple cells is specified for argument 1
– When the argument 1 value is not of the numerical type

#NUM! error

When the value of argument 1 is negative

For errors common among functions, see "In the event of an error of a function".

Example

LN(2)=0.693147

LOG(argument 1, [argument 2])

Calculates the logarithm to the base of any number.

Argument 1

Specify a positive real number for which to calculate the logarithm.

Argument 2

Specify a base. Omitting this argument is equivalent to specifying 10.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Logarithm

Error condition

#NUM! error

When any argument value is less than or equal to 0

For errors common among functions, see "In the event of an error of a function".

Example

LOG(16,2)=4

LOG10(argument 1)

Returns the logarithm (common logarithm) of the number to base 10.

Argument 1

Specify a positive real number. If the value is not an integer, it is rounded off.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Logarithm to base 10

Error condition

#NUM! error

When argument 1 value is less than or equal to 0

For errors common among functions, see "In the event of an error of a function".

Example

LOG10(10000)=4

MOD(argument 1, argument 2)

Returns the remainder of a number (argument 1) divided by a divisor (argument 2). The sign of the return value is the same as the divisor. The relation between the MOD and INT functions can be expressed as follows:
MOD(n,d)=n-d*INT(n/d)

Argument 1

Specify the dividend (number to be divided).

Argument 2

Specify the divisor (dividing number).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Remainder

Error condition

#DIV/0! error

When argument 2 is 0

#NUM! error

When the quotient of argument 1/argument 2 is beyond 1.0E+12

For errors common among functions, see "In the event of an error of a function".

Example

MOD(10,3)=1

MROUND(argument 1, argument 2)

Rounds the specified number to a multiple of the base number. If the remainder obtained by dividing a number by a multiple is greater than or equal to half the multiple, it is rounded to the furthest value from 0.

Argument 1

Specify the number to be rounded.

Argument 2

Specify the base number of multiples.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	A number rounded to a multiple of the reference value.

Error condition

#NUM! error
When the signs of argument 1 and argument 2 are different

#VALUE! error
When a logical value is specified for argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: MROUND(10.4,3)=9
- Formula 2: MROUND(10.4,6)=12

ODD(argument 1)

Rounds up the specified number to the nearest odd number. The absolute value of the rounded-up value is larger than the specified number. The value of argument 1 is not rounded up if it is an odd number.

Argument 1
Specify the number to be rounded up.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Odd number

Error condition

#VALUE! error
When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ODD(20)=21
- Formula 2: ODD(-20)=-21

PI()

Returns an approximate number (3.14159265358979) of circumference ratio π. The number is of 15-digit accuracy.

Argument

None

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	3.14159265358979

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

POWER(argument 1, argument 2)

Returns a power of the specified value.

Argument 1

Specify a base.

Argument 2

Specify an exponent for exponentiation.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	-2147483648	2147483647	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Applicable	Not relevant	Power of a number

Error condition

#NUM! error

When the result exceeds the upper limit of the Integer type

For errors common among functions, see "In the event of an error of a function".

Example

POWER(10,4)=10000

PRODUCT(argument 1, [argument 2], ...[argument 32])

Multiplies the numbers specified as arguments and return the product.

Argument 1 to 32

Specify the numbers to calculate the product.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Number	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Product

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	2	3
2	4	6

- Formula 1
  =PRODUCT(A1:B2)
  → Return value: 144
- Formula 2
  =PRODUCT(A1,B1,A2,B2)
  → Return value: 144

QUOTIENT(argument 1, argument 2)

Returns the integer quotient of division.

Argument 1

Specify a numerator.

Argument 2

Specify a denominator.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Integer quotient

Error condition

#DIV/0! error
When argument 2 is 0

For errors common among functions, see "In the event of an error of a function".

Example
QUOTIENT(10,3)=3

RADIANS(argument 1)

Converts degrees to radians.

Argument 1
Specify an angle to be converted to a radian value.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Radian value

Error condition
There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example
RADIANS(180)=3.141593

RAND()

Returns a random real number that is equal to or larger than 0 and smaller than 1. In one calculation, return values of the same cell are the same.

Point You can use this function only in a formula in a cell (you cannot use it for data input rules, conditional formats, etc.).

Argument
None

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Real random number that is equal to or larger than 0 and smaller than 1

Error condition

#INVALID! error

When no measurements have been performed after resetting or restarting the device

For errors common among functions, see "In the event of an error of a function".

ROUND(argument 1, argument 2)

Rounds a number to the specified digit position. If argument 2 is positive, the decimal part of the number is rounded to the specified digit position. If argument 2 is negative, the integer part of the number is rounded at the specified digit position.

Argument 1

Specify the number to be rounded.

Argument 2

Specify the digit position to round the number to/at.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Result of rounding

Error condition

#VALUE! error

When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ROUND(5.486,2)=5.49
- Formula 2: ROUND(5.486,-1)=10

ROUNDDOWN(argument 1, argument 2)

Rounds down a number to the specified digit position. If argument 2 is positive, the portion of the decimal part of the number to the right of the specified digit position is discarded.

Argument 1

Specify the real number to be rounded down.

Argument 2

Specify the digit position to round down the number to.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Rounded down number

Error condition

#VALUE! error

When any argument value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ROUNDDOWN(5.486,2)=5.48
- Formula 2: ROUNDDOWN(5.486,-1)=0

ROUNDUP(argument 1, argument 2)

Rounds up a number to the specified digit position. If argument 2 is positive, the specified number of decimal places is rounded up, and, if argument 2 is negative, the specified number of digits to the left of the decimal point is rounded up.

Argument 1

Specify the real number to be rounded up.

Argument 2

Specify the digit position to round up the number to.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Result of rounding up

Error condition

#VALUE! error
When any argument value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ROUNDUP(5.486,2)=5.49
- Formula 2: ROUNDUP(5.486,-1)=10

SIGN(argument 1)

Checks whether a number is positive or negative. If the number is positive, 1 is returned; if it is 0, 0 is returned; and if it is negative, -1 is returned.

Argument 1
Specify a real number.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	1: The number is positive 0: The number is 0 -1: The number is negative

Error condition

#VALUE! error
When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

Formula: SIGN(20)=1

SIN(argument 1)

Returns the sine of the specified angle.

Argument 1
Specify an angle in radian that you want to get the sine of.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-134217727.999	134217727.999	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Sine

Error condition

#VALUE! error

When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: SIN(1)=0.841471
- Formula 2: SIN(0.1)=0.099833

SQRT(argument 1)

Returns the positive square root of the number.

Argument 1

Specify the number that you want to calculate the square root of.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	0	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Square root

Error condition

#VALUE! error

When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: SQRT(4)=2
- Formula 2: SQRT(2)=1.414214

SUM(argument 1, [argument 2], ...[argument 32])

Calculates the sum of numbers.

Argument 1 to 32

Specify the numbers to be summed.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Sum

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	1
2	2

- Formula 1
  =SUM(1,2)
  → Return value: 3
- Formula 2
  =SUM(A1,A2)
  → Return value: 3
- Formula 3
  =SUM(1+1,A1)
  → Return value: 3

SUMIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n]], ...)

Sums the numbers in the range specified by argument 1 that match multiple search conditions.

Argument 1

Specify the range of the cells to be summed.

Argument 2

Specify the range to be evaluated based on the conditions defined in arguments 3 and 4.

Argument 3

Specify comparative operators (= (equal to), > (larger than), < (smaller than), >= (equal to or larger than), <= (equal to or smaller than), <> (not equal)).

Argument 4

Specify the conditions that define which cells are to be summed.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	
Argument 2	Cell	Applicable	Not relevant	Not relevant	
Argument 3	String	Not applicable	Not relevant	Not relevant	
Argument 4	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Sum of numbers in the cells that meet the conditions

Error condition

#VALUE! error

– When the number of rows specified by argument 1 is smaller than the number of rows specified by argument 2
– When the number of rows specified by argument 1 is larger than the number of rows specified by argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A		C
1	1	WED	A-1
2	2	THU	A-2
3	3	FRI	A-3
4	4	SAT	B-1
5	5	SUN	B-2
6	6	MON	B-3
7	7	TUE	A-1
8	8	WED	A-2
9	9	THU	A-3
10	10	FRI	B-1

- Formula 1
  =SUMIFS(A1:A10,B1:B10,"=","FRI")
  → Return value: 13
- Formula 2
  =SUMIFS(A1:A10,B1:B10,"<>","FRI",C1:C10,"=","B-1")
  → Return value: 4

TAN(argument 1)

Returns the tangent of the number.

Argument 1

Specify a number.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-134217727.999	134217727.999	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Tangent

Error condition

#VALUE! error

When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: TAN(1)=1.557408
- Formula 2: TAN(0.1)=0.100335

MDETERM(argument 1)

Calculates the determinant of the specified array.

Argument 1

Specify the array.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (matrix)	Applicable (nxn square matrix)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	

Error condition

#VALUE! error

When there is a missing or excessive array size in argument 1

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	1	3	4
2	2	4	2
3	3	1	1

Formula
=MDETERM(A1:C3)
→ Return value: -26

MINVERSE(argument 1)

Calculates the inverse matrix of the specified matrix.

Argument 1

Specify the matrix as an array.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (matrix)	Applicable (nxn square matrix)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (matrix)	Not relevant	Not relevant	A matrix of the same size as the matrix specified in argument 1 is spilled.

Error condition

#NUM! error

When there is no inverse matrix

#VALUE! error

When there is a missing or excessive array size in argument 1

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	1	1	4
2	2	4	2
3	4	2	2

Formula
=MINVERSE(A1:C3)

→ Return value:

-0.1	-0.15	0.35
-0.1	0.35	-0.15
0.3	-0.05	-0.05

MMULT(argument 1, argument 2)

Returns the matrix product of two specified arrays.

Argument 1

Specify the first matrix as an array.

Argument 2

Specify the second matrix as an array.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (matrix)	Applicable	Not relevant	Not relevant	
Argument 2	Number (matrix)	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (matrix)	Not relevant	Not relevant	A matrix with the same number of rows as the matrix specified in argument 1 and the same number of columns as the matrix specified in argument 2 is spilled.

Error condition

#VALUE! error

When there is a missing or excessive array size in argument 1 and argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	1	1	4
2	2	4	2
3	4	2	2

Formula
=MMULT(A1:C3,A1:C3)
→ Return value:

19	13	14
18	22	20
16	16	24

ACOSD(argument 1)

Calculates the inverse cosine (arccosine) of the specified number (unit: degrees).

Argument 1

Specify the cosine of the angle to be calculated.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-1	1	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	180	Unit in degrees

Error condition

#NUM! error

When a value exceeding the upper or lower limit is specified for argument 1

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ACOSD(1)=0
- Formula 2: ACOSD(0.1)=84.26083

ASIND(argument 1)

Calculates the inverse sine (arcsine) of the specified number (unit: degrees).

Argument 1

Specify the sine of the angle to be calculated.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-1	1	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	-90	90	Unit in degrees

Error condition

#NUM! error

When a value exceeding the upper or lower limit is specified for argument 1

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ASIND(1)=90
- Formula 2: ASIND(0.1)=5.73917

ATAND(argument 1)

Calculates the inverse tangent (arctangent) of the specified number (unit: degrees).

Argument 1

Specify the sine of the angle to be calculated.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	-90	90	Unit in degrees

Error condition

#NUM! error

When a value exceeding the upper or lower limit is specified for argument 1

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ATAND(1)=45
- Formula 2: ATAND(0.1)=5.710593

ATAN2D(argument 1, argument 2)

Returns the inverse tangent (arctangent) of the specified X coordinate and Y coordinate. The return value is the angle between the line passing through the origin and the specified XY coordinates and the X-axis (unit: degrees).

Argument 1

Specify the X coordinate.

Argument 2

Specify the Y coordinate.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	-180	180	Unit in degrees

Error condition

#DIV/0! error

When all arguments are 0

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ATAN2D(1,1)=45
- Formula 2: ATAN2D(1,2)=63.43495

COSD(argument 1)

Calculates the cosine of the specified angle (unit: degrees).

Argument 1

Specify the degree (unit: degrees).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-7690109350	7690109350	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	

Error condition

#NUM! error

When If the argument value exceeds the upper and lower limits

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: COSD(1)=0.999848
- Formula 2: COSD(0.1)=0.999998

SIND(argument 1)

Returns the sine of the specified angle (unit: degrees).

Argument 1

Specify the degree (unit: degrees).

Argument

	Type	Cell Range Specification	Array	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	-7690109350	7690109350	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Sine

Error condition

#NUM! error

When If the argument value exceeds the upper and lower limits

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: SIND(1)=0.017452
- Formula 2: SIND(0.1)=0.001745

TAND(argument 1)

Calculates the tangent of the specified angle (unit: degrees).

Argument 1

Specify the degree (unit: degrees).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-7690109350	7690109350	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	

Error condition

#NUM! error

When If the argument value exceeds the upper and lower limits

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: TAND(1)=0.017455
- Formula 2: TAND(0.1)=0.001745

Statistics Functions

Function Name	Description
AVERAGE(argument 1, [argument 2], ...[argument 32])	Calculates the average of numbers
AVERAGEA(argument 1, [argument 2], ...[argument 32])	Calculates the average of data items
AVERAGEIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n]], ...)	Calculates the average of numbers with multiple conditions specified
COUNT(argument 1, [argument 2], ...[argument 32])	Calculates the number of cells that have numbers, dates, or times
COUNTA(argument 1, [argument 2], ...[argument 32])	Calculates the number of cells that have data
COUNTBLANK(argument 1)	Calculates the number of empty cells
COUNTERROR(argument 1, [argument 2], ...[argument 32])	Returns the number of errors in one or more cells or in the range of cells
COUNTIFS(argument 1, argument 2, argument 3, [argument 1[n], argument 2[n], argument 3[n], ...)	Calculates the number of data items that match multiple conditions
INRANGE(argument 1, argument 2, argument 3)	B<=A<=C (TRUE if A is within the range from B to C)
LARGE(argument 1, argument 2)	Obtains the value that is in the specified position in terms of largeness
LARGEINDEX(argument 1, argument 2)	Return the index of the k-th largest value from a variable-length list of values, where "k" is specified by argument 2.
MAX(argument 1, [argument 2], ...[argument 32])	Obtains the maximum value among numbers
MAXA(argument 1, [argument 2], ...[argument 32])	Obtains the maximum value in a dataset
MAXIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n], ...)	Obtains the maximum value with multiple conditions specified
MAXINDEX(argument 1, [argument 2], ...[argument 32])	Returns the index of the largest value in a variable-length list of values
MEDIAN(argument 1, [argument 2], ...[argument 32])	Obtains the median of numbers
MIN(argument 1, [argument 2], ...[argument 32])	Obtains the minimum value among numbers
MINA(argument 1, [argument 2], ...[argument 32])	Obtains the minimum value in a dataset
MINIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n]], ...)	Obtains the minimum value with multiple conditions specified
MININDEX(argument 1, [argument 2], ...[argument 32])	Returns the index of the smallest value in a variable-length list of values
MODE.SNGL(argument 1, [argument 2], ...[argument 32])/MODE(argument 1, [argument 2], ...[argument 32])	Obtains the mode of values
RANK.EQ(argument 1, argument 2, [argument 3])/ RANK(argument 1, argument 2, [argument 3])	Obtains the rank. (If the number appears multiple times in the range, the highest rank is returned)
SMALL(argument 1, argument 2)	Obtains the value that is in the specified position in terms of smallness

Function Name	Description
SMALLINDEX(argument 1, argument 2)	Return the index of the k-th smallest value from a variable-length list of values, where "k" is specified by argument 2.
STDEV.P(argument 1, [argument 2], ...[argument 32])/ STDEVP(argument 1, [argument 2], ...[argument 32])	Calculates the standard deviation of numbers
STDEV.S(argument 1, [argument 2], ...[argument 32])/ STDEV(argument 1, [argument 2], ...[argument 32])	Calculates the unbiased standard deviation of numbers
STDEVA(argument 1, [argument 2], ...[argument 32])	Calculates the unbiased standard deviation of a dataset
STDEVPA(argument 1, [argument 2], ...[argument 32])	Calculates the standard deviation of a dataset
VAR.P(argument 1, [argument 2], ...[argument 32])/ VARP(argument 1, [argument 2], ...[argument 32])	Calculates the variance of numbers
VAR.S(argument 1, [argument 2], ...[argument 32])/ VAR(argument 1, [argument 2], ...[argument 32])	Calculates the unbiased variance of numbers
VARA(argument 1, [argument 2], ...[argument 32])	Calculates the unbiased variance of a dataset
VARPA(argument 1, [argument 2], ...[argument 32])	Calculate the variance of the whole population.

AVERAGE(argument 1, [argument 2], ...[argument 32])

Returns the average (arithmetic mean) of numbers. Ignores strings, empty cells, and logical values.

Argument 1 to 32

Specify the numbers to obtain the average from.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Number	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Average value

Error condition

#DIV/0! error

When an argument value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	7	8
2	6	a

Formula
=AVERAGE(A1:B2)
→ Return value: 7

AVERAGEA(argument 1, [argument 2], ...[argument 32])

Returns the average (arithmetic mean) of the values in the argument list.

Argument 1 to 32

Specify the numbers to calculate the average of. Treat strings as "0", logical values as TRUE=1/FALSE-0, and ignore empty cells.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Number	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Average value

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	7	8
2	6	a

Formula
=AVERAGEA(A1:B2)
→ Return value: 5.25

AVERAGEIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n]], ...)

Returns the arithmetic mean of all numbers in a cell range that satisfy multiple conditions.

Argument 1

Specify the range of the cells for average calculation.

Argument 2

Specify the ranges to be evaluated on the conditions defined in arguments 3 and 4.

Argument 3, argument 14 to 22

Specify comparative operators (= (equal to), > (larger than), < (smaller than), >= (equal to or larger than), <= (equal to or smaller than), <> (not equal to)).

Argument 4, argument 23 to 32

Specify the conditions that define which cells to be averaged.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	
Argument 2, argument 5 to 13	Cell	Applicable	Not relevant	Not relevant	
Argument 3, argument 14 to 22	String	Not applicable	Not relevant	Not relevant	
Argument 4, argument 23 to 32	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Arithmetic mean value of all cells that match the conditions

Error condition

#VALUE! error

– When the number of rows specified by argument 1 is smaller than the number of rows specified by argument 2
– When the number of rows specified by argument 1 is larger than the number of rows specified by argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	90	A	NL
2	73	A	MA
3	86	A	EN
4	83	B	NL
5	78	B	MA
6	81	B	EN
7	84	C	NL
8	79	C	MA
9	75	C	EN

- Formula 1
  =AVERAGEIFS(A1:A9,B1:B9,"=","A")
  → Return value: 83
- Formula 2
  =AVERAGEIFS(A1:A9,B1:B9,"=","A",C1:C9,"<>","NL")
  → Return value: 79.5

COUNT(argument 1, [argument 2], ...[argument 32])

Returns the count of cells that contain numbers, and the count of numbers in the argument list. Obtains the count of entries in the number fields that are contained in a cell range or an array of numbers.

Argument 1 to 32

Specify the cells in which to examine the quantity of numbers.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	The count of cells that contain numbers and the count of numbers

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	7	
2	6	a

Formula 1
=COUNT(A1:B2)
→ Return value: 2

COUNTA(argument 1, [argument 2], ...[argument 32])

Returns the number of cells in the range that are not empty.

Argument 1 to 32

Specify the target cells to calculate the quantity for.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	Not relevant	Number of non-empty cells

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	7	
2	6	a

Formula
=COUNTA(A1:C3)
→ Return value: 3

COUNTBLANK(argument 1)

Returns the number of empty cells in the specified range.

Argument 1

Specify the range of the cells for counting empty cells.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	Not relevant	Number of empty cells

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	1	a	3
2	TRUE	#REF!	
3	7		9

Formula
=COUNTBLANK(A1:C3)
→ Return value: 2

COUNTERROR(argument 1, [argument 2], ...[argument 32])

Returns the number of errors in one or more cells or in a range of cells.

Argument 1 to 32

Specify errors or cells.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	Not relevant	Number of errors

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	1	a	3
2	TRUE	#REF!	
3	7		#NUM!

Formula
=COUNTERROR(A1:C3)
→ Return value: 2

COUNTIFS(argument 1, argument 2, argument 3, [argument 1[n], argument 2[n], argument 3[n], ...)

Applies conditions to multiple cell ranges and returns the count of the number of data items that satisfy all conditions.

Argument 1[]

Specify the range to be searched on the conditions defined in arguments 2 and 3.

Argument 2[]

Specify comparative operators (= (equal to), > (larger than), < (smaller than), >= (equal to or larger than), <= (equal to or smaller than), <> (not equal to)).

Argument 3[]

Specify the conditions that define the target to be counted.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	
Argument 2	String	Not applicable	Not relevant	Not relevant	
Argument 3	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	0	Not relevant	Number of times in which all conditions are satisfied

Error condition

#VALUE! error

If the range differs when specifying multiple argument 1[]

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	
1	A-1	WED	1
2	A-2	THU	2
3	A-3	FRI	3
4	B-1	SAT	4
5	B-2	SUN	5
6	B-3	MON	6
7	A-1	TUE	7

- Formula 1
  =COUNTIFS(A1:A7,"=","A-1")
  → Return value: 2
- Formula 2
  =COUNTIFS(A1:A7,"=","A-1",B1:B7,"=","WED")
  → Return value: 1

INRANGE(argument 1, argument 2, argument 3)

Returns TRUE if the value (argument 1) is within the range of values specified in arguments 2 and 3.

Argument 1

Specify a value.

Argument 2

Specify the minimum (maximum) number.

Argument 3

Specify the maximum (minimum) number.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	
Argument 3	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	FALSE	TRUE	TRUE (1): When argument 1 is within the range of values specified in arguments 2 and 3 FALSE (0): When argument 1 is not within the range of values specified in arguments 2 and 3

Error condition

#VALUE! error

When any argument value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: INRANGE(50,1,100)=TRUE
- Formula 2: INRANGE(150,1,100)=FALSE

LARGE(argument 1, argument 2)

Returns the k-th largest value in an array or cell range, where "k" is specified by argument 2.

Argument 1

Specify a range of cells.

Argument 2

Specify the rank value counted from the largest item.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	1	100	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Specified k-th largest value

Error condition

When the value of argument 2 is larger than the number of data items specified by argument 1.

Example

	A	B
1	101	1
2	-102	2

Formula
=LARGE(A1:B2,2)

→ Return value: 2

LARGEINDEX(argument 1, argument 2)

Return the index of the k-th largest value from a variable-length list of values, where "k" is specified by argument 2.

Argument 1

Specify a range of cells.

Argument 2

Specify a rank. When a negative value is specified, 0 is returned.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	1	100	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Position of the specified k-th largest value among cells or numbers

Error condition

#NUM! error

When the value of argument 2 is larger than the number of data items specified by argument 1

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	101	1
2	-102	2

Formula
=LARGEINDEX(A1:B2,2)
→ Return value: 4

MAX(argument 1, [argument 2], ...[argument 32])

Returns the largest number found within the set of arguments. Ignores strings, empty cells, and logical values.

Argument 1 to 32

Specify the cell to evaluate the maximum value.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Maximum value

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	101	1
2	-102	2

Formula
=MAX(A1:B2)
→ Return value: 101

MAXA(argument 1, [argument 2], ...[argument 32])

Returns the largest value found within the set of arguments.

Argument 1 to 32

Specify the cell to evaluate the maximum value. Treat strings as "0", logical values as TRUE=1/FALSE-0, and ignore empty cells.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	The largest value found within the set of arguments

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	101	1
2	-102	2

Formula
=MAXA(A1:B2)
→ Return value: 101

MAXIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n], ...)

Returns the largest value in the cells that satisfy all of the multiple conditions specified.

Argument 1
Specify the range of the cells to find the maximum value from.

Argument 2[]
Specify the range to be evaluated on the conditions defined in arguments 3 and 4.

Argument 3[]
Specify comparative operators (= (equal to), > (larger than), < (smaller than), >= (equal to or larger than), <= (equal to or smaller than), <> (not equal to)) (Maximum of 10).

Argument 4[]
Specify conditions for evaluation for finding the maximum value (maximum of 10).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	
Argument 2	Cell	Applicable	Not relevant	Not relevant	
Argument 3	String	Not applicable	Not relevant	Not relevant	
Argument 4	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Maximum value in the cells that satisfy the conditions

Error condition

#VALUE! error
– When the number of rows specified by argument 1 is smaller than the number of rows specified by argument 2
– When the number of rows specified by argument 1 is larger than the number of rows specified by argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	90	A	NL
2	73	A	MA
3	86	A	EN
4	83	B	NL
5	78	B	MA
6	81	B	EN
7	84	C	NL
8	79	C	MA
9	75	C	EN

- Formula 1
  =MAXIFS(A1:A9,B1:B9,"=","B")
  → Return value: 83
- Formula 2
  =MAXIFS(A1:A9,B1:B9,"<>","B",C1:C9,"=","MA")
  → Return value: 79

MAXINDEX(argument 1, [argument 2], ...[argument 32])

Return the index of the largest "value" in a variable-length list of values.

Argument 1 to 32

Specify the cell to evaluate the maximum value. An error is returned if all arguments are omitted or of irrelevant type.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1	Not relevant	Position of the maximum value among cells or numbers

Error condition

#VALUE! error

When an argument value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	101	1
2	-102	2

Formula
=MAXINDEX(A1:B2)
→ Return value: 1

MEDIAN(argument 1, [argument 2], ...[argument 32])

Returns the median (center value) of the numbers in the argument list. The median refers to the number that falls at the center of a set of numbers. For example, the median of 2, 3, 3, 5, 7, 10 is 4.

Argument 1 to 32

Specify a cell to obtain the median from.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	The center number of the set of numbers

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	1	2	3
2	4	5	6
3	7	8	9

Formula
=MEDIAN(A1:C3)
→ Return value: 5

MIN(argument 1, [argument 2], ...[argument 32])

Returns the smallest number found within the set of arguments. Ignores strings, empty cells, and logical values.

Argument 1 to 32

Specify the cell to evaluate the minimum value. Ignore strings, empty cells, and logical values.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Minimum value

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	101	1
2	-102	2

Formula
=MIN(A1:B2)
→ Return value: -102

MINA(argument 1, [argument 2], ...[argument 32])

Returns the smallest value found within the set of arguments. Processes strings as "0" and logical values as TRUE = "1" and FALSE = "0". Ignores empty cells.

Argument 1 to 32

Specify the cell to evaluate the minimum value.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Minimum value

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	101	1
2	-102	2

Formula
=MINA(A1:B2)
→ Return value: -102

MINIFS(argument 1, argument 2, argument 3, argument 4, [argument 2[n], argument 3[n], argument 4[n]], ...)

Returns the minimum value in the cells that satisfy all of the multiple conditions specified.

Argument 1
Specify the range of the cells to find the minimum value from.

Argument 2[]
Specify the ranges to be evaluated based on the conditions defined in arguments 3 and 4 (maximum of 10).

Argument 3[]
Specify comparative operators (= (equal to), > (larger than), < (smaller than), >= (equal to or larger than), <= (equal to or smaller than), <> (not equal to)) (Maximum of 10).

Argument 4[]
Specify conditions for evaluation for finding the minimum value (maximum of 10).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	
Argument 2	Cell	Applicable	Not relevant	Not relevant	
Argument 3	String	Not applicable	Not relevant	Not relevant	
Argument 4	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Minimum value in the cells that satisfy the conditions

Error condition

#VALUE! error
- When the number of rows specified by argument 1 is smaller than the number of rows specified by argument 2
- When the number of rows specified by argument 1 is larger than the number of rows specified by argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	90	A	NL
2	73	A	MA
3	86	A	EN
4	83	B	NL
5	78	B	MA
6	81	B	EN
7	84	C	NL
8	79	C	MA
9	75	C	EN

- Formula 1
  =MINIFS(A1:A9,B1:B9,"=","C")
  → Return value: 75
- Formula 2
  =MINIFS(A1:A9,B1:B9,"<>","C",C1:C9,"=","MA")
  → Return value: 73

MININDEX(argument 1, [argument 2], ...[argument 32])

Return the index of the smallest "value" in a variable-length list of values.

Argument 1 to 32

Specify the cell to evaluate the minimum value. An error is returned if all arguments are empty or of irrelevant type.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1	Not relevant	Position of the smallest value among cells or numbers

Error condition

#VALUE! error

When an argument value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	101	1
2	-102	2

Formula
=MININDEX(A1:B2)
→ Return value: 3

MODE.SNGL(argument 1, [argument 2], ...[argument 32])/MODE(argument 1, [argument 2], ...[argument 32])

Returns the value that occurs most frequently in a list or array of numbers.

Argument 1 to 32

Specify a cell. The text of arguments, logical values, and empty cells are ignored.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Value that appeared the most number of times

Error condition

#N/A error

When only one number is contained in the range specified by argument 1

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	6	1	3
2	7	5	3
3	7	3	3

- Formula 1
  =MODE.SNGL(A1:C3)
  → Return value: 3
- Formula 2
  =MODE(A1:C3)
  → Return value: 3

RANK.EQ(argument 1, argument 2, [argument 3])/RANK(argument 1, argument 2, [argument 3])

RANK.EQ returns the rank of the value of argument 1 in the specified range. If the same value appears multiple times in the range, the highest rank is returned. Rearranging the order of arguments does not change the return value.

RANK returns the position of the value of argument 1 in the specified range. Rearranging the order of arguments changes the return value.

Argument 1

Specify the number whose rank (position) in the range is to be found.

Argument 2

Specify a cell range of an array of numbers or the reference to the cell range. Values other than numbers in the range are ignored.

Argument 3

Specify the way in which to arrange the numbers in the range. Specifying 0 or omitting this argument arranges the numbers in the range in the descending order. Specifying a non-zero number arranges the numbers in the range in the ascending order.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	Cell range	Not applicable	Not relevant	Not relevant	
Argument 3	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1	Not relevant	Rank of the number in the list

Error condition

#N/A error

When the number specified by argument 1 does not exist in the range specified by argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	6	1	3
2	7	5	3
3	7	3	3

- Formula 1
  =RANK.EQ(A1,A1:C3)
  → Return value: 3
- Formula 2
  =RANK(A1,A1:C3)
  → Return value: 3

SMALL(argument 1, argument 2)

Return the k-th smallest value from the cells specified by argument 1, where "k" is specified by argument 2.

Argument 1

Specify a cell.

Argument 2

Specify the rank value counted from the smallest item.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	1	100	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Specified k-th smallest value

Error condition

#NUM! error

When the range specified by argument 1 is smaller than the number specified by argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	101	1
2	-102	2

Formula
=SMALL(A1:B2,2)
→ Return value: 1

SMALLINDEX(argument 1, argument 2)

Return the index of the k-th smallest value from a variable-length list of values, where "k" is specified by argument 2.

Argument 1

Specify a range of cells.

Argument 2

Specify a rank. When a negative value is specified, 0 is returned.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	1	100	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	The value s pecified by argument 2 in ascending order from argument 1

Error condition

#NUM! error

When the value of argument 2 is larger than the number of data items specified by argument 1

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	101	1
2	-102	2

Formula
=SMALLINDEX(A1:B2,2)
→ Return value: 2

STDEV.P(argument 1, [argument 2], ...[argument 32])/STDEVP(argument 1, [argument 2], ...[argument 32])

Returns the standard deviation of the population, regarding the arguments as the whole population (Logical values and text strings are excluded). The standard deviation is an index that represents how wide the target statistical values are distributed from the average.

Argument 1 to 32

Specify numbers to include in the population.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Standard deviation of the population

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	88.82	10.92	71.78
2	73.43	52.16	57.36
3	a	77.72	'73.78

- Formula 1
  =STDEV.P(A1:C3)
  → Return value: 23.66
- Formula 2
  =STDEVP(A1,B1,C1,A2,B2,C2,A3,B3,C3)
  → Return value: 23.66
  *Strings are ignored.

STDEV.S(argument 1, [argument 2], ...[argument 32])/STDEV(argument 1, [argument 2], ...[argument 32])

Returns the unbiased standard deviation (estimated standard deviation of the population) based on a sample, regarding the arguments as the sample (Logical values and text strings in the sample are excluded). The standard deviation is an index that represents how wide the target statistical values are distributed from the average.

Argument 1 to 32

Specify numbers to include in the sample of the population. You can also specify a single array or a reference to an array.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Estimated standard deviation of the population

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	88.82	10.92	71.78
2	73.43	52.16	57.36
3	a	77.72	'73.78

- Formula 1
  =STDEV.S(A1:C3)
  → Return value: 25.56
- Formula 2
  =STDEV(A1:C3)
  → Return value: 25.56
  *Strings are ignored.

STDEVA(argument 1, [argument 2], ...[argument 32])

Returns the unbiased standard deviation (estimated standard deviation of the population) based on a sample, regarding the arguments that include text strings and logical values as the sample. The standard deviation is an index that represents how wide the target statistical values are distributed from the average.

Argument 1 to 32

Specify numbers to include in the sample of the population. You can also specify a single array or a reference to an array.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Estimated standard deviation

Error condition

#DIV/0! error

When only one number is contained in the range specified by the argument

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	88.82	10.92	71.78
2	73.43	52.16	57.36
3	a	77.72	'73.78

- Formula 1

=STDEVA(A1:C3)
→ Return value: 30.83

- Formula 2
  =STDEVA(A1,B1,C1,A2,B2,C2,A3,B3,C3)
  → Return value: 30.83
  *Ignore strings.

STDEVPA(argument 1, [argument 2], ...[argument 32])

Returns the standard deviation of the population, regarding the arguments that include text strings and logical values as the whole population. The standard deviation is an index that represents how wide the target statistical values are distributed from the average.

Argument 1 to 32

Specify numbers to include in the sample of the population. You can also specify a single array or a reference to an array.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Standard deviation of the population

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	88.82	10.92	71.78
2	73.43	52.16	57.36
3	a	77.72	'73.78

- Formula 1
  =STDEVPA(A1:C3)
  → Return value: 29.06
- Formula 2
  =STDEVPA(A1,B1,C1,A2,B2,C2,A3,B3,C3)
  → Return value: 29.06
  *Strings are ignored.

VAR.P(argument 1, [argument 2], ...[argument 32])/VARP(argument 1, [argument 2], ...[argument 32])

Returns the variance (sample variance) of the population, regarding the arguments as the whole population. (Logical values and text strings in the population are excluded.)

Argument 1 to 32

Specify numbers to include in the population.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Variance (sample variance) of the population

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	88.82	10.92	71.78
2	73.43	52.16	57.36
3	a	77.72	'73.78

- Formula 1
  =VAR.P(A1:C3)
  → Return value: 559.97
- Formula 2
  =VARP(A1,B1,C1,A2,B2,C2,A3,B3,C3)
  → Return value: 559.97
  *Strings are ignored.

VAR.S(argument 1, [argument 2], ...[argument 32])/VAR(argument 1, [argument 2], ...[argument 32])

Returns the unbiased variance (estimated variance of the population) based on a sample, regarding the arguments as the sample of a normal population. (Logical values and text strings in the sample are excluded.)

Argument 1 to 32

Specify numbers to include in the sample of the population.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Estimated variance (unbiased variance)

Error condition

#DIV/0! error

When only one number is contained in the range specified by the argument

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	88.82	10.92	71.78
2	73.43	52.16	57.36
3	a	77.72	'73.78

- Formula 1
  =VAR.S(A1:C3)
  → Return value: 653.3
- Formula 2
  =VAR(A1,B1,C1,A2,B2,C2,A3,B3,C3)
  → Return value: 653.3
  *Ignore strings and logical values.

VARA(argument 1, [argument 2], ...[argument 32])

Returns an unbiased variance (estimated variance of the population) based on a sample.

Argument 1 to 32

Specify values to include in the sample of the population.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Estimated variance (unbiased variance)

Error condition

#DIV/0! error

When only one number is contained in the range specified by the argument

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	88.82	10.92	71.78
2	73.43	52.16	57.36
3	a	77.72	'73.78

- Formula 1
  =VARA(A1:C3)
  → Return value: 950.28
- Formula 2
  =VARA(A1,B1,C1,A2,B2,C2,A3,B3,C3)
  → Return value: 950.28
  *Ignore strings and logical values.

VARPA(argument 1, [argument 2], ...[argument 32])

Returns the variance based on the whole population (logical values and text strings included). TRUE is treated as 1, and a string and FALSE are treated as 0.

Argument 1 to 32

Specify values to include in the whole population.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Cell	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Variance

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	88.82	10.92	71.78
2	73.43	52.16	57.36
3	a	77.72	'73.78

- Formula 1
  =VARPA(A1:C3)
  → Return value: 844.69
- Formula 2
  =VARPA(A1,B1,C1,A2,B2,C2,A3,B3,C3)
  → Return value: 844.69
  *Ignore strings and logical values.

Lookup/Reference Functions

Function Name	Description
CHOOSE(argument 1, argument 2, [argument 3], ...[argument 32])	Selects a value from a list of arguments
COLUMN([argument 1])	Obtains the column number of a cell
COLUMNS(argument 1)	Obtains the number of columns
HLOOKUP(argument 1, argument 2, argument 3, [argument 4])	After finding a matching value in the first row, returns the value of the same column
INDEX(argument 1, [argument 2], [argument 3])	Obtains the value of the position specified by the row and column
ROW([argument 1])	Obtains the row number of a cell
ROWS(argument 1)	Obtains the number of rows
VLOOKUP(argument 1, argument 2, argument 3, [argument 4])	After finding a matching value in the first column, returns the value of the same row
XMATCH(argument 1, argument 2, [argument 3], [argument 4])	Obtains the relative position of the value being searched for
XLOOKUP(argument 1, argument 2, argument 3, [argument 4], [argument 5], [argument 6])	Searches a range or an array, and then returns the item corresponding to the first match it finds
TRANSPOSE(argument 1)	Transposes the rows and columns of a range of cells
FILTER(argument 1, argument 2, [argument 3])	Filters a range of data based on defined conditions
UNIQUE(argument 1, [argument 2], [argument 3])	Returns a list of unique values in a list or range
SORT(argument 1, argument 2, [argument 3], [argument 4])	Sorts a specified range
SORTBY(argument 1, argument 2, [argument 3], [argument 4, argument 5]...[argument 30, argument 31])	Sorts a specified range by multiple criteria and order

CHOOSE(argument 1, argument 2, [argument 3], ...[argument 32])

Selects a value from a list of value arguments.

Argument 1

Specify a number from 1 to 31, or a formula or cell reference that returns a number from 1 to 31, to designate the value argument to be selected. When 1 is specified, argument 2 is returned.

Argument 2

Specify value arguments.

Argument 3 to 32

Up to 30 arguments can be added.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	1	31	
Argument 2 to 32	Number String Logical value Error value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number String Logical value Error value	Not relevant	Not relevant	Result specified by the index

Error condition

#VALUE! error

– When a value exceeding the upper or lower limit is specified for argument 1
– When argument 1 is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: CHOOSE(1,"A","B","C")=A
- Formula 2: CHOOSE(3,"A","B","C")=C

COLUMN([argument 1])

Returns the column number of the cell.

Point You can use this function only in a formula in a cell (you cannot use it for data input rules, conditional formats, etc.).

Argument 1

Specify the cell number that you want to find the column number of.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	A1	CV1000	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1	100	Column number of the cell

Error condition

#VALUE! error

– When argument 1 cannot be interpreted as a cell range
– When argument 1 specifies a cell range that includes multiple columns

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: COLUMN()=Column number of the input cell
- Formula 2: COLUMN(B1)=2

COLUMNS(argument 1)

Returns the number of columns within the referenced cell range.

Argument 1

Specify a range of cells.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	A1	CV1000	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1	100	Number of columns in the cell range

Error condition

#VALUE! error

When argument 1 cannot be interpreted as a cell range

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: COLUMNS(A1)=1
- Formula 2: COLUMNS(A1:C2)=3

HLOOKUP(argument 1, argument 2, argument 3, [argument 4])

Returns a value in the same column after finding the matching value in the first row.

Argument 1
Specify the search key value to look for in the first row of the table.

Argument 2
Specify a cell range that contains a data table.

Argument 3
Specify the row number (the top row of the range being row 1) from which to return a return value.

Argument 4
Specify a logical value to specify whether approximate match or perfect match is to be used as the search method.
- -1/TRUE (approximate match): Search for the nearest value, assuming that the first data of the table are arranged in ascending order. Omitting this argument is equivalent to specifying TRUE.
- -0/FALSE (perfect match): Searches the first row beginning from the left end for a value that perfectly matches the search key.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value	Not applicable	Not relevant	Not relevant	
Argument 2	Cell	Applicable	Not relevant	Not relevant	
Argument 3	Number	Not applicable	1	Number of rows of the table	
Argument 4	Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String Number Logical value	Not relevant	Not relevant	The value of the cell at the intersecting point of the specified row and the column that contains the matching value

Error condition

#N/A error
- When the value specified by argument 1 was not found
- When an empty string is specified in argument 1

#REF! error
When the row number specified by argument 3 is not included in the cell range specified by argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C	D	E	F
1	1st	2nd	3rd	4th	5th	6th
2	a	b	c	d	e	f
3	A	B	C	D	E	F

Formula
=HLOOKUP("3rd",A1:F3,3)
→ Return value: C

INDEX(argument 1, [argument 2], [argument 3])

Return the value of the element of a table or array specified by the row number and column number.

Argument

Argument 1
Specify a cell range or an array constant. If the array has only one row or one column, the row number or column number can be omitted. If the array has multiple rows and multiple columns, and only either the row number or the column number is specified, the whole row or the whole column in the array is returned.

Argument 2
In the array, specify by means of a number the row number from which to return a value. This argument cannot be omitted unless a column number is specified. If row number specification is omitted, a column number must be specified.

Argument 3
Specify by means of a number the column number of the array from which to return a value. If column number specification is omitted, a row number must be specified.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell Number	Applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	1	Not relevant	
Argument 3	Number	Not applicable	1	Not relevant	
Argument 4	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number String Logical value Error value	Not relevant	Not relevant	The value of the specified element

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	1	2	3
2	4	5	6
3	7	8	9

- Formula 1
  =INDEX(A1:C1,3)
  → Return value: 3
- Formula 2
  =INDEX(A1:A3,3)
  → Return value: 7
- Formula 3
  =INDEX(A1:C3,3.3)
  → Return value: 9

ROW([argument 1])

Returns the row number of a cell.

Point You can use this function only in a formula in a cell (you cannot use it for data input rules, conditional formats, etc.).

Argument 1

Specify the cell that you want to find the row number of.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	A1	CV1000	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1	1000	Row number of the cell

Error condition

#VALUE! error

– When argument 1 cannot be interpreted as a cell range
– When argument 1 specifies a cell range that includes multiple rows

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ROW()=Row number of the input cell
- Formula 2: ROW(A2)=2

ROWS(argument 1)

Returns the number of rows.

Argument 1

Return the number of rows within the referenced cell range.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Applicable	A1	CV1000	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1	1000	Number of rows

Error condition

#VALUE! error

When argument 1 cannot be interpreted as a cell range

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ROWS(A1)=1
- Formula 2: ROWS(A1:B3)=3

VLOOKUP(argument 1, argument 2, argument 3, [argument 4])

Returns a value in the same row after finding the matching value in the first column.

Argument 1

Specify the search key value to look for in the first column of the table.

Argument 2

Specify a cell range or a range name that contains a data table.

Argument 3

Specify the column number (the leftmost column of the range being column 1) from which to return a return value.

Argument 4

Specify a logical value to specify whether approximate match or perfect match is to be used as the search method.

– -1/TRUE (approximate match): Search for the nearest value, assuming that the data of the first column of the table are arranged in ascending order. Omitting this argument is equivalent to specifying TRUE.
– -0/FALSE (perfect match): Searches the first column beginning from the top for a value that perfectly matches the search key.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value	Not applicable	Not relevant	Not relevant	
Argument 2	Cell	Applicable	Not relevant	Not relevant	
Argument 3	Number	Not applicable	1	Number of columns of argument 2	
Argument 4	Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String Number Logical value Error value	Not relevant	Not relevant	The value of the cell at the intersecting point of the specified column and the row of the matching value

Error condition

#N/A error

– When the value specified by argument 1 was not found
– When an empty string is specified in argument 1

#REF! error

When the column number specified by argument 3 is not included in the cell range specified by argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	1st	a	A
2	2nd	b	B
3	3rd	c	C
4	4th	d	D
5	5th	e	E
6	6th	f	F

Formula
=VLOOKUP("3rd",A1:C6,3)
→ Return value: C

XMATCH(argument 1, argument 2, [argument 3], [argument 4])

Returns the position of a value within the list, table, or cell range.

Argument 1

Specify the value to search for.

Argument 2

Specify a search range.

Argument 3

Specify a match mode.

- 0: Perfect match (default)
- -1: Perfect match or the next smaller item
- 1: Perfect match or the next larger item
- 2: Wildcard character match

Argument 4

Specify a search mode.

- 1: From start to end (default)
- -1: From end to start
- 2: Binary search in the ascending order
- -2: Binary search in the descending order

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value	Not applicable	Not relevant	Not relevant	
Argument 2	Cell	Applicable	Not relevant	Not relevant	
Argument 3	Number	Not applicable	-1	2	
Argument 4	Number	Not applicable	-2	2	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Position of the found value

Error condition

#N/A error

- When the value was not found in the search range
- When the perfect-match value and a next smaller value were not found
- When the perfect-match value and a next larger value were not found

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	40	A1
2	20	B2
3	10	C3
4	50	D4
5	30	E5

- Formula 1
  =XMATCH(10,A1:A5)
  → Return value: 3
- Formula 2
  =XMATCH("D*",B1:B5,2)
  → Return value: 4

XLOOKUP(argument 1, argument 2, argument 3, [argument 4], [argument 5], [argument 6])

Searches a specified range or array, and then returns the item corresponding to the first match it finds. If there is no match, returns the closest match.

Argument 1

Specify the value to be searched.

Argument 2

Specify a search range.

Argument 3

Specify the range of values to be returned as the return value.

Argument 4

Specify the return value when the search value is not found. If it is omitted, #N/A is returned.

Argument 5

Specify the search method.

- Omitted or 0: Exact match (return #N/A if not found)
- -1: Exact match (return the next smaller item if not found)
- 1: Exact match (return the next larger item if not found)
- 2: Match using wildcards

Argument 6

Specify the search direction.

- Omitted or 0: Search from the first item.
- -1: Search backwards from the last item.
- 2: Perform a binary search using the search range sorted in ascending order. If it is not sorted, an invalid result is returned.
- -2: Perform a binary search using the search range sorted in descending order. If it is not sorted, an invalid result is returned.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String, number, logical value, empty cell	Applicable	Not relevant	Not relevant	
Argument 2	String, number, logical value, empty cell	Applicable (1 x n or n x 1)	Not relevant	Not relevant	
Argument 3	String, number, logical value, empty cell	Applicable (Multiple rows/ columns can be specified)	Not relevant	Not relevant	
Argument 4	String, number, logical value, empty cell	Applicable	Not relevant	Not relevant	
Argument 5	Number	Not applicable	-1	2	
Argument 6	Number	Not applicable	-2	2	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String, number, logical value	Not relevant	Not relevant	Return argument 3 corresponding to the first match found

Error condition

#N/A! error

When the search value is not found and argument 4 is omitted

#VALUE! error

- When the size of argument 2 is other than 1*n or n*1
- When the number of arrays differs between argument 2 and argument 3
- When the array direction differs between argument 2 and argument 3
- When a match uses wildcards and a binary search is performed

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	HK	Hong Kong
2	JP	Japan
3	MA	Morocco
4	NG	Nigeria
5	WS	Samoa
6	FJ	Fiji
7	AT	Austria
8	ES	Spain
9	TM	Turkmenistan
10	UZ	Uzbekistan

Formula
=XLOOKUP("WS",A1:A10,B1:B10)
→ Return value: Samoa

TRANSPOSE(argument 1)

Transposes the rows and columns of the specified range of cells

Argument 1

Specify the array.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String, number, logical value, Error type	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String, number, logical value, error value	Not relevant	Not relevant	

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	apple	1000g	1200
2	strawberry	800g	800
3	grapes	400g	900
4	watermelon	2000g	600

Formula
=TRANSPOSE(A1:C4)
→ Return value:

apple	strawberry	grapes	watermelon
1000g	800g	400g	2000g
1200	800	900	600

FILTER(argument 1, argument 2, [argument 3])

Filters the specified range of data based on the specified conditions

Argument 1

Specify the range of the filter target.

Argument 2

Specify the range to be filtered.

Argument 3

Specify the value to be returned if the filter returns nothing.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number, string, logical value, error type	Applicable	Not relevant	Not relevant	
Argument 2	Number, string, logical value, error type	Applicable (column or row is the same as argument 1)	Not relevant	Not relevant	
Argument 3	String, number, logical value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String, number, logical value, error value	Not relevant	Not relevant	

Error condition

#CALC! error

When there is no applicable data in the return value

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	NA	81
2	MA	75
3	EN	94
4	SI	68
5	SO	79

Formula
=FILTER(A1:B5,B1:B5>75)
→ Return value:

NA	81
EN	94
SO	79
#N/A	#N/A
#N/A	#N/A

UNIQUE(argument 1, [argument 2], [argument 3])

Returns a list of unique values in the specified range

Argument 1

Specify a range that returns unique rows or columns.

Argument 2

Specify the comparison method.
– Omitted or FALSE: Compare rows with each other and return unique rows.
– TRUE: Compare columns with each other and return unique columns.

Argument 3

Specify whether to return rows or columns that occur only once.
– Omitted or FALSE: Return all individual rows or columns regardless of number of occurrences.
– TRUE: Return all individual rows or columns that occur only once.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number, string, logical value, error type	Applicable	Not relevant	Not relevant	
Argument 2	Logical value	Not applicable	Not relevant	Not relevant	
Argument 3	Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String, number, logical value, error value	Not relevant	Not relevant	

Error condition

#CALC! error

When there is no applicable data in the return value

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	A
2	C
3	D
4	B
5	A
6	B
7	F
8	E
9	A
10	C

Formula
=UNIQUE(A1:A10,FALSE,TRUE)
→ Return value:

D
F
E
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A

SORT(argument 1, argument 2, [argument 3], [argument 4])

Sorts the specified range by the specified criteria.

Reference The sort order is "number < empty character < string (UNICODE) < logical value < error value (ERROR.TYPE) < blank".

Argument 1

Specify the range to be sorted.

Argument 2

Specify the reference columns or rows to be sorted. Numerically specify the beginning of the range specified by argument 1 as 1. If it is omitted, it is treated as 1.

Argument 3

Specify the sort order.

– Omitted or 1: ascending order
– -1: descending order

Argument 4

Specify the sort direction.

– Omitted or FALSE: row direction
– TRUE: column direction

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number, string, logical value, error type, blank cell	Applicable	Not relevant	Not relevant	Empty cells are treated as 0, but they are not numeric values.
Argument 2	Number	Not applicable	1	Not relevant	Number of rows or columns for argument 1
Argument 3	Number	Not applicable	Not relevant	Not relevant	
Argument 4	Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String, empty character, number, logical value, error value, blank cell	Not relevant	Not relevant	

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	NA	81
2	MA	75
3	EN	94
4	SI	68
5	SO	79

Formula
=SORT(A1:B5,2,-1,0)

→ Return value:

EN	94
NA	81
SO	79
MA	75
SI	68

SORTBY(argument 1, argument 2, [argument 3], [argument 4, argument 5]…[argument 30, argument 31])

Sorts a specified range by multiple criteria and order

Reference The sort order is "number < empty character < string (UNICODE) < logical value < error value (ERROR.TYPE) < blank".

Argument 1

Specify the range to be sorted.

Argument 2

Specify the reference range to be sorted.

Argument 3

Specify the sort order.

– Omitted or 1: ascending order
– -1: descending order

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number, string, logical value, error type, blank cell	Applicable	Not relevant	Not relevant	Empty cells are treated as 0, but they are not numeric values.
Argument 2	Number, string, logical value, error type, blank cell	Applicable (1 x n or n x 1)	Not relevant	Not relevant	
Argument 3	Number	Not applicable	-1	1	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String, empty character, number, logical value, error value, blank cell	Not relevant	Not relevant	

Error condition

#VALUE! error

- When the number of matrices in argument 1 and argument 2 do not match
- When argument 2 is greater than or equal to 2*2
- When a matrix range of argument 1 or more is specified
- When the matrix direction is not aligned

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	A	74
2	C	48
3	B	20
4	B	42
5	A	94
6	B	61
7	C	54
8	A	78
9	A	55
10	C	71

Formula
=SORTBY(A1:B10,A1:A10,1,B1:B10,-1)
→ Return value:

A	94
A	78
A	74
A	55
B	61
B	42
B	20
C	71
C	54
C	48

String Operation Functions

Function Name	Description
CONCAT(argument 1, [argument 2], ...[argument 32])	Concatenates strings
EXACT(argument 1, argument 2)	Compares strings to check whether they match
FIND(argument 1, argument 2, [argument 3])	Finds the position of a string
LEFT(argument 1, argument 2)	Extracts several characters from the left
LEN(argument 1)	Obtains the number of characters of a string
LOWER(argument 1)	Converts uppercase letters to lowercase letters

Function Name	Description
MID(argument 1, argument 2, argument 3)	Extracts several characters from the specified position
REPLACE(argument 1, argument 2, argument 3,argument 4)	Replaces a string of the specified number of characters
RIGHT(argument 1, [argument 2])	Extracts several characters from the right
SEARCH(argument 1, argument 2, [argument 3])	Finds the position of a string
SUBSTITUTE(argument 1, argument 2, argument 3, [argument 4])	Replaces a string found by search
TEXT(argument 1, [argument 2])	Returns a string that results from applying a display format to a number
TEXTJOIN(argument 1, argument 2, argument 3, [argument 4], ...[argument 32])	Concatenates multiple strings while inserting delimiters
UNICHAR(argument 1)	Returns the character corresponding to the character code (Unicode)
UNICODE(argument 1)	Finds the character code (Unicode)
UPPER(argument 1)	Converts lowercase letters to uppercase letters
VALUE(argument 1, [argument 2])	Converts a string that represents a number to a number
TEXTSPLIT(argument 1, argument 2, argument 3, [argument 4])	Splits the target string by the delimiter and returns the split character corresponding to the index
TEXTVERIFY(argument 1, argument 2, [arguments 3 to 32])	Checks whether a string matches judgment criteria

CONCAT(argument 1, [argument 2], ...[argument 32])

Concatenates strings. Delimiters and IgnoreEmpty arguments are ignored.

Argument 1

Specify a string or an array of strings such as a cell range.

Argument 2 to 32

Specify strings or arrays of strings such as cell ranges (maximum of 253).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2 to 32	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	Concatenated string

Error condition

#NUM! error

When the return value is 501 bytes or larger

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C	D
1	Aa	Bb	Cc	Dd
2	1	2	3	4

Formula
=CONCAT(A1:C2)
→ Return value: AaBbCc123

EXACT(argument 1, argument 2)

Checks whether two strings match. This function returns TRUE if they completely match, and returns FALSE in other cases. The comparison is case-sensitive. Format difference is ignored.

Argument 1 to 2

Specify strings.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 2	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: Match FALSE: Do not match

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator
2	KEYENCE VS Creator
3	KEYENCE VC Creator

- Formula 1
  =EXACT(A1,A2)
  → Return value: TRUE
- Formula 2
  =EXACT(A1,A3)
  → Return value: FALSE

FIND(argument 1, argument 2, [argument 3])

Searches for the specified string within another string, counts from the left the position where the text string first appears, and returns the position number.

Argument 1
Specify the string to look for.

Argument 2
Specify the string that contains the search target string.

Argument 3
Specify the start position of search. Specify 1 if you want to search from the first character. Omitting this argument is equivalent to specifying 1.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	String	Not applicable	Not relevant	Not relevant	
Argument 3	Number	Not applicable	1	512	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1	512	Position of the found string

Error condition

#VALUE! error
- When the string specified by argument 1 was not found
- When the length of the string specified by argument 1 is smaller than the position specified by argument 3

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator

Formula
=FIND("e",A1)
→ Return value: 14

LEFT(argument 1, argument 2)

Returns the specified number of characters from the beginning of a string.

Argument 1
Specify the string that contains the characters to be retrieved.

Argument 2
Specify the number of characters to be retrieved. If the number of characters is larger than the length of the string, the whole string is returned. Omitting this argument is equivalent to specifying 1.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	0	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	Retrieved string

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator

Formula
=LEFT(A1,9)
→ Return value: Keyence V

LEN(argument 1)

Returns the number of characters of the text string.

Argument 1

Specify the string to find the character count of. Spaces are counted as characters.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	512	Number of characters found

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator

Formula

=LEN(A1)
→ Return value: 18

LOWER(argument 1)

Converts all the upper-case alphabetics in the text string to lowercase. Characters other than upper-case alphabetics are not converted.

Argument 1

Specify a string enclosing it with double quotation marks (" ") or specify a reference to a cell that contains the string to be converted.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	The string obtained by converting the uppercase letters of a string to lowercase letters

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator

Formula
=LOWER(A1)
→ Return value: keyence vs creator

MID(argument 1, argument 2, argument 3)

Returns the string of the specified number of characters extracted from the specified position in a string. A double-byte character is also counted as 1 character.

Argument 1

Specify the string that contains the string to be retrieved.

Argument 2

Specify a number to indicate the position from where to begin string extraction. The position of the initial character of the argument 1 string is 1.

Argument 3

Specify the number of characters to be retrieved.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	1	Not relevant	
Argument 3	Number	Not applicable	0	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	Retrieved string

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator

Formula
=MID(A1,8,18)
→ Return value: VS Creator

REPLACE(argument 1, argument 2, argument 3,argument 4)

Replaces the specified number of characters contained in a string by different characters. A double-byte character is also counted as 1 character.

Argument 1

Specify the string in which replacement is to be performed.

Argument 2

Specify a number to indicate the position of the first character of the characters to be replaced by the replacing string. The position of the initial character of the argument 1 string is 1.

Argument 3

Specify the number of characters of the string to be replaced.

Argument 4

Specify the replacing string.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	1	Not relevant	
Argument 3	Number	Not applicable	1	Not relevant	
Argument 4	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	String resulting from replacement

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator

Formula
=REPLACE(A1,9,2,"AB")
→ Return value: KEYENCE AB Creator

RIGHT(argument 1, [argument 2])

Returns the characters of the specified character count from the end (rightmost) of the text string.

Argument 1

Specify the string that contains the characters to be retrieved.

Argument 2

Specify the number of characters to be retrieved. If the number of characters is larger than the length of the string, the whole string is returned. Omitting this argument is equivalent to specifying 1.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	0	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	Retrieved string

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator

Formula
=RIGHT(A1,9)

→ Return value: S Creator

SEARCH(argument 1, argument 2, [argument 3])

Returns the position at which the specified string appears first.

Argument 1

Specify a search string.

Argument 2

Specify the string in which to search from.

Argument 3

Specify the start position of search. Omitting this argument is equivalent to specifying 1.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	String	Not applicable	Not relevant	Not relevant	
Argument 3	Number	Not applicable	1	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	The position at which the string appears first

Error condition

#VALUE! error

- When the string specified by argument 1 was not found
- When argument 2 is an empty string
- When argument 2 refers to an empty cell
- When argument 3 is -1, 0, or an empty string
- When argument 3 is a logical value
- When argument 3 is larger than the number of characters of the string specified by argument 2
- When argument 3 refers to an empty cell
- When all arguments refer to empty cells
- When a string exceeding 500 characters is specified

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator

Formula
=SEARCH("e",A1)
→ Return value: 2

SUBSTITUTE(argument 1, argument 2, argument 3, [argument 4])

Replaces a string found by search.

Argument 1

Specify a string or a cell reference to be searched.

Argument 2

Specify the string to be replaced.

Argument 3

Specify the replacing string.

Argument 4

Specify a string number to indicate which of the replacement-target strings found in the searched string is to be replaced. Only the specified replacement-target string is replaced. If this argument is omitted, all replacement-target strings are replaced.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	String	Not applicable	Not relevant	Not relevant	
Argument 3	String	Not applicable	Not relevant	Not relevant	
Argument 4	Number	Not applicable	1	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	String resulting from replacement

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator

Formula
=SUBSTITUTE(A1,"EYENCE","eyence")
→ Return value: KEYENCE VS Creator

TEXT(argument 1, [argument 2])

Returns a string obtained by applying the specified format to a number. This function is useful for displaying a number in an easier-to-read format or for combining a number with a string or symbol.

Argument 1

Specify a number to be converted to a string.

Argument 2

Specify a string that defines the format to be applied to the number, enclosing it with double quotation marks (" ").

Argument 2	Description	Example
@	Substitutes argument 1 for the @ part.	Argument 1: 123, argument 2: "A@A" Return value: A123A
#	Displays a 1-digit number. If the digit count of the number is smaller than the specified digit count, "0" is not added.	• Argument 1: 123.456, argument 2: "####.##" Return value: 123.46 • Argument 1: 123.4, argument 2: ####.## Return value: 123.4
0	Displays a 1-digit number. If the digit count of the number is smaller than the specified digit count, the necessary number of "0" is prepended to make up the difference.	Argument 1: 123.456, argument 2: "0000.00" Return value: 0123.46
YMD	Converts the number to a string of the specified date format.	Argument 1: 45170, argument 2: "YYYY/MM/DD" Return value: 2023/09/01
hms	Converts the number to a string of the specified time format.	Argument 1: 0.603136574, argument 2: "hh:mm:ss" Return value: 14:28:31
String	Replaces the number of argument 1 by the string of argument 2.	Argument 1: 123, argument 2: "ABC" Return value: ABC
Omitted	When argument 2 is omitted, the number specified by argument 1 is converted to a string without formatting.	Argument 1: 123.456, argument 2: omitted Return value: 123.456

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	
Argument 2	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	The formatted string of argument 2.

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

TEXTJOIN(argument 1, argument 2, argument 3, [argument 4], ...[argument 32])

Concatenates strings in multiple ranges and/or strings while inserting delimiters in between. If the delimiter is an empty string, this function concatenates the ranges.

Argument 1

Specify an empty string, one or more characters enclosed by double quotations, or a reference to a valid string. A numerical value is treated as a string.

Argument 2
When TRUE is specified, empty cells are ignored.

Argument 3
Specify a string or an array of strings such as a cell range which will be concatenated.

Argument 4 to 32
Specify additional strings or arrays of strings such as cell ranges which will be concatenated.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	Logical value	Not applicable	Not relevant	Not relevant	
Argument 3	String	Not applicable	Not relevant	Not relevant	
Argument 4 to 32	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	Concatenated string

Error condition
There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	KEYENCE	VS	Creator

Formula
=TEXTJOIN("-",TRUE,A1,B1,C1)
→ Return value: KEYENCE-VS-Creator

UNICHAR(argument 1)
Returns the character corresponding to the specified number (Unicode).

Argument 1
Specify a Unicode number.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

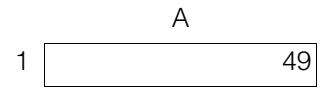
Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	Unicode character

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example



Formula
=UNICHAR(A1)
→ Return value: 1

UNICODE(argument 1)

Returns the Unicode number (code point) of the first character of a string.

Argument 1

Specify a string.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Cell range Logical value	Not applicable	Not relevant	Not relevant	

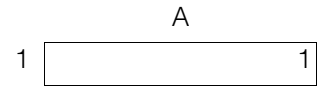
Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Code point of the first character

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example



Formula
=UNICODE(A1)
→ Return value: 49

UPPER(argument 1)

Converts all the lower-case alphabetics in the text string to uppercase. Characters other than lower-case alphabetics are not converted.

Argument 1

Specify a string enclosing it with double quotation marks (" ") or specify a reference to a cell that contains the string to be converted.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	The string obtained by converting the lowercase letters of a string to uppercase letters

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	KEYENCE VS Creator

Formula
=UPPER(A1)
→ Return value: KEYENCE VS CREATOR

VALUE(argument 1, [argument 2])

Converts a string that represents a number to a number. Specify a number, date, or time.

Argument 1

Specify a string enclosing it with double quotation marks (" ") or specify a reference to a cell that contains the string to be converted.

Argument 2

Specify a string that defines the format of the string specified by argument 1, enclosing it with double quotation marks (" ").

Argument 2	Description	Example
@	Specify the numeric part of argument 1.	Argument 1: "0123450 hours", argument 2: "@ hours" Return value: 123450
YMD	If the string specified by argument 1 is a date, specify the format of the date by argument 2.	Argument 1: "2023/09/01", argument 2: "YYYY/MM/DD" Return value: 45170
hms	If the string specified by argument 1 is a time, specify the format of the time by argument 2.	Argument 1: "14:28:30", argument 2: "hh:mm:ss" Return value: 0.603125
Omitted	When argument 2 is omitted, the number string specified by argument 1 is converted to a number as is.	Argument 1: "123.456", argument 2: omitted Return value: 123.456

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Number converted from the string that represents a number

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

TEXTSPLIT(argument 1, argument 2, argument 3, [argument 4])

Splits the specified string by the specified delimiter and finds the separate string corresponding to the specified index.

Argument 1
Specify the string to be split.

Argument 2
Specify the delimiter.

Argument 3
Specify the index.

Argument 4
When the separate string contains blanks, specify whether to include blanks in the index.
- Omitted or FALSE: include blanks
- TRUE: do not include blanks

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	String	Not applicable	Not relevant	Not relevant	
Argument 3	Number	Not applicable	0	Not relevant	
Argument 4	Logical value	Not applicable	FALSE	TRUE	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	

Error condition

#NUM! error

When the value of argument 3 is greater than the number of return value arrays

For errors common among functions, see "In the event of an error of a function".

Example

- Usage example

	A
1	KEYENCE VS Creator

Formula
=TEXTSPLIT(A1,"C",2)
→ Return value: reator

- For TEXTSPLIT(YYYY_MMDD_HHMMSS,"_",0), the separate string is "YYYY".
- For TEXTSPLIT(YYYY_MMDD_HHMMSS,"_",1), the separate string is "MMDD".
- For TEXTSPLIT(YYYY_MMDD_HHMMSS,"_",2), the separate string is "HHMMSS".
- For TEXTSPLIT("YYYY__MMDD_HHMMSS","_",2,FALSE), the separate string is "MMDD". The strings separated by [TEXTSPLIT] will be "YYYY", "(blank)", "MMDD", and "HHMMSS", and when "FALSE" is specified for argument 4, "(blank)" will also be included, and the string for index 2 will be "MMDD".
- For TEXTSPLIT("YYYY__MMDD_HHMMSS","_",2,TRUE), the separate string is "HHMMSS". The strings separated by [TEXTSPLIT] will be "YYYY", "(blank)", "MMDD", and "HHMMSS", and when "TRUE" is specified for argument 4, "(blank)" will not be included, and the string for index 2 will be "HHMMSS".
- For TEXTSPLIT("YYYY_ _MMDD_HHMMSS","_",2,TRUE), the separate string is "MMDD". The strings separated by [TEXTSPLIT] will be "YYYY", "(space)", "MMDD", and "HHMMSS", and even if "TRUE" is specified for argument 4, "(space)" will be included, and the string for index 2 will be "MMDD".

TEXTVERIFY(argument 1, argument 2, [arguments 3 to 32])

Compares the string specified by argument 1 with the judgment criteria specified by argument 2, and returns TRUE or FALSE depending on whether they match.

Argument 1

Specify the string to be judged.

Argument 2

Specify the judgment criteria string. You can specify a combination of characters used for determination, predefined pattern characters, and pattern characters defined in arguments 3 through 32.

Definition	Pattern	Definition description	Description
Pre-defined	~a,@a	a=abcdefghijklmnopqrstuvwxyz	Matches lowercase Latin characters.
Pre-defined	~A,@A	A=ABCDEFGHIJKLMNOPQRSTUVWXYZ	Matches uppercase Latin characters.
Pre-defined	~B,@B	B=abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ	Matches Latin characters.

Definition	Pattern	Definition description	Description
Pre-defined	~N,@N	N=0123456789	Matches numbers.
Pre-defined	~o,@o	o=oO0	Matches similar characters (o, O, 0).
Pre-defined	~O,@O	O=oO0	Matches similar characters (o, O, 0).
Pre-defined	~l,@l	l=lI1	Matches similar characters (l, I, 1).
Pre-defined	~I,@I	I=lI1	Matches similar characters (l, I, 1).
Pre-defined	~c,@c	c=cC	Matches similar characters (c, C).
Pre-defined	~p,@p	p=pP	Matches similar characters (p, P).
Pre-defined	~s,@s	s=sS	Matches similar characters (s, S).
Pre-defined	~u,@u	u=uU	Matches similar characters (u, U).
Pre-defined	~v,@v	v=vV	Matches similar characters (v, V).
Pre-defined	~w,@w	w=wW	Matches similar characters (w, W).
Pre-defined	~x,@x	x=xX	Matches similar characters (x, X).
Pre-defined	~z,@z	z=zZ	Matches similar characters (z, Z).
Pre-defined	?	Any Single Character	Matches any single character.
Pre-defined	*	Any String of Zero or More Characters	Matches any zero or more characters.
Pre-defined	~,@~	~	Matches “~”.
Pre-defined	~?,@?	?	Matches “?”.
Pre-defined	~*,@*	*	Matches “*”.
User-defined	~ (single character), @ (single character)	User definition is available using arguments 3 through 32.	Operates according to the user definition.

Arguments 3 to 32

Define the judgment criteria string (maximum of 30). When the pre-defined pattern characters are specified, the definition specified after arguments 3 to 32 is prioritized.

Argument

	Type	Cell range specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	String	Not applicable	Not relevant	Not relevant	
Arguments 3 to 32	String	Applicable	Not relevant	Not relevant	A format of (single character) = (string)

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	

Error condition

#VALUE! error

When a string other than (single character) = (string) or data other than a string type is specified in arguments 3 to 32.

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	banana	banana	
2	banana	apple	
3	REDbanana	???banana	
4	bananaPEN	banana*	
5	banana123	banana~N~N~N	
6	app1e	app~le	
7	Cat	~cat	
8	A10cR2025	A~I~O~cR2~N*	
9	CBA	~●~●~●	●=ABC

- Formula 1: Simple collation (TEXTVERIFY function returns TRUE.)
  =TEXTVERIFY(A1,B1)
- Formula 2: Simple collation (TEXTVERIFY function returns FALSE.)
  =TEXTVERIFY(A2,B2)
- Formula 3: Collation using any single character (TEXTVERIFY function returns TRUE.)
  =TEXTVERIFY(A3,B3)
- Formula 4: Collation using any string of zero or more characters (TEXTVERIFY function returns TRUE.)
  =TEXTVERIFY(A4,B4)
- Formula 5: Collation of changing numbers (TEXTVERIFY function returns TRUE.)
  =TEXTVERIFY(A5,B5)
- Formula 6: Collation when recognizing I, l, and 1 that are difficult to distinguish (TEXTVERIFY function returns TRUE.)
  =TEXTVERIFY(A6,B6)
- Formula 7: Collation when recognizing c and C that are difficult to distinguish (TEXTVERIFY function returns TRUE.)
  =TEXTVERIFY(A7,B7)
- Formula 8: Collation using complex patterns (TEXTVERIFY function returns TRUE.)
  =TEXTVERIFY(A8,B8)
- Formula 9: Collation using free additional definitions (TEXTVERIFY function returns TRUE.)
  =TEXTVERIFY(A9, B9,C9)

Logical Functions

Function Name	Description
AND(argument 1, [argument 2], ...[argument 32])	Checks whether all conditions are satisfied
IF(argument 1, argument 2, argument 3)	Applies different formulas depending on a condition
IFERROR(argument 1, argument 2)	Specifies the value to be returned in the event of an error
IFNA(argument 1, argument 2)	Specifies the value to be returned in the case of [#N/A]
IFS(argument 1, argument 2, [argument 3, argument 4], ...[argument 31, argument 32])	Returns a different value according to the result of checking multiple conditions in turn
NOT(argument 1)	Checks that a condition is not satisfied

Function Name	Description
OR(argument 1, [argument 2], ...[argument 32])	Checks whether one of the conditions is satisfied
SWITCH(argument 1, argument 2, argument 3, [argument 2[n], argument 3[n]], ...[argument 4])	Return the result associated with the value that matches the conditional expression.
XOR(argument 1, [argument 2], ...[argument 32])	Checks whether an odd number of conditions are satisfied

AND(argument 1, [argument 2], ...[argument 32])

Checks whether all conditions are satisfied. Returns TRUE when all the arguments are TRUE. Returns FALSE when any of the arguments is FALSE.

Argument 1

Specify a logical formula.

Argument 2 to 32

Specify a logical formula. Can be omitted.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Logical value	Applicable	Not relevant	Not relevant	
Argument 2 to 32	Logical value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE or FALSE

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	TRUE
2	FALSE

- Formula 1
  =AND(A1,A1)
  → TRUE
- Formula 2
  =AND(A1,A2)
  → FALSE
- Formula 3
  =AND(A2,A2)
  → FALSE

IF(argument 1, argument 2, argument 3)

Returns the value assigned to TRUE or the value assigned to FALSE depending on whether the logical formula is true or false. You can compare a value and its expected value logically.

Argument 1
Specify a logical formula.

Argument 2
Specify the value to be returned when the logical formula is true.

Argument 3
Specify the value to be returned when the logical formula is false.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Logical value	Not applicable	Not relevant	Not relevant	
Argument 2	String Number Logical value	Not applicable	Not relevant	Not relevant	
Argument 3	String Number Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String Number Logical value	Not relevant	Not relevant	Value for true/false

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	TRUE
2	FALSE

- Formula 1
  =IF(A1,"A",1)
  → Return value: A
- Formula 2
  =IF(FALSE,"A",1)
  → Return value: 1

IFERROR(argument 1, argument 2)

Returns the designated value when the specified value is an error. If the value is not an error, it is returned as it is.

Argument 1

Specify the value to be judged.

Argument 2

Specify the value to be displayed when the value of argument 1 is an error.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value Error value	Applicable	Not relevant	Not relevant	
Argument 2	String Number Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String Number Logical value	Not relevant	Not relevant	The value of argument 2 in the case of an error The value of argument 1 when it is not an error If multiple values a re returned, return them as an array.

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	1
2	#VALUE!

- Formula 1
  =IFERROR(A1,"A")
  → Return value: 1
- Formula 2
  =IFERROR(A2,"A")
  → Return value: A

IFNA(argument 1, argument 2)

Returns the designated value when the specified value is "#N/A". If the value is not "#N/A", it is returned as it is.

Argument 1

Specify the value to be judged.

Argument 2

Specify the value to be displayed when the value of argument 1 is "#N/A".

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value Error value	Not applicable	Not relevant	Not relevant	
Argument 2	String Number Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String Number Logical value	Not relevant	Not relevant	The value of argument 2 in the case of "#N/A" The value of argument 1 if it is not "#N/A"

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	1
2	#N/A

- Formula 1
  =IFNA(A1,"A")
  → Return value: 1
- Formula 2
  =IFNA(A2,"A")
  → Return value: A

IFS(argument 1, argument 2, [argument 3, argument 4], ...[argument 31, argument 32])

Checks specified multiple conditions in turn, and returns the value corresponding to the first TRUE condition. With the IFS function, you can easily take into consideration multiple conditions because you can combine multiple IF function instances.

Argument 1, argument 3, ..., argument 31

Specify a logical formula.

Argument 2, argument 4, ..., argument 32

Specify the value to return when the condition stated by the logical formula is true.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1, argument 3, ..., argument 31	Number Logical value	Not applicable	Not relevant	Not relevant	
Argument 2, argument 4, ..., argument 32	String Number Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String Number Logical value	Not relevant	Not relevant	Value corresponding to the matched condition

Error condition

#N/A error

When none of the conditions was true

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	1
2	2

- Formula 1
  =IFS(A1=1,"A",A1=2,"B")
  → Return value: A
- Formula 2
  =IFS(A2=1,"A",A2=2,"B")
  → Return value: B

NOT(argument 1)

Checks whether a condition is not satisfied, and returns TRUE or FALSE conversely.

Argument 1

Specify a value or formula that can be evaluated TRUE or FALSE.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE or FALSE

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	TRUE
2	FALSE

- Formula 1
  =NOT(A1)
  → Return value: FALSE
- Formula 2
  =NOT(A2)
  → Return value: TRUE

OR(argument 1, [argument 2], ...[argument 32])

Checks whether one of the conditions is satisfied.

Argument 1 to 32

Specify a logical formula.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Logical value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE or FALSE

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	TRUE
2	FALSE

- Formula 1
  =OR(A1,A1)
  → Return value: TRUE
- Formula 2
  =OR(A1,A2)
  → Return value: TRUE
- Formula 3
  =OR(A2,A2)
  → Return value: FALSE

SWITCH(argument 1, argument 2, argument 3, [argument 2[n], argument 3[n]], …[argument 4])

Returns the result associated with the value that matches the conditional expression.

Argument 1
Specify a conditional expression.

Argument 2
Specify a value to be compared with the conditional expression (Maximum of 15).

Argument 3
Specify return value corresponding to argument 2 (Maximum of 15).

Argument 4
Specify the value to be returned when the value of argument 2 does not match argument 1.
Specify this argument after the variable-length arguments.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value	Not applicable	Not relevant	Not relevant	
Argument 2	String Number Logical value	Not applicable	Not relevant	Not relevant	
Argument 3	String Number	Not applicable	Not relevant	Not relevant	
Argument 4	String Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String Number	Not relevant	Not relevant	The value corresponding to the value that matches the conditional expression, or the value of argument 4

Error condition

#N/A error

When argument 2 does not match and argument 4 is not specified

For errors common among functions, see "In the event of an error of a function".

Example

SWITCH(3,1,"SUN",2,"MON",3,"TUE",4,"WED",5,"THU",6,"FRI",7,"SAT")=TUE

XOR(argument 1, [argument 2], ...[argument 32])

Returns the exclusive logical OR of all arguments. The result is TRUE when an odd number of conditions are satisfied.
For each argument, you must specify a logical formula that can be judged to be a logical value (TRUE or FALSE) or an array or reference that contains logical values. Strings or empty cells included in the array or reference specified by an argument are ignored.

Argument 1 to 32

Specify a condition to be judged TRUE or FALSE.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1 to 32	Logical value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE or FALSE

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: XOR(TRUE,TRUE)=FALSE
- Formula 2: XOR(TRUE,FALSE)=TRUE
- Formula 3: XOR(FALSE,FALSE)=FALSE

Information Functions

Function Name	Description
ERROR.TYPE(argument 1)	Checks the type of an error value
FORMULATEXT(argument 1)	Extracts a formula
ISBLANK(argument 1)	Checks whether a cell is empty
ISERROR(argument 1)	Checks whether a value is an error value
ISEVEN(argument 1)	Checks whether a number is an even number
ISFORMULA(argument 1)	Checks whether a value is a formula
ISLOGICAL(argument 1)	Checks whether a value is a logical value
ISNA(argument 1)	Checks whether a value is "#N/A"
ISNONTEXT(argument 1)	Checks whether a value is not a string
ISNUMBER(argument 1)	Checks whether a value is a number
ISODD(argument 1)	Checks whether a value is an odd number
ISREF(argument 1)	Checks whether a value is a cell reference
ISTEXT(argument 1)	Checks whether a value is a string
TYPE(argument 1)	Checks the type of data

ERROR.TYPE(argument 1)

Returns the number corresponding to the error specified in the argument.

Argument 1

Specify an error value.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Error type	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	1	14	1: #NULL! error (There is no common area between the two cell ranges specified by a single-byte space reference operator) 2: #DIV/0! error (A formula or a function is divided by zero or an empty cell) 3: #VALUE! error (The format of an argument of a function is wrong) 4: #REF! error (An invalid cell is referenced by a formula) 5: #NAME? error (An unusable name is used in a function) 6: #NUM! error (A number specification is inappropriate, or a proper result cannot be obtained) 7: #N/A error (A process where calculation takes a long time is being executed) 8: #GETTING_DATA error (This error is displayed for a calculation process that takes a long time) 9: #SPILL! error (Unwanted data is included in a cell range entered by the spill function) 10: #CONNECT! error (An external data cannot be found, etc.) 11: #BLOCKED! error (Cannot access a resource) 12: #UNKNOWN! error (A data type is not supported by the current version) 13: #FIELD! error (The referenced field does not exist) 14: #CALC! error (An array formula returned an empty array) #N/A: Others (There is no applicable error)

Error condition

#N/A error

– When there is no applicable error
– When an empty cell is referenced

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	#REF!
2	#VALUE!
3	#SPILL!

- Formula 1
  =ERROR.TYPE(A1)
  → Return value: 4
- Formula 2
  =ERROR.TYPE(A2)
  → Return value: 3
- Formula 3

=ERROR.TYPE(A3)
→ Return value: 9

FORMULATEXT(argument 1)

Extract a formula from the specified cell. "#N/A" is returned if the cell range does not contain a formula.

Argument 1

Specify a cell.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	Returns a formula from the cell range

Error condition

#N/A error

When no valid formula is contained in the cell specified by argument 1

#VALUE! error

– When multiple cell ranges are specified by argument 1
– When argument 1 is not a cell reference

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	=1+1
2	=SUM(1,1)

- Formula 1
  =FORMULATEXT(A1)
  → Return value: =1+1
- Formula 2
  =FORMULATEXT(A2)
  → Return value: =SUM(1,1)

ISBLANK(argument 1)

Checks whether a cell is empty. Returns TRUE or FALSE depending on whether the value is empty or not.

Argument 1

Select a cell or cells.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number String Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When the cell is empty FALSE: When the cell is not empty

Error condition

#VALUE! error

When multiple cell ranges are specified by argument 1

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	
2	1

- Formula 1
  =ISBLANK(A1)
  → Return value: TRUE
- Formula 2
  =ISBLANK(A2)
  → Return value: FALSE

ISERROR(argument 1)

Checks whether a value is an error value. Returns TRUE or FALSE depending on whether the value is an error or not.

Argument 1

Select a cell or cells.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number String Logical value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When the value is an error FALSE: When the value is not an error

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	123
2	#VALUE!

- Formula 1
  =ISERROR(A1)
  → Return value: FALSE
- Formula 2
  =ISERROR(A2)
  → Return value: TRUE

ISEVEN(argument 1)

Checks whether a number is an even number. TRUE is returned when the number is even, and FALSE is returned when the number is odd.

Argument 1

Specify the value to be checked. If the number is not an integer, the decimal part is rounded off.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When the number is even FALSE: When the number is odd

Error condition

#VALUE! error

When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	123
2	122

- Formula 1
  =ISEVEN(A1)
  → Return value: FALSE
- Formula 2
  =ISEVEN(A2)
  → Return value: TRUE

ISFORMULA(argument 1)

Checks whether a value is a formula. Returns TRUE or FALSE depending on whether the specified cell range contains a formula.

Argument 1

Select a cell.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When a formula is contained FALSE: When a formula is not contained

Error condition

#VALUE! error

– When argument 1 is not a cell reference
– When multiple cell ranges are specified by argument 1

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	2
2	=1+1
2	=SUM(1,1)

- Formula 1
  =ISFORMULA(A1)
  → Return value: FALSE
- Formula 2

=ISFORMULA(A2)
→ Return value: TRUE

- Formula 3
  =ISFORMULA(A3)
  → Return value: TRUE

ISLOGICAL(argument 1)

Checks whether a value is a logical value. Returns TRUE or FALSE depending on whether the target value is a logical value or not.

Argument 1

Specify a target value.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value Error value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When the value is a logical value FALSE: When the value is not a logical value

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	TRUE
2	1

- Formula 1
  =ISLOGICAL(A1)
  → Return value: TRUE
- Formula 2
  =ISLOGICAL(A2)
  → Return value: FALSE

ISNA(argument 1)

Checks whether a value is "#N/A". Returns TRUE or FALSE depending on whether the value is "#N/A" or not.

Argument 1

Specify a cell.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Cell	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When the value is "#N/A" FALSE: When the value is not "#N/A"

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	#REF!
2	#N/A

- Formula 1
  =ISNA(A1)
  → Return value: FALSE
- Formula 2
  =ISNA(A2)
  → Return value: TRUE

ISNONTEXT(argument 1)

Checks whether a value is not a string. Returns TRUE or FALSE depending on whether the value is a string or not.

Argument 1

Specify a value to check.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value Error value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When the value is not a string FALSE: When the value is a string

Error condition

#VALUE! error

When a cell range that includes multiple cells is specified

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	123
2	abc

- Formula 1
  =ISNONTEXT(A1)
  → Return value: FALSE
- Formula 2
  =ISNONTEXT(A2)
  → Return value: TRUE

ISNUMBER(argument 1)

Checks whether a value is a number. Returns TRUE or FALSE depending on whether the value is a number or not.

Argument 1

Specify a value to check.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value Error value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When the value is a number FALSE: When the value is not a number

Error condition

#VALUE! error

When a cell range that includes multiple cells is specified

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	123
2	abc

- Formula 1
  =ISNUMBER(A1)
  → Return value: TRUE
- Formula 2
  =ISNUMBER(A2)
  → Return value: FALSE

ISODD(argument 1)

Checks whether a number is an odd number. TRUE is returned when the number is odd, and FALSE is returned when the number is even.

Argument 1

Specify the value to be checked. If the number is not an integer, the decimal part is rounded off.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When the number is odd FALSE: When the number is even

Error condition

#VALUE! error

When the argument 1 value is not of the numerical type

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	5
2	4

- Formula 1
  =ISODD(A1)
  → Return value: TRUE
- Formula 2
  =ISODD(A2)
  → Return value: FALSE

ISREF(argument 1)

Checks whether a cell reference is valid or not.

Argument 1

Specify the value to be checked.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value Error value	Applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When the cell reference is valid FALSE: When the cell reference is not valid

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	5

- Formula 1
  =ISREF(A1)
  → Return value: TRUE
- Formula 2
  =ISREF("A1")
  → Return value: FALSE

ISTEXT(argument 1)

Checks whether a value is a string. Returns TRUE or FALSE depending on whether the value or cell range contains a string.

Argument 1

Specify a string.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value Error value	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Logical value	Not relevant	Not relevant	TRUE: When the value is a string FALSE: When the value is not a string

Error condition

#VALUE! error

When a cell range that includes multiple cells is specified

For errors common among functions, see "In the event of an error of a function".

Example

	A
1	5
2	abc

- Formula 1
  =ISTEXT(A1)
  → Return value: FALSE
- Formula 2
  =ISTEXT(A2)
  → Return value: TRUE

TYPE(argument 1)

Checks and returns the data type of a value.

Argument 1

Specify a value that you want to get the data type of.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String Number Logical value Error value Cell range	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	1: Number 2: String 4: Logical value 16: Error value 64: Array

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

	A
1	ABC
2	TRUE
2	#VALUE!

- Formula 1
  =TYPE(A1)
  → Return value: 2
- Formula 2
  =TYPE(A2)
  → Return value: 4
- Formula 3
  =TYPE(A3)
  → Return value: 16

Engineering

Function Name	Description
BIN2DEC(argument 1)	Converts a binary expression to a decimal expression
BIN2HEX(argument 1, [argument 2])	Converts a binary expression to a hexadecimal expression
BITAND(argument 1, argument 2)	Calculates the logical product of bits
BITLSHIFT(argument 1, argument 2)	Shifts bits to the left
BITOR(argument 1, argument 2)	Calculates the logical sum of bits
BITRSHIFT(argument 1, argument 2)	Shifts bits to the right
BITXOR(argument 1, argument 2)	Calculates the exclusive OR of bits
DEC2BIN(argument 1, [argument 2])	Converts a decimal expression to a binary expression
DEC2HEX(argument 1, [argument 2])	Converts a decimal expression to a hexadecimal expression
HEX2BIN(argument 1, [argument 2])	Converts a hexadecimal expression to a binary expression
HEX2DEC(argument 1)	Converts a hexadecimal expression to a decimal expression

BIN2DEC(argument 1)

Converts a binary to a decimal.

Argument 1

Specify a binary integer to be converted (maximum of 10 digits). The most significant bit indicates the sign, and other bits indicate the absolute value. Negative values are expressed in two's complement.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Decimal number

Error condition

#NUM! error

- When the number of digits (bits) of argument 1 is larger than 10
- When a number other than a binary number is specified by argument 1
- When argument 1 contains a character other than "0" and "1"
- When a negative value or a decimal fraction is specified by argument 1

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: BIN2DEC("111111111")=511
- Formula 2: BIN2DEC("1000000001")=-511

BIN2HEX(argument 1, [argument 2])

Converts a binary to a hexadecimal.

Argument 1

Specify a binary integer to be converted (maximum of 10 digits). The most significant bit indicates the sign, and other bits indicate the absolute value. Negative values are expressed in two's complement.

Argument 2

Specify the number of digits of the return value. When the digit count of the return value is less than the specified number of digits, the upper digit positions are filled by "0". When argument 2 is omitted, "0" is not prepended so that the return value has the smallest necessary number of digits.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	Not relevant	Not relevant	
Argument 2	Number	Not applicable	1	10	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	FFFFFFFFFF	Hexadecimal number

Error condition

#NUM! error

– When the number of digits (bits) of argument 1 is larger than 10
– When a number other than a binary number is specified by argument 1
– When argument 1 contains a character other than "0" and "1"
– When a negative value or a decimal fraction is specified by argument 1
– When 0 is specified by argument 2
– When the cell referred to from argument 2 is empty

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: BIN2HEX("1111111111",10)=FFFFFFFFFF
- Formula 2: BIN2HEX("1111",10)=000000000F
- Formula 3: BIN2HEX("1111")=F

BITAND(argument 1, argument 2)

Returns the logical product (AND) of each bit of two numbers. The two numbers are converted to binary numbers. Then, the respective bits of the resulting number becomes 1 if the bits of the same bit position of the two numbers are both 1, and becomes 0 in other cases. The return value is an integer decimal number converted from the resulting binary number.

Argument 1 and argument 2

Specify an integer that is equal to or larger than 0.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	0	4294967295	
Argument 2	Number	Not applicable	0	4294967295	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Logical product of the bits of the arguments

Error condition

#VALUE! error
When one of the arguments is not of the numerical type

#NUM! error
When one of the arguments is less than 0 or a decimal fraction

For errors common among functions, see "In the event of an error of a function".

Example
BITAND(15.9)=9

BITLSHIFT(argument 1, argument 2)

Returns the number that has been shifted to the left by the specified number of bits. Argument 1 is converted to a binary number, and then zeros as many as specified by argument 2 are appended on the right. Therefore, the resulting number is argument 1 multiplied by 2 to the power of argument 2. The return value is an integer decimal number converted from the resulting binary number.
Example: BITLSHIFT(4,2) adds two zeros on the right of "100" resulting in "10000", and then returns its decimal expression, which is "16".

Argument 1
Specify an integer that is equal to or larger than 0.

Argument 2
Specify an integer. When a negative integer is specified, shift to the right by the specified number of bits.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	0	4294967295	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	4294967295	Integer

Error condition

#VALUE! error
When one of the arguments is not of the numerical type

#NUM! error
– When argument 1 is larger than the upper limit
– When the result of shifting is larger than the upper limit of argument 1
– When argument 1 is a negative number or a decimal fraction

For errors common among functions, see "In the event of an error of a function".

Example

BITLSHIFT(10,1)=20

BITOR(argument 1, argument 2)

Returns the logical sum (OR) of each bit of two numbers. The two numbers are converted to binary numbers. Then, the respective bits of the resulting number becomes 1 if one of the bits of the same bit position of the two numbers is 1, and becomes 0 in other cases. The return value is an integer decimal number converted from the resulting binary number.

Argument 1 and argument 2

Specify a number that is equal to or larger than 0.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	0	4294967295	
Argument 2	Number	Not applicable	0	4294967295	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	Not relevant	Logical sum of the bits of the arguments

Error condition

#VALUE! error

When one of the arguments is not of the numerical type

#NUM! error

- When one of the arguments is larger than the upper limit
- When argument 1 is a negative number or a decimal fraction

For errors common among functions, see "In the event of an error of a function".

Example

BITOR(15.9)=15

BITRSHIFT(argument 1, argument 2)

Returns the number that has been shifted to the right by the specified number of bits. Argument 1 is converted to a binary number, and then zeros as many as specified by argument 2 are prepended on the left. Therefore, the resulting number is argument 1 multiplied by 1/2 to the power of argument 2. The return value is an integer decimal number converted from the resulting binary number.

Example: BITRSHIFT(13,2) adds two zeros on the left of "1101" (deletes "01" on the right side) resulting in "0011", and then returns its decimal expression, which is "3".

Argument 1

Specify an integer that is equal to or larger than 0.

Argument 2

Specify an integer. Shifted to the right by the specified number of bits if a negative integer is specified.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	0	4294967295	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	4294967295	Integer

Error condition

#VALUE! error

When one of the arguments is not of the numerical type

#NUM! error

- When argument 1 is larger than the upper limit
- When the result of shifting is larger than the upper limit of argument 1
- When argument 1 is a negative number or a decimal fraction

For errors common among functions, see "In the event of an error of a function".

Example

BITRSHIFT(10,1)=5

BITXOR(argument 1, argument 2)

Returns the exclusive logical OR (XOR) of each bit of two numbers. The two numbers are converted to binary numbers. Then, the respective bits of the resulting number becomes 1 if the bits of the same bit position of the two numbers are not equal, and becomes 0 if they are equal. The return value is an integer decimal number converted from the resulting binary number.

Argument 1 and argument 2

Specify a number that is equal to or larger than 0.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	0	4294967295	
Argument 2	Number	Not applicable	0	4294967295	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	Not relevant	Exclusive logical sum of the bits of the arguments

Error condition

#VALUE! error

When one of the arguments is not of the numerical type

#NUM! error

- When one of the arguments is larger than the upper limit
- When argument 1 is a negative number or a decimal fraction

For errors common among functions, see "In the event of an error of a function".

Example

BITXOR(15.10)=5

DEC2BIN(argument 1, [argument 2])

Converts a decimal expression to a binary expression. The return value is a 10-digit (10-bit) binary number. If the decimal number is a negative value, a 10-digit binary number is returned regardless of the digit count specification. The most significant bit of the return value indicates the sign, and the other bits indicate the absolute value. Negative values are expressed in two's complement.

Argument 1

Specify a decimal integer to be converted.

Argument 2

Specify the number of digits of the return value. When the digit count of the return value is less than the specified number of digits, the upper digit positions are filled by "0". When argument 2 is omitted, "0" is not prepended so that the return value has the smallest necessary number of digits.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-512	511	
Argument 2	Number	Not applicable	1	10	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	Binary number

Error condition

#VALUE! error

When one of the arguments is not of the numerical type

#NUM! error

– When the cell referred to from argument 2 is empty
– When the result of conversion has digits exceeding the digit count specified by argument 2
– When one of the arguments exceeds the lower limit or upper limit

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: DEC2BIN(511)=111111111
- Formula 2: DEC2BIN(-511)=1000000001
- Formula 3: DEC2BIN(16,10)=0000010000
- Formula 4: DEC2BIN(16)=10000

DEC2HEX(argument 1, [argument 2])

Converts a decimal to a hexadecimal.

Argument 1

Specify a decimal integer to be converted.

Argument 2

Specify the number of digits of the return value. When argument 2 is omitted, the return value has the smallest necessary number of digits.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Not applicable	-549755813888	549755813887	
Argument 2	Number	Not applicable	1	10	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	8000000000	7FFFFFFFFF	Hexadecimal number

Error condition

#NUM! error

– When argument 1 is larger than the upper limit or smaller than the lower limit
– When 0 is specified by argument 2

– When the cell referred to from argument 2 is empty

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: DEC2HEX(255)=FF
- Formula 2: DEC2HEX(-16)=FFFFFFFFF0
- Formula 3: DEC2HEX(16,10)=0000000010
- Formula 4: DEC2HEX(16)=10

HEX2BIN(argument 1, [argument 2])

Converts a hexadecimal to a binary.

Argument 1

Specify a hexadecimal integer to be converted by a string enclosed by double quotations (" "). Up to 10 characters (40 bits) can be specified. The most significant bit indicates the sign. Negative values are expressed in two's complement.

Argument 2

Specify the number of digits of the return value. When the digit count of the return value is less than the specified number of digits, the upper digit positions are filled by "0". When argument 2 is omitted, "0" is not prepended so that the return value has the smallest necessary number of digits.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	0	Not relevant	
Argument 2	Number	Not applicable	1	10	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
String	Not relevant	Not relevant	Binary number

Error condition

#NUM! error

– When argument 1 is a negative number or a decimal fraction
– When argument 1 is not a hexadecimal number (contains an alphabet character other than A to F)
– When the binary number obtained by conversion has more than 10 digits
– When the binary number obtained by conversion has more digits than the number of digits specified by argument 2

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: HEX2BIN("FFFFFFFFFF")=1111111111
- Formula 2: HEX2BIN("F0")=11110000
- Formula 3: HEX2BIN("A",10)=0000001010
- Formula 4: HEX2BIN("A")=1010

HEX2DEC(argument 1)

Converts a hexadecimal to a decimal.

Argument 1

Specify a hexadecimal natural number to be converted by a string enclosed by double quotations (" "). Double quotations are not necessary when a cell is specified or result data is referenced.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	String	Not applicable	8000000000	7FFFFFFFFF	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	-549755813888	549755813887	Decimal number

Error condition

#NUM! error

– When argument 1 is not a hexadecimal number (contains an alphabet character other than A to F)
– When argument 1 is a negative value

For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: HEX2DEC("7FFFFFFFFF")=549755813887
- Formula 2: =HEX2DEC("8000000000")=-549755813888
-

2D Geometric Operation Functions

Function Name	Description
ANGLE(argument 1, argument 2)	Calculate the angle that the line segment connecting two points makes with the horizontal line
ANGLETRANS(argument 1, argument 2)	Calculate the value of an angle transformed to a value in the specified angle range

Function Name	Description
CALIBINFO(argument 1)	From the calibration information, calculate the pixel resolution, camera rotation angle, Y-axis skew angle in the X-axis direction, and the presence or absence of the hand system transformation
CIRCLE(argument 1, [argument 2])	Calculate a circle from multiple points using the least-square method
CIRCLETAN(argument 1, argument 2, [argument 3])	Calculate the tangent points (2 points) of a tangent line drawn from a point to a circle
CONVCRD(argument 1, argument 2, argument 3, [argument 4])	Calculate the coordinates of P1 when expressed in a coordinate system with P2 as the origin, tilted by D degrees and multiplied by P
TRANSXY(argument 1, argument 2)	Transform the coordinate values of point P with CALIB[]
TRANSXYINV(argument 1, argument 2)	Inversely transform the coordinate values of point P with CALIB[]
DIST(argument 1, argument 2)	Calculate the distance between two points
I2CIRCLE(argument 1, argument 2, [argument 3])	Calculate the intersections (2 points) of two circles
I4XY(argument 1, argument 2, argument 3, argument 4, [argument 5])	Calculate the center of gravity or intersection of diagonals from four points
I4LINE(argument 1, argument 2, argument 3, argument 4, [argument 5])	Calculate the center of gravity or intersection from four lines
ILINECIRCLE(argument 1, argument 2, [argument 3])	Calculate the intersections (2 points) of a circle and a line
INNERPROD(argument 1, argument 2)	Calculate the inner product of a 2-dimensional vector consisting of two points
I2LINE(argument 1, argument 2)	Calculate the intersections of two lines
LINE(argument 1, [argument 2])	Calculate a line from multiple points using the least-square method
LLANGLE(argument 1, argument 2)	Calculate the angle that two lines make
LNDIST(argument 1, argument 2)	Calculate the distance between a line and a point
LNDISTP(argument 1, argument 2)	Calculate the signed distance between a line and a point
LNDISTXY(argument 1, argument 2)	Calculate the intersections of a perpendicular line drawn from a point to a line and a line
MIDLINE(argument 1, argument 2, [argument 3])	Calculate the bisectors (two lines) of the angle formed by two lines
MIDXY(argument 1, argument 2)	Calculate the midpoint of two points
MULTIPOINTCALIB(argument 1, argument 2, [argument 3])	Calculate calibration information from position coordinates of multiple points
OUTERPROD(argument 1, argument 2)	Calculate the outer product of a 2-dimensional vector consisting of two points

Function Name	Description
ROTATE(argument 1, argument 2, argument 3, [argument 4])	Calculate the coordinates multiplied by the specified value by rotating point P1 by D degrees only around point P2.
ROTCENTER(argument 1, argument 2, argument 3)	Calculate the center of rotation when rotating from point P1 to point P2 by D degrees
ROTCENTERLS(argument 1, argument 2)	Calculate the rotation center coordinates from multiple points and their angles
VMIDLINE(argument 1, argument 2)	Calculate the perpendicular bisectors of a line segment passing through two points
SHIFTLINE(argument 1, argument 2)	Move a line by a specified amount in parallel

ANGLE(argument 1, argument 2)

Calculate the angle that the line segment connecting the two specified points makes with the horizontal line, centered at the point specified in argument 1.

Argument 1

Specify the first point as an array (X coordinate, Y coordinate).

Argument 2

Specify the second point as an array (X coordinate, Y coordinate).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	✔ (1×2 or 2×1)	–	-	
Argument 2	Number (position)	✔ (1×2 or 2×1)	–	-	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	-180	179.999	Unit in degrees

Error condition

#NUM! error

When argument 1 and argument 2 have the same value

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example

• Usage example

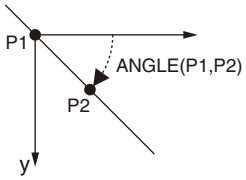
A	B

1	10	20
2	100	200

=ANGLE(A1:B1,A2:B2)

→ Return value: 63.43

- If P1 (0, 0) and P2 (100, 100) are specified, the angle is 45 degrees.



P1: Point specified by argument 1

P2: Point specified by argument 2

ANGLETRANS(argument 1, argument 2)

Calculate the value of an angle transformed to a value within the specified angle range.

Argument 1

Specify an angle of the transformation target.

Argument 2

Specify a range of angle.

– FALSE: Transform between -180 degrees and 179.999 degrees.

– TRUE: Transform between 0 degrees and 359.999 degrees.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	–	–	-	
Argument 2	Logical value	–	FALSE	TRUE	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	-180	179.999	When argument 2 is FALSE. Unit in degrees.
	0	359.999	When argument 2 is TRUE. Unit in degrees.

Error condition

There is no function-specific error. For errors common among functions, see "In the event of an error of a function".

Example

- Formula 1: ANGLETRANS(240,FALSE)=120
- Formula 2: ANGLETRANS(240,TRUE)=240
- Formula 3: ANGLETRANS(-60,FALSE)=-60
- Formula 4: ANGLETRANS(-60,TRUE)=300

CALIBINFO(argument 1)

From the specified calibration information, calculate the pixel resolution, camera rotation angle, Y-axis tilt, and the presence or absence of the hand system transformation.

Argument 1

Specify the calibration information for 18 elements.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	✔ (1×18 or 18×1)	–	-	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	–	-	An array of 5 elements is returned. • Element 0: pixel resolution X (mm/pixel) • Element 1: pixel resolution Y (mm/pixel) • Element 2: camera rotation angle on the XY plane (degrees) • Element 3: Y-axis tilt in the X-axis direction (degrees) • Element 4: the presence or absence of transformation from the left-handed system to the right-handed system 1: no transformation -1: with transformation

Error condition

#VALUE! error

When there is a missing or excessive array size in argument 1

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	1	0	100	0	1	145	0	0	1	1	0	-100	0	1	-145	0	0	1

Formula:
=CALIBINFO(A1:R1)
→ Return value:

1	1	0	0	1

CIRCLE(argument 1, [argument 2])

Calculate a circle from the specified point group using the least-square method.

Argument 1

Specify multiple coordinates in an array.

Argument 2

Specify whether to perform deformation correction or not.
– Omitted or FALSE: no deformation correction
– TRUE: with deformation correction

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	✔ (2× n or n×2)	–	-	
Argument 2	Logical value	–	FALSE	TRUE	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (circle XYR)	–	-	Return the center coordinates X, Y and radius R in an array.

Error condition

#NUM! error

– When the number of coordinates in argument 1 is less than three
– When there are less than three points that are not on the same line in argument 1

#VALUE! error

When there is a missing or excessive array size of the coordinate value in argument 1

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	5	31
2	41	34
3	66	63
4	76	95

Formula
=CIRCLE(A1:B4,FALSE)
→ Return value:

CIRCLETAN(argument 1, argument 2, [argument 3])

14.33	90.55	60.81

Calculate the tangent points (2 points) of a tangent line drawn from the specified point to a circle.

Argument 1

Specify the circle in an array (center X, center Y, radius).

Argument 2

Specify the points in an array (X coordinate, Y coordinate).

Argument 3

Specify the tangent points to be returned. If omitted, two points are returned.

– FALSE: Return the value of the left tangent point seen from the center of the circle specified by argument 1 to the point specified by argument 2.
– TRUE: Return the value of the right tangent point seen from the center of the circle specified by argument 1 to the point specified by argument 2.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (circle	✓ (1×3 or 3×1)	–	-	
Argument 2	Number (position)	✓ (1×2 or 2×1)	–	-	
Argument 3	Logical value	–	FALSE	TRUE	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position XY)	–	-	Return the tangent points X, Y in an array. If argument 3 is omitted, two points are returned in an array.

Error condition

#NUM! error

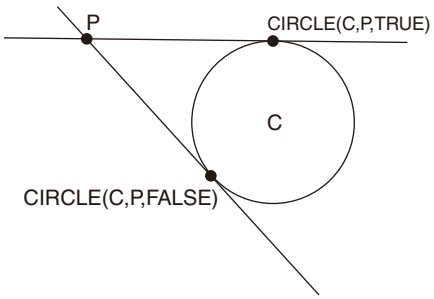
When all values of argument 1 are 0

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive number of arrays in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example



C: Circle specified by argument 1
P: Point specified by argument 2

• Usage example

	A	B	C
1	10	15	5
2	-10	-10	

Formula
=CIRCLETAN(A1:C1,A2:B2)
→ Return value:

5.66	17.48
13.37	11.31

CONVCRD(argument 1, argument 2, argument 3, [argument 4])

Calculate the position of the point specified in argument 1 when expressed in a coordinate system multiplied by the specified angle by tilting the coordinate axes by the specified angle only with the point specified in argument 2 as the origin.

Argument 1
Specify the points before transformation in an array (X coordinate, Y coordinate).

Argument 2
Specify the origin after transformation in an array (X coordinate, Y coordinate).

Argument 3
Specify the angle to be tilted.

Argument 4
Specify how many times to be multiplied. If it is omitted, it is treated as 1.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	✓ (1×2 or 2×1)	–	-	
Argument 2	Number (position)	✓ (1×2 or 2×1)	–	-	
Argument 3	Number	–	–	-	Specify the unit in degrees.
Argument 4	Number	–	–	-	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position XY)	–	-	Return the coordinates X, Y after transformation in an array.

Error condition

#NUM! error
When argument 4 is set to 0

#VALUE! error
– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example

• Usage example

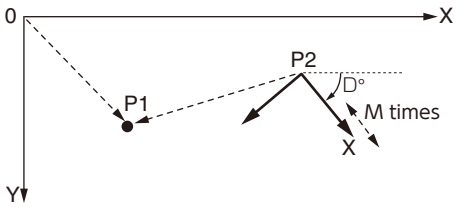
A	B

1	10	10
2	-10	-10

Formula
=CONVCRD(A1:B1,A2:B2,30,2)
→ Return value:

13.66	3.66

- For P1 (100, 100), P2 (250, 50), D 45 degrees, and M 1 time, the position of Q1 after transformation is (-70.71, 141.42).



Q1: Point specified by argument 1
Q2: Point specified by argument 2
D: Angle specified by argument 3
M: Multiple specified by argument 4

TRANSXY(argument 1, argument 2)

Calculate the transformed coordinates with the specified calibration information.

Argument 1

Specify the position before transformation in an array (X coordinate, Y coordinate).

Argument 2

Specify the calibration information for 18 elements in an array.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	✓ (1×2 or 2×1)	–	-	
Argument 2	Number	✓ (1×18 or 18×1)	–	-	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position XY)	–	-	Return the coordinates X, Y after transformation in an array.

Error condition

#NUM! error

When argument 2 has an abnormal value

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	10	150																
1	1	0	100	0	1	145	0	0	1	1	0	-100	0	1	-145	0	0	1

Formula:
=TRANSXY(A1:B1,A2:R2)
→ Return value:

110	295

TRANSXYINV(argument 1, argument 2)

Calculate the transformed coordinates with the specified calibration information.

Argument 1

Specify the position before transformation in an array (X coordinate, Y coordinate).

Argument 2

Specify the calibration information for 18 elements in an array.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	✔ (1×2 or 2×1)	–	-	
Argument 2	Number	✔ (1×18 or 18×1)	–	-	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position XY)	–	-	Return the coordinates X, Y after transformation in an array.

Error condition

#NUM! error

When argument 2 has an abnormal value

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	110	295																

1	1	0	100	0	1	145	0	0	1	1	0	-100	0	1	-145	0	0	1

Formula:
=TRANSXYINV(A1:B1,A2:R2)
→ Return value:

10	150

DIST(argument 1, argument 2)

Calculate the distance between the two specified points.

Argument 1

Specify the first point as an array (X coordinate, Y coordinate).

Argument 2

Specify the second point as an array (X coordinate, Y coordinate).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 2	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Distance

Error condition

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

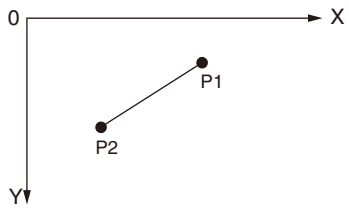
Example

• Usage example

	A	B
1	300	300
2	300	-300

Formula
=DIST(A1:B1,A2:B2)
→ Return value: 600

• If P1 (70, 20) and P2 (30, 50) are specified, the distance is 50.



P1: Point specified by argument 1
P2: Point specified by argument 2

I2CIRCLE(argument 1, argument 2, [argument 3])

Calculate the intersection of the two specified circles. If they are tangent, both points have the same coordinates.

Argument 1

Specify the first circle in an array (center X, center Y, radius).

Argument 2

Specify the second circle in an array (center X, center Y, radius).

Argument 3

Specify the intersections to be returned. If omitted, two points are returned.

– FALSE: Return the value of the left intersection when looking at a line passing through the two intersections from the circle of argument 1.
– TRUE: Return the value of the right intersection when looking at a line passing through the two intersections from the circle of argument 1.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (circle	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 2	Number (circle	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 3	Logical value	Not relevant	FALSE	TRUE	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position XY)	Not relevant	Not relevant	Return the intersections X, Y in an array, and when argument 3 is omitted, return two intersections.

Error condition

#NUM! error

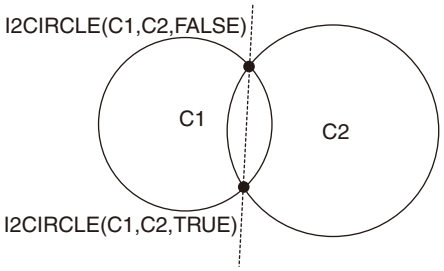
– When argument 1 and argument 2 have the same value
– When the radius of the argument is 0 or minus
– When argument 1 and argument 2 do not intersect
– When there is a circle inside a circle

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example



C1: Circle specified by argument 1
C2: Circle specified by argument 2

• Usage example

	A	B	C
1	100	100	50
2	200	210	100

Formula
=I2CIRCLE(A1:C1,A2:C2)
→ Return value:

140.00	130.00
126.06	142.67

I4XY(argument 1, argument 2, argument 3, argument 4, [argument 5])

Calculate the center of gravity or intersection of diagonals from the four specified points.

Reference The diagonals are the line connecting the points specified by argument 1 and argument 3, and the line connecting the points specified by argument 2 and argument 4.

Argument 1

Specify the first point as an array (X coordinate, Y coordinate).

Argument 2

Specify the second point as an array (X coordinate, Y coordinate).

Argument 3

Specify the third point as an array (X coordinate, Y coordinate).

Argument 4

Specify the fourth point as an array (X coordinate, Y coordinate).

Argument 5

Specify whether to calculate the center of gravity or the intersection.
– Omitted or FALSE: Calculate the center of gravity.
– TRUE: Calculate the intersection.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 2	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 3	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 4	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 5	Logical value	Not relevant	FALSE	TRUE	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position XY)	Not relevant	Not relevant	Return the X, Y coordinates of the point specified by argument 5 (the center of gravity or intersection, the center of gravity if argument 5 is omitted) in an array.

Error condition

#NUM! error

– If the line of argument 1 and argument 3 or the line of argument 2 and argument 4 does not hold
– When the line of argument 1 and argument 3 do not intersect with the line of argument 2 and argument 4

#VALUE! error

– When the array directions of arguments 1 through 4 do not match
– When there is a missing or excessive array size in any of argument 1 through argument 4

For errors common among functions, see "In the event of an error of a function".

Example

• Usage example

	A	B
1	100	100
2	600	100
3	650	650
4	100	550

Formula 1
=I4XY(A1:B1,A2:B2,A3:B3,A4:B4,FALSE)
→ Return value:

362.50	350.00

Formula 2
=I4XY(A1:B1,A2:B2,A3:B3,A4:B4,TRUE)
→ Return value:

336.84	336.84

I4LINE(argument 1, argument 2, argument 3, argument 4, [argument 5])

Calculate the intersection of the center of gravity and the diagonal from the four intersections of the four specified lines.

Reference
- The lines specified by arguments 1 through 4 must be specified clockwise or counterclockwise.
- The diagonals are the line connecting the points specified by argument 1 and argument 3, and the line connecting the points specified by argument 2 and argument 4.

Argument 1
Specify the first line in an array (line center X, line center Y, line angle).

Argument 2
Specify the second line in an array (line center X, line center Y, line angle).

Argument 3
Specify the third line in an array (line center X, line center Y, line angle).

Argument 4
Specify the fourth line in an array (line center X, line center Y, line angle).

Argument 5
Specify whether to calculate the center of gravity or the intersection.
– Omitted or FALSE: Calculate the center of gravity.
– TRUE: Calculate the intersection.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 2	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 3	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 4	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 5	Logical value	Not relevant	FALSE	TRUE	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position XY)	Not relevant	Not relevant	Return the X, Y coordinates of the point specified by argument 5 (the center of gravity or intersection, the center of gravity if argument 5 is omitted) in an array.

Error condition

#NUM! error

– When 3 or more θ have the same value in arguments 1 through 4
– When two lines match exactly in argument 1 through argument 4

#VALUE! error

– When the array directions of arguments 1 through 4 do not match
– When there is a missing or excessive array size in any of argument 1 through argument 4

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	100	100	-70
2	100	100	10
3	600	100	70
4	600	600	-10

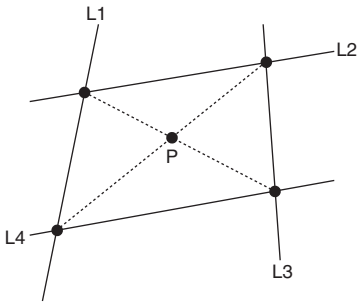
- Formula 1
  =I4LINE(A1:C1,A2:C2,A3:C3,A4:C4,FALSE)
  → Return value:

344.14	398.14

- Formula 2
  =I4LINE(A1:C1,A2:C2,A3:C3,A4:C4,TRUE)
  → Return value:

434.42	334.16

- For I4LINE(L1, L2, L3, L4, TRUE), the center of gravity P can be calculated.



L1: Line specified by argument 1
L2: Line specified by argument 2
L3: Line specified by argument 3
L4: Line specified by argument 4
P: Center of gravity (specify TRUE with argument 5)

ILINECIRCLE(argument 1, argument 2, [argument 3])

Calculate the intersections (2 points) of the specified circle and line If the circle and the line are tangent, the same coordinates are stored for both points.

Argument 1

Specify the circle in an array (center X, center Y, radius).

Argument 2

Specify the line in an array (line center X, line center Y, line angle).

Argument 3

Specify which of the two intersections to be returned. If omitted, two points are returned.

- FALSE: Return the left intersection seen from the center of the circle specified by argument 1 to the line specified by argument 2.
- TRUE: Return the right intersection seen from the center of the circle specified by argument 1 to the line specified by argument 2.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (circle	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 2	Number (circle	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 3	Logical value	Not relevant	FALSE	TRUE	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position XY)	Not relevant	Not relevant	Return the intersections X, Y in an array. If argument 3 is omitted, two points are returned in an array.

Error condition

#NUM! error

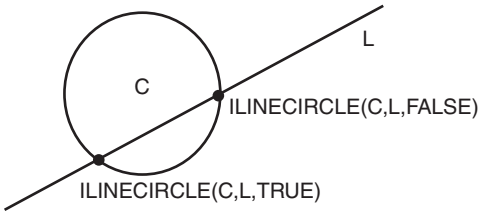
When the circle and the line do not intersect

#VALUE! error

- When the array direction of argument 1 and argument 2 differs
- When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example



C: Circle specified by argument 1
L: Line specified by argument 2

• Usage example

	A	B	C
1	200	200	100
3	190	220	70

Formula 1
=ILINECIRCLE(A1:C1,A3:C3)
→ Return value:

218.49	298.28
150.99	112.83

INNERPROD(argument 1, argument 2)

Calculate the inner product of a 2-dimensional vector consisting of the two specified points.

Argument 1

Specify the first point as an array (X coordinate, Y coordinate).

Argument 2

Specify the second point as an array (X coordinate, Y coordinate).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 2	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Inner product

Error condition

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	10
2	30	20

Formula
=INNERPROD(A1:B1,A2:B2)

→ Return value: 800

I2LINE(argument 1, argument 2)

Calculate the intersections of the two specified lines.

Argument 1

Specify the first line in an array (line center X, line center Y, line angle).

Argument 2

Specify the second line in an array (line center X, line center Y, line angle).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 2	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Intersection

Error condition

#NUM! error

– When argument 1 and argument 2 are an exact match
– When argument 1 and argument 2 are not the same but are parallel

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	20	10	45
2	30	20	90

Formula
=I2LINE(A1:C1,A2:C2)
→ Return value:

30	20

LINE(argument 1, [argument 2])

Calculate a line from the specified point group using the least-square method.

Argument 1

Specify multiple coordinates in an array (coordinate X, coordinate Y).

Argument 2

Specify whether to perform deformation correction or not.

– Omitted or FALSE: no deformation correction
– TRUE: with deformation correction

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	Applicable (2× n or n×2)	Not relevant	Not relevant	If the number of coordinates is 2, it is treated as 2×n.
Argument 2	Logical value	Not relevant	FALSE	TRUE	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (line)	Not relevant	Not relevant	Return line center XY (the foot of the perpendicular drawn from the origin to the line) and the line angle in an array.

Error condition

#NUM! error

– When the number of coordinates in argument 1 is less than two (2×1 or 1×2)
– When the coordinates specified in argument 1 are all the same

#VALUE! error

When there is a missing or excessive array size in argument 1 (1×n, n×3 and so on)

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	10
2	30	20
3	40	30

Formula
=LINE(A1:B3)
→ Return value:

5	-5	45

LLANGLE(argument 1, argument 2)

Calculate the angle that the two specified lines make If the specified line is perpendicular to the horizontal line, the angle of the line is treated as 90 degrees.

Argument 1

Specify the first line in an array (line center X, line center Y, line angle).

Argument 2

Specify the second line in an array (line center X, line center Y, line angle).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 2	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	90	Unit in degrees

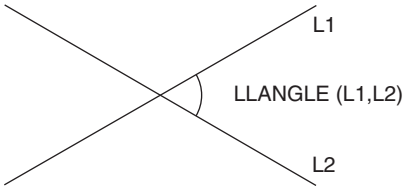
Error condition

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example



L1: Line specified by argument 1
L2: Line specified by argument 2

• Usage example

	A	B	C
1	20	10	45
2	30	20	90

Formula
=LLANGLE(A1:C1,A2:C2)
→ Return value: 45

LNDIST(argument 1, argument 2)

Calculate the distance between the specified line and point.

Argument 1

Specify the line in an array (line center X, line center Y, line angle).

Argument 2

Specify the points in an array (X coordinate, Y coordinate).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 2	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	0	Not relevant	Distance

Error condition

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	20	10	90
2	40	30	

Formula
=LNDIST(A1:C1,A2:B2)
→ Return value: 20

LNDISTP(argument 1, argument 2)

Calculate the distance between the specified line and point.

Reference
- If the point is on the opposite side of the origin with respect to the line, it will be a positive value, and if it is on the origin side, it will be a negative value.
- If the line passes through the origin, it will be a positive value.

Argument 1

Specify the line in an array (line center X, line center Y, line angle).

Argument 2

Specify the points in an array (X coordinate, Y coordinate).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 2	Number (point)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Distance (signed)

Error condition

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C
1	20	10	90
2	10	30	

Formula
=LNDISTP(A1:C1,A2:B2)
→ Return value: -10

LNDISTXY(argument 1, argument 2)

Calculate the intersections of a perpendicular line drawn from the specified point to the specified line and the specified line

Argument 1

Specify the line in an array (line center X, line center Y, line angle).

Argument 2

Specify the points in an array (X coordinate, Y coordinate).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 2	Number (point)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position)	Not relevant	Not relevant	Return the coordinates X,Y of the intersection in an array.

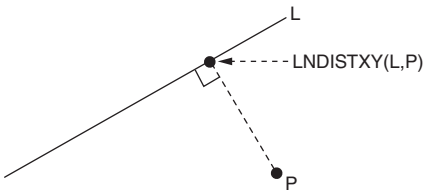
Error condition

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example



L: Line specified by argument 1
P: Point specified by argument 2

• Usage example

	A	B	C
1	20	10	90
2	40	30	

Formula
=LNDISTXY(A1:C1,A2:B2)
→ Return value: 90

MIDLINE(argument 1, argument 2, [argument 3])

Calculate the bisectors (two lines) of the angle formed by the two specified lines.

Argument 1

Specify the first line in an array (line center X, line center Y, line angle).

Argument 2

Specify the second line in an array (line center X, line center Y, line angle).

Argument 3

Specify which of the two bisectors to be returned. If omitted, two lines are returned.
– FALSE: Return the bisector with the smaller angle formed by two lines.
– TRUE: Return a line perpendicular to the bisector when FALSE is specified (return a midline with a larger angle).
– If omitted, both are returned.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 2	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 3	Logical value	Not applicable	FALSE	TRUE	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (line)	Not relevant	Not relevant	Return line center XY (the foot of the perpendicular drawn from the origin to the line) and the line angle in an array.

Error condition

#NUM! error

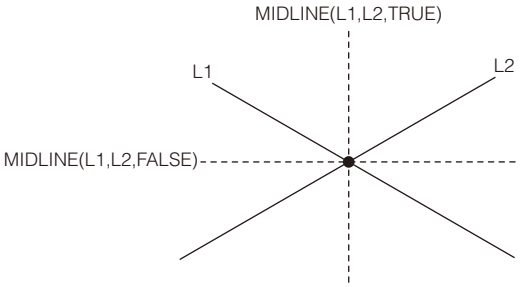
– When the lines of argument 1 and 2 are the same line
– When the lines of argument 1 and argument 2 are parallel

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example



L1: Line specified by argument 1
L2: Line specified by argument 2

• Usage example

	A	B	C
1	10	10	45
2	20	20	90

Formula
=MIDLINE(A1:C1,A2:C2)
→ Return value:

10	-4.14214	67.5
10	24.14214	-22.5

MIDXY(argument 1, argument 2)

Calculate the midpoint of the two specified points.

Argument 1

Specify the first point as an array (X coordinate, Y coordinate).

Argument 2

Specify the second point as an array (X coordinate, Y coordinate).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 2	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position)	Not relevant	Not relevant	Return the coordinates X,Y of the midpoint in an array.

Error condition

#VALUE! error

- When the array direction of argument 1 and argument 2 differs
- When there is a missing or excessive array size in argument 1 or argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	10	10
2	20	20

Formula
=MIDXY(A1:B1,A2:B2)
→ Return value:

15	15

MULTIPOINTCALIB(argument 1, argument 2, [argument 3])

Calculate calibration information from position coordinates of the multiple points specified by argument 1 and argument 2.

Reference By specifying the calibration information obtained by this function as an argument of the TRANSXY function or TRANSXYINV function, the following coordinate transformations can be performed.

- TRANSXY: Transform the coordinate system of the point group specified by argument 1 to the coordinate system of the point group specified by argument 2.
- TRANSXYINV: Transform the coordinate system of the point group specified by argument 2 to the coordinate system of the point group specified by argument 1.

Argument 1

Specify multiple coordinates in an array (coordinate X, coordinate Y).

Argument 2

Specify multiple coordinates in an array (coordinate X, coordinate Y).

Argument 3

Specify the transformation method.

– 0: Helmert transformation + no hand system transformation
– 1: Helmert transformation + with hand system transformation
– 2: Affine transformation
– 3: Projective transformation

Reference If argument 3 is omitted, the conversion formula is automatically determined by the number of coordinate points specified in argument 1 and argument 2.

- Number of coordinates 1: parallel movement
- Number of coordinates 2: Helmert transformation + no hand system transformation
- Number of coordinates 3 or more: Affine transformation

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	Applicable (n×2 or 2× n)	Not relevant	Not relevant	
Argument 2	Number (position)	Applicable (n×2 or 2× n)	Not relevant	Not relevant	
Argument 3	Number	Not applicable	0	3	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Return an array containing calibration information. • An array of 18 elements is spilled and returned. • The direction of spill expansion follows the range specification direction of argument 1 and argument 2. – If the argument is taken in n×2, it is expanded by 1×18. – If the argument is specified ad 2×n, it is expanded by 18×1.

Error condition

#NUM! error

– When the point groups of argument 1 and argument 2 have the same coordinates
– When the three points in argument 1 and argument 2 are on the same straight line
– When argument 3 is 0 or 1 and the number of coordinates in argument 1 and argument 2 is less than two
– When argument 3 is 2, if the number of coordinates in argument 1 and argument 2 is less than three
– When argument 3 is 3, if the number of coordinates in argument 1 and argument 2 is less than four

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 and argument 2
– When the number of coordinates differs between argument 1 and argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B	C	D
1	10	150	110	295
2	10	50	110	195
3	80	50	180	195
4	80	150	180	295

Formula
=MULTIPOINTCALIB(A1:B4,C1:D4,3)
→ Return value:

1	0	100	0	1	145	0	0	1	1	0	-100	0	1	-145	0	0	1

OUTERPROD(argument 1, argument 2)

Calculate the outer product of a 2-dimensional vector consisting of the two specified points.

Argument 1
Specify the first point as an array (X coordinate, Y coordinate).

Argument 2
Specify the second point as an array (X coordinate, Y coordinate).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 2	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Outer product

Error condition

#VALUE! error
– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 and argument 2

For errors common among functions, see "In the event of an error of a function".

Example

	A	B
1	20	10
2	30	20

Formula
=OUTERPROD(A1:B1,A2:B2)
→ Return value: 100

ROTATE(argument 1, argument 2, argument 3, [argument 4])

Calculate the coordinates multiplied by the specified value by rotating the point specified in argument 1 by the specified degrees only around the point specified in argument 2.

Argument 1
Specify the points to be rotated in an array (X coordinate, Y coordinate).

Argument 2
Specify the point that should be the center of rotation in an array (X coordinate, Y coordinate).

Argument 3
Specify the angle value (unit: degrees; clockwise is positive).

Argument 4

Specify the magnification value. If it is omitted, it is treated as 1.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 2	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 3	Number	Not applicable	Not relevant	Not relevant	Unit in degrees
Argument 4	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position)	Not relevant	Not relevant	Return the coordinates X,Y in an array.

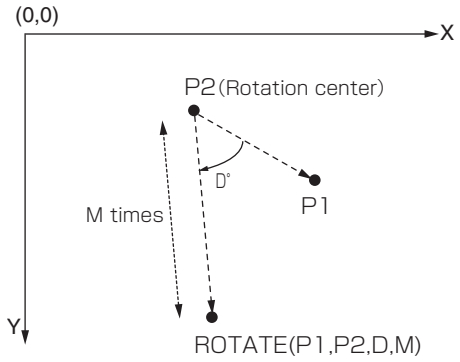
Error condition

#VALUE! error

- When the array direction of argument 1 and argument 2 differs
- When there is a missing or excessive array size in argument 1 and argument 2

For errors common among functions, see "In the event of an error of a function".

Example



P1: Point specified by argument 1
P2: Point specified by argument 2
D: Angle specified by argument 3
M: Modulus specified by argument 4

- Usage example

	A	B
1	10	10
2	20	20
3	90	
4	2	

Formula
=ROTATE(A1:B1,A2:B2,A3,A4)
→ Return value:

40	0

ROTCENTER(argument 1, argument 2, argument 3)

Calculate the rotation center coordinates when rotating from the point specified in argument 1 to the point specified in argument 2 by the specified degrees only.

Argument 1

Specify the starting point in an array (X coordinate, Y coordinate).

Argument 2

Specify the end point in an array (X coordinate, Y coordinate).

Argument 3

Specify the angle value (unit: degrees).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 2	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 3	Number	Not applicable	Not relevant	Not relevant	Unit in degrees

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position)	Not relevant	Not relevant	Return the coordinates X,Y in an array.

Error condition

#NUM! error

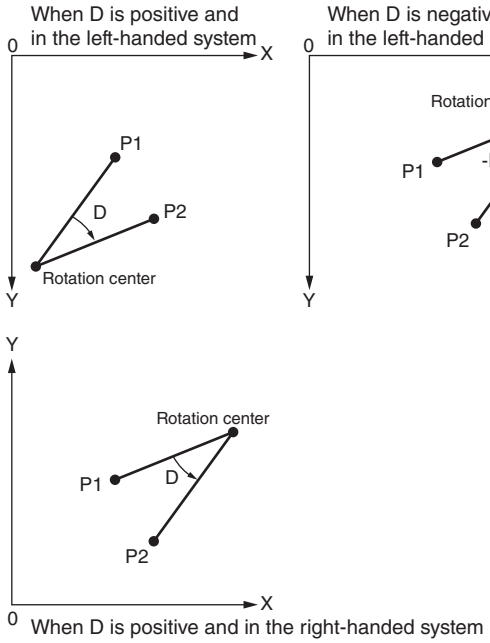
When the coordinates of argument 1 and argument 2 overlap

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 and argument 2

For errors common among functions, see "In the event of an error of a function".

Example



P1: Point specified by argument 1
P2: Point specified by argument 2
D: Angle specified by argument 3

- Usage example

	A	B
1	10	10
2	20	20
3	90	

Formula
=ROCENTER(A1:B1,A2:B2,A3)
→ Return value:

10	20

ROTCENTERLS(argument 1, argument 2)

Calculate the rotation center coordinates from the multiple points and their angles.

Argument 1

Specify the coordinate value.

Argument 2

Specify the rotation angle value.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number	Applicable (2× n or n×2)	Not relevant	Not relevant	
Argument 2	Number	Applicable (1× n or n×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (position XY)	Not relevant	Not relevant	Return the coordinates X,Y of the rotation center in an array.

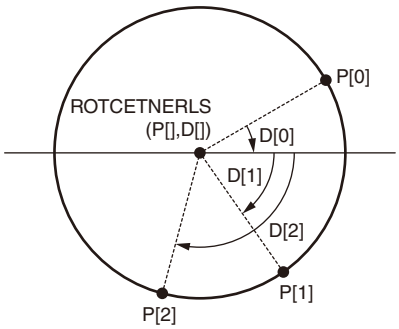
Error condition

#VALUE! error

– When the number of arrays in argument 1 and that in argument 2 do not match
– When argument 1 or argument 2 has an excess or deficiency in array size

For errors common among functions, see "In the event of an error of a function".

Example



P[]: Point group specified by argument 1
D[]: Angle specified by argument 2 (D[0] is specified as a negative value)

• Usage example

	A	B
1	2	4
2	2	3
3		
4	252	342

Formula
=ROTCENTERLS(A1:B2,A4:B4)
→ Return value:

2.5
3.5

VMIDLINE(argument 1, argument 2)

Calculate the perpendicular bisectors of a line segment passing through the two specified points.

Argument 1

Specify the first point as an array (X coordinate, Y coordinate).

Argument 2

Specify the second point as an array (X coordinate, Y coordinate).

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	
Argument 2	Number (position)	Applicable (1×2 or 2×1)	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number (line)	Not relevant	Not relevant	Return line center XY (the foot of the perpendicular drawn from the origin to the line) and the line angle in an array.

Error condition

#NUM! error

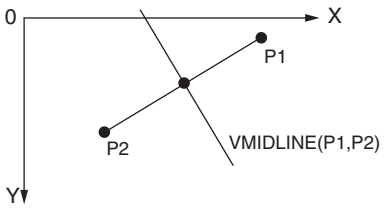
When the coordinates of argument 1 and argument 2 overlap

#VALUE! error

– When the array direction of argument 1 and argument 2 differs
– When there is a missing or excessive array size in argument 1 and argument 2

For errors common among functions, see "In the event of an error of a function".

Example



P1: Point specified by argument 1
P2: Point specified by argument 2

• Usage example

	A	B
1	10	10
2	20	20

Formula
=VMIDLINE(A1:B1,A2:B2)
→ Return value:

15	15	-45

SHIFTLINE(argument 1, argument 2)

Move the specified line by a specified amount in parallel

Argument 1

Specify the line in an array (line center X, line center Y, line angle).

Argument 2

Specify the segment shift of the line specified by argument 1 in the vertical direction.

Reference
- If a positive value is specified, the line moves away from the origin.
- If a negative value is specified, the line moves closer to the origin.

Argument

	Type	Cell Range Specification	Lower Limit Value	Upper Limit Value	Remarks
Argument 1	Number (line)	Applicable (1×3 or 3×1)	Not relevant	Not relevant	
Argument 2	Number	Not applicable	Not relevant	Not relevant	

Return value

Type	Lower Limit Value	Upper Limit Value	Description
Number	Not relevant	Not relevant	Return the coordinates X,Y of the foot of the perpendicular drawn to the line and the line angle between the x-axis and the line in an array.

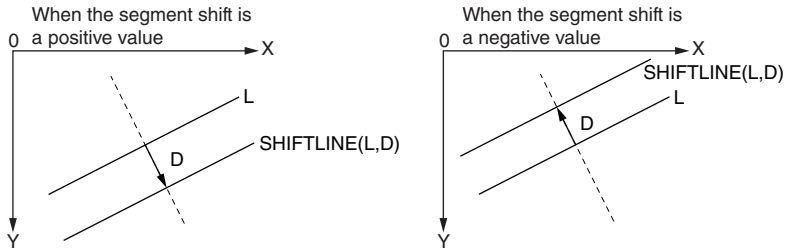
Error condition

#VALUE! error

When there is a missing or excessive array size in argument 1

For errors common among functions, see "In the event of an error of a function".

Example



L: Specified line
D: Specified segment shift

- Usage example

	A	B	C
1	10	10	90
2	50		

Formula
=SHIFTLINE(A1:C1,A2)
→ Return value:

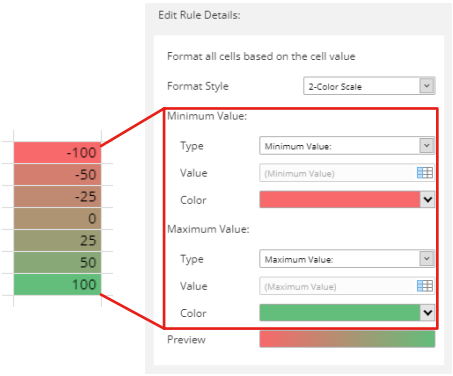
60	0	-90

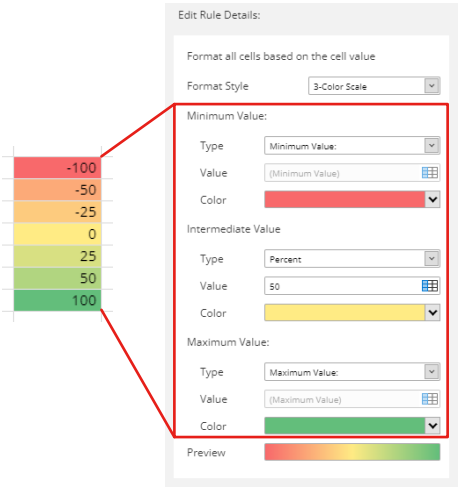
Setting a Conditional Format

#H006

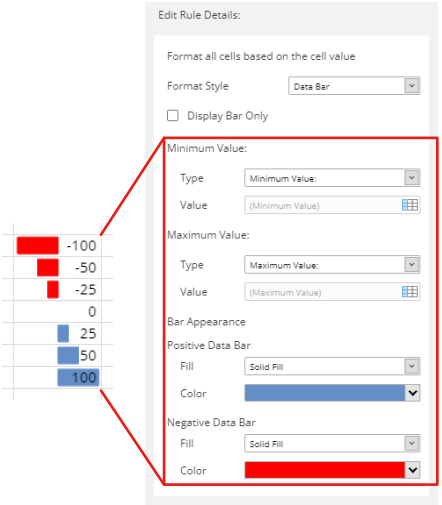
If you set a condition to a specified cell for its value or the calculation result of its formula, a format style is automatically applied if the cell satisfies the condition. The VS Creator provides the following format styles to make the magnitude relationship of values easy to comprehend.

- Color Scale
  Fills the cell with the color that corresponds to the cell value. The cells in the specified ranges are color-coded according to the cell values so that you can grasp which ones are larger or smaller by the color shade. Cells are rendered in 2-color distributions or 3-color distributions. (→ "When [Format Style] is [2-Color Scale] or [3-Color Scale]")





- Data Bar
  Cells are marked with bars of different lengths that correspond to the cell values. Cell values in the specified ranges can be compared by the length of the bars so you can visually grasp which ones are larger or smaller. (→ "When [Format Style] is [Data Bar]")



- Icon Set
  Cells are marked with icons (symbols, arrows, etc.) that correspond to the cell values. Cell values in the specified ranges are marked by icons so that you can visually grasp which ones are larger or smaller. (→ "When [Format Style] is [Icon Set]")

For example, you can use an icon set to display the ● mark when the measurement result does not exceed a threshold, and the mark will change to ✕ when the value exceeds the threshold. By setting a format style on a cell that refers to a measurement result ("Configuring References") that you want to monitor, you can visually grasp the condition because the color or the icon changes according to the measurement result.

How to Set Format Rules

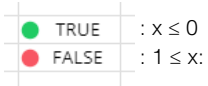
For a format style, you must set a format rule that defines the conditions for applying the format style. For details of setting format rules, see linked sections.

- Using Default Format Rule: Use the provided icon set.
- Configuring a New Format Rule: Add a new format rule. You can also specify a cell range to which to apply the format rule.
- Clearing a format rule: Delete a formatting rule.
- Editing a format rule: Edit an existing format rule. You can also configure priorities that define the application order of multiple format rules.

Using Default Format Rule

If you use the provided icon set "Judgment Indicator", icons are displayed in the following manner in accordance with the cell value (x). This icon set is useful for cells of measurement results judged by two values (0/1 or FALSE/TRUE).

- x ≤ 0: ● mark
- 0 < x < 1: None
- 1 ≤ x: ● mark



1 Select the cell for which to configure a format rule.

2 Click the (Conditional Format) icon on the toolbar.

3 Select [Judgment Indicator] from the menu.

The rule of the Judgment Indicator is applied to the cell.

Reference The rule configured for the Judgment Indicator is as follows:

- Icon Style: User-set
- Range 1: 🔴
- Range 2: No Icon
- Range 3: 🟢
- Setting Values for Range 2

  Threshold 1

  –Value: 0

  –Type: Number

  –Condition: Greater Than

  Threshold 2

  –Value: 1

  –Type: Number

  –Condition: Less Than

You can change these items as necessary.

Configuring a New Format Rule

You can configure a new format rule to suit your purposes.

1 Select a cell or cell range for which to configure a format rule.

2 Click the (Conditional Format) icon on the toolbar.

3 Select [New Rule] from the menu.

In the right area of the [Vision Dashboard] view, the [New Format Rule] side panel is displayed.

4 Select a rule type from the following:

- Format all cells based on the cell value
- Formatting only the cells that contain the specified value
- Determine the cell to format by using a formula

After this point, different steps are taken depending on the selected rule type.

Format all cells based on the cell value

Applies the configured format rule to all cells. First, make a selection for [Format Style]. Setting items vary depending on the format style.

Format Style

- **2-Color Scale**: This color scale shows a gradation between two colors to indicate the position of the cell value between a minimum and a maximum value. The cell is filled with the color that corresponds with the cell value. For details, see "When [Format Style] is [2-Color Scale] or [3-Color Scale]".
- **3-Color Scale**: This color scale shows a gradation amidst three colors to indicate the position of the cell value in the midst of a minimum, an intermediate, and a maximum value. The cell is filled with the color that corresponds with the cell value. For details, see "When [Format Style] is [2-Color Scale] or [3-Color Scale]".
- **Data Bar**: A bar of the length that corresponds to the cell value is displayed in the plus or minus direction from the 0-point. For details, see "When [Format Style] is [Data Bar]".
- **Icon Set**: Three different icons indicate which of the three ranges the cell value is in. For details, see "When [Format Style] is [Icon Set]".

When [Format Style] is [2-Color Scale] or [3-Color Scale]

Set the minimum value, the intermediate value, and the maximum value and configure the color to assign to each of them.

Point Configure an intermediate color distribution color for [Intermediate Value] only when [Format Style] is [3-Color Scale].

Minimum Value, Intermediate Value, Maximum Value

Configure a format for each of them individually.

- **Type**: Select the type of the value from [Minimum Value], [Maximum Value], [Number], [Percent], and [Formula].
- **Value**: Enter a threshold. You can make reference to a cell by clicking the icon.
- **Color**: Set a color to be assigned with [Value].

Default Display

	Minimum Value	Intermediate Value	Maximum Value
Type	Minimum Value	Percent	Maximum Value
Value	(Minimum Value)	50	(Maximum Value)
Color			

Preview

You can view the color distribution for the range between the minimum value and the maximum value.

When [Format Style] is [Data Bar]

Set the minimum value, maximum value, and the bar format.

Display Bar Only

If you select this item, the value is not displayed in the cell and only the data bar is displayed.

Minimum Value / Maximum Value

Configure a format for each of them individually.

- **Type**: Select the type of the value from [Minimum Value], [Maximum Value], [Number], [Percent], and [Formula].
- **Value**: Enter a threshold. You can make reference to a cell by clicking the icon.

Default Display

	Minimum Value	Maximum Value
Type	Minimum Value	Maximum Value
Value	(Minimum Value)	(Maximum Value)

Bar Appearance

Configure the filling type and color for [Positive Data Bar] and [Negative Data Bar].

– **Fill**: Select Solid Fill or Gradient Fill.
– **Color**: Select a color for filling.

Default Display

	Positive Data Bar	Negative Data Bar
Fill	Solid Fill	Solid Fill
Color		

When [Format Style] is [Icon Set]

An icon set is an assortment of three types of icons. The icons indicate which of the three ranges the cell value is in. Configure the type of the icon set and the range each of the icons corresponds to.

Icon Style

Select the icon set to be displayed. Each icon of the selected icon set is displayed in [Range 1/2/3].

Display Icon Only

If you select this item, the value is not displayed in the cell and only the icon is displayed.

Preview

The configured rule is illustrated by a number line. Under the number line, the values configured for [Threshold 1] and [Threshold 2] are displayed (maximum of 11 digits).

Range 1/2/3

You can individually change the icons of the icon set configured by [Icon Style]. After a change, [Format Style] changes to [User-set].

Setting Values for Range 2

In [Threshold 1], set the threshold between Range 1 and Range 2, and in [Threshold 2], set the threshold between Range 2 and Range 3.

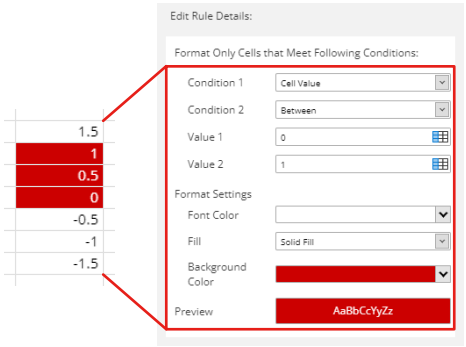
– **Value**: Enter a threshold. You can make reference to a cell by clicking the icon.
– **Type**: Select the type of [Value] from [Number], [Percent], and [Formula].
– **Condition**: For [Threshold 1], select [Greater Than or Equal to] or [Greater Than], and for [Threshold 2], select [Less Than or Equal to] or [Less Than].

Default Display

Icon Style	Red, yellow, and green circle icons	
	Threshold 1	Threshold 2
Value	33	67
Type	Percent	Percent
Condition	Greater Than or Equal to	Less Than

Formatting only the cells that contain the specified value

Applies the format rule only to the cells whose values satisfy the condition.
Example: Set the font color to white and the fill color to solid red for cells whose values are between 0 and 1



Format Only Cells that Meet Following Conditions

Configure conditions for applying the format setting.

Condition 1

Select the type (Cell Value/String) of target value.

Condition 2

Select a conditional statement from the following:

- When [Condition 1] is [Cell Value]: [Between] (default), [Not Between], [Equal to], [Not Equal to], [Greater Than], [Less Than], [Greater Than or Equal to], and [Less Than or Equal to]
- When [Condition 1] is [String]: [Contains the Following] (default), [Does Not Contain the Following], [Starts with the Following], and [Ends with the Following]

Value 1/2

Enter a threshold. You can make reference to a cell by clicking the icon.

Point	Configure [Value 2] only when [Condition 2] is [Between] or [Not Between].

Format Settings

Configure the format to be applied when the condition is satisfied.

Font Color

Configure a character color (default display: #000000).

Fill

Select solid or gradient (default display: Solid Fill)

Background Color

Configure a filling color (default display: No Color).

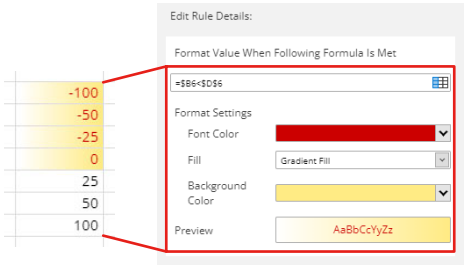
Preview

You can check the setting result of [Format Settings].

Determine the cell to format by using a formula

Applies the format rule only to the cells that satisfy the condition.

Example: Set the font color to red and the filling type to yellow gradation for cells whose values are smaller than the value of a specified cell



Formula bar

Enter a formula as the condition. You can make reference to a cell by clicking the icon.

Format Settings

Configure the format to be applied when the condition is satisfied.

Font Color

Configure a character color (default display: #000000).

Fill

Select Solid Fill or Gradient Fill (default display: Solid Fill).

Background Color

Configure a filling color (default display: No Color).

Preview

You can check the setting result of [Format Settings].

Clearing a format rule

Delete the format rules in the selected range.

1. To delete the format rules of a particular range, select the range in the Vision Dashboard.
2. Click the (Conditional Format) icon on the toolbar.
3. Click [Clear Rule] from the menu.
4. From the submenu, select one of the following:
   - **Clear Rules for Selected Range**: Deletes only the formatting rules set in the selected cell range.
   - **Clear Rules for Entire Sheet**: Deletes all format rules.

Editing a format rule

You can view or edit a configured format rule from the list of format rules.

1 To limit the display of format rules to those applied to a range of cells, select the cell range in the Vision Dashboard.

2 Click the (Conditional Format) icon on the toolbar.

3 Select [Manage Rules] from the menu.
In the right area of the [Vision Dashboard] view, the [Conditional Format Rule Management] side panel is displayed.

4 In [Display], select the range that you want to display format rules for.
- **Currently Selected Range**: Displays the format rules configured for the cell range selected in the Vision Dashboard.
- **Current Sheet**: Displays all format rules.

5 Edit format rules as necessary. (→ "Editing of format rules")

Editing of format rules

You can directly edit a format rule from the displayed list.

↑↓ (Arrows)

Selecting a format rule and clicking one of these buttons changes the application priority of the format rule. Format rules are applied in turn from the top one in the list.

Add

Adds a new format rule. For details, see "Configuring a New Format Rule".

Format rule name

The name of the format rule is displayed.

× (Delete)

Deletes the selected format rule.

Format

Displays the preview of the format.

Applies to

Displays the range of the cells to which the formatting will be applied. You can check and change the cell range by clicking the icon.

Stop If True

Configure whether to restrict the application of format rules when a cell satisfies the conditions of multiple format rules.

Point You cannot configure this setting if the type of the format rule is [Format all cells based on the cell value].

– ON: If the condition of the format rule is satisfied, other format rules below it are not applied.

– OFF (default display): Even if the condition of the format rule is satisfied, other format rules below it are applied.

Edit

Edit the selected rule. Click the button to display the [Editing of Format Rule] side panel. For details, see "Configuring a New Format Rule".

Configuring Data Validation

#H007

Configure the validation rule for when data is entered into a cell. You can set restriction on entry in cells and display a message for an entry that does not satisfy the rule.

1 Select the cell range to which data validation is to be applied.

2 Click the (Data Validation) icon on the toolbar.
In the right area of the [Vision Dashboard] view, the [Data Validation] side panel is displayed. In the [Data Validation] side panel, configure the type and conditions of values that can be entered.

Input Value Type

From the following, select a type of value that can be entered.

- **All Values (default display)**: No restriction is made on input. Selecting this item disables the other setting items.
- **Integer**: Only integers can be entered.
- **Decimal**: Only decimals can be entered.
- **List**: Only a selection from the drop-down list is accepted.
- **Date**: Only numbers of date format can be entered.
- **Checkbox**: Only the selection or deselection of the check box is allowed. Selecting this item disables the other setting items.
- **Text (Specified Length)**: Only a string of the specified number of characters or less can be entered.

Data

Point Configure [Data] when [Input Value Type] is [Integer], [Decimal], [Date], or [Text (Specified Length)].

Select a condition for the [Input Value Type] from [Between], [Not Between], [Equal to], [Not Equal to], [Greater Than], [Less Than], [Greater Than or Equal to], and [Less Than or Equal to].

Value 1

Point Configure [Value 1] when [Input Value Type] is [Integer], [Decimal], [List], [Date], or [Text (Specified Length)].

This item configures a value that defines the restriction condition of the input rule. In the case of [List], list the items to display in the drop-down list separating them by commas (,) (maximum of 1000 items), or click the icon on the right of the text box to select the cell(s) (only cells in the same row or same column).

Value 2

Point Configure [Value 2] only when [Data] is [Between] or [Not Between].

This item configures a value that defines the restriction condition of the input rule.

Step Value Increment

Point Configure [Step Value Increment] when [Input Value Type] is [Integer] or [Decimal].

This item configures the amount of increment for the cell value when the button is clicked.

Forbid Input When Data Is Invalid

If this check box is selected, a message is displayed when the user tries to enter data that violates the input rule, and such entries are prohibited. If this check box is not selected, the user can enter data that violates the input rule.

Display the Below Message When the Cell is Selected

If this check box is selected, selecting the cell displays a message in a tooltip. It is helpful if you configure a message that explains valid entry values. Enter a message in the text box.

Apply Changes to All Cells with the Same Input Rule

If this check box is selected, any change to the input rule is reflected to all cells for which the same input rule has been configured. If this check box is not selected, a change to the input rule is not reflected to other cells.

Convert Selected Items to Integer Values

Point
- This setting is available when [Input Value Type] is [List]. The check box is not selected in the default setting.
- This check box is automatically selected when you drag and drop a list-type parameter of a tool from the [Properties] view to the cell.

If this check box is selected, the list of pairs of [Item Name] and [Integer Value] is displayed. Associate an integer value to each item of the drop-down list.

- **Item Name**: Values in the cell range selected by [Value 1] are displayed.
- **Integer Value**: Configure an integer value (-1000 to 1000) to be associated with each item.

When a cell makes reference to a cell for which this check box is selected, the integer value associated with the item name is what is passed on. If this check box is not selected, the item name string is passed on as is.

Clear All

Clicking this button returns the input rule to the initial state. [Input Value Type] is set to [All Values]. If the [Apply Changes to All Cells with the Same Input Rule] check box is selected, all cells for which the same input rule is configured are reset to the default condition.

Using a Template

#H008

If a string or formula entered in a cell can be reused, it is useful to register the cell range as a template. A template can be reused not only in the same Vision Dashboard but it can also be shared with other program settings to efficiently configure and perform setups. You can perform the following operations on templates. For details, see the linked sections.

- Inserting a Template
- Registering a Template
- Exporting a Template File
- Importing a Template File

Point When you place a template that contains a reference in the Vision Dashboard, the relative designation of cell reference is shifted in accordance with the position of the template placement (Example: "A1:=B2+C3" -> "C3:=D4+E5"). A cell designation of absolute reference does not change (Example: "A2:=$B$3+C$4" -> "C4:=$B$3+E$4"). If the referenced position is outside the range of the Vision Dashboard after placement, a reference error (#REF!) is issued.

Inserting a Template

Select a template from the template list and place it in the Vision Dashboard.

Point You need to register the template to be used in the *"Template"* folder beforehand. (→ "Registering a Template")

1 On the Vision Dashboard, select a cell on which to place a template.

Point The template is placed in the Vision Dashboard in the range starting from the currently selected cell. On the Vision Dashboard, select a cell distant from cells already used so that the posted data does not overlap them.

2 From the toolbar of the Vision Dashboard, select (Template) - [Insert Template].

The registered templates are listed in the [Template List] dialog. In the list, folders and templates under the *"Template"* folder are displayed in a tree structure in ascending order by name.

Point You can perform the following operations by selecting the item from the popup menu of a template.

- **Delete**: Deletes the template.
- **Rename**: In the displayed [Rename] dialog, enter the template name in [Registered Name].

3 Select a template, and then click the [OK] button.

The template is loaded and placed in such a way that the cell selected in step 1 comes in at the upper-left corner of the template.

Reference You can also place a template by double-clicking it.

Registering a Template

Select a cell range and register it as a template.

1 Select a cell range on the Vision Dashboard.

> **Point** If you select multiple cell ranges by Ctrl + left-click, the circumscribed rectangle cell range is selected. Cells not selected are treated as empty cells.

2 From the context menu, select [Register to Template List].
The [Register to Template List] dialog appears.

3 Specify a folder as the location to save the template in.
The "Template" folder is displayed by default.

> **Point** You can also save the template in a folder other than the *"Template"* folder, but in that case, the saved template is not displayed in the template list.

4 Set a name for the template.
By default, "Template*" (*: automatically allocated number) is displayed in [File Name]. [File Type] is "Template File (*.tpl)".

5 Click [Save].
The template is saved. A template contains values, formulas, formats, conditional formats, data validation rules, and memos.

Exporting a Template File

Save a selected cell range in a desired location as a template file.

> **Point** A template saved in a desired location is not displayed in the template list.

1 Select a cell range on the Vision Dashboard.

> **Point** If you select multiple cell ranges by Ctrl + left-click, the circumscribed rectangle cell range is selected. Cells not selected are treated as empty cells.

2 From the context menu, select [Template File] - [Export].
The [Export] dialog appears.

3 Specify a folder as the location to save the template in.
By default, the "Document" folder is displayed.

4 Configure [File Name] and [File Type].

5 Click [Save].

The template is saved. A template contains values, formulas, formats, conditional formats, data validation rules, and memos.

Importing a Template File

Import a template file saved in any location.

1 On the Vision Dashboard, select a cell on which to place a template.

Point When you load a template file, its cell information is placed in the Vision Dashboard in the range starting from the currently selected cell. On the Vision Dashboard, select a cell distant from cells already used so that the posted data does not overlap them. If the template to be placed extends beyond the border of the Vision Dashboard, the import operation is canceled.

2 From the context menu, select [Template File] - [Import].
The [Import] dialog appears.

3 Specify the folder where the template to import is stored.
By default, the "Document" folder is displayed.

4 Select a template file.

5 Click [Load].
The template is placed in such a way that the cell selected in step 1 comes in at the upper-left corner of the template, and the cells in the range of the template are in selected state.

Point
- If the imported template overlaps a cell that has content, a confirmation message is displayed.
- If the template has a cell that contains a relative reference of a cell, the referenced position is corrected after the template is placed.
- The referenced position is not corrected for an absolute reference to a cell outside the template. An absolute reference to a cell inside the template is corrected.
- If the referenced position is outside the Vision Dashboard after template placement, a reference error (#REF!) is issued.

Inserting an Image

#H009

You can insert an image in the Vision Dashboard. Inserted images can be moved, enlarged, and reduced.

Point
- A maximum of 20 images can be inserted.
- The valid extensions of inserted images are bmp, png, and jpg (jpeg).

Steps of inserting an image

An image is inserted in an area starting from the top-left corner of a cell.

1 Select a cell for image insertion.

2 Click the (Insert Object) icon on the toolbar.

3 Select [Image] from the menu.
Explorer appears.

4 Select an image and click [OK].
The image is inserted in a position where the selected cell coincides with the upper-left corner of the image.

Reference The image is saved in the Program Setting folder as "image*" (*: 000-999).

5 Edit the image as necessary. (→ "Editing an image")

Editing an image

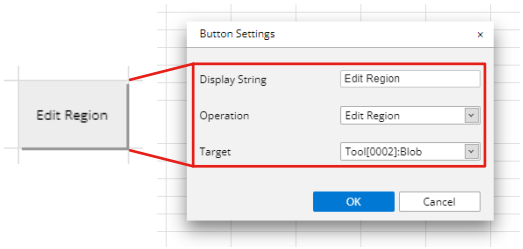
Operations vary depending on the purpose.
- Move: Drag the target image.
- Change size: Drag the handle that appears when you select an image. The aspect ratio is retained.
- Delete: Click the (Delete) icon that appears at the upper right when you select an image.

Inserting a Button

#H010

By setting a specific process to a [Button], the process is executed by just clicking on the button that has been placed on the Vision Dashboard. The following processes can be executed:

- Edit Region: The [Edit Region] dialog of the configured target tool is displayed. You can configure the shape of the region, the mask region, and a region reference.
- Execute Task: The configured subtask is executed.
- Soft Event: The soft event of the configured ID is executed.
- Issue Command: The configured command is executed (maximum of 8).



Steps of inserting a button

1 Select a cell for button insertion.

2 Click the (Insert Object) icon on the toolbar.

3 Select [Button] from the menu.
A button is placed inside the selected cell.

4 Select [Edit Button] from the context menu of the button.
The [Button Settings] dialog appears. (→ "Configuring a Button")

Reference By the context menu, you can also cut, copy, paste, and delete the button.

Configuring a Button

For the inserted button, configure a name and an event to be executed when clicked.

Display String

Configure the string to display on the button.

Point If you enter a formula, it cannot be changed.

Operation

From the drop-down menu, select an event to be executed at the click of the button. Subsequent setting items vary depending on the selected event.

- **Edit Region** (default display): Configure the target tool for which to edit the region. (→ "Target")
- **Execute Task**: Configure the subtask to be executed. (→ "Task to Execute")
- **Soft Event**: Configure the ID of the soft event to be executed. (→ "Event ID")
- **Issue Command**: Configure the command to be executed. (→ "Command 1 to Command 8")

Target

When [Operation] is [Edit Region], select a tool for which to edit the region from the drop-down menu (default display: None). Among tools placed on the [Task] view, the drop-down menu lists tools that have the Region setting item. For details of the [Edit Region] dialog that appears when clicking the corresponding button, see "[Edit Region] dialog".

Task to Execute

When [Operation] is [Execute Task], select a subtask to be executed from the drop-down menu. The drop-down menu lists the subtasks that have been added to the [Task] view (default display: None). If there is no subtask, only [None] is displayed. If there are multiple subtasks, the drop-down menu provides multiple choices of [Subtask000], [Subtask001], and so forth.

Event ID

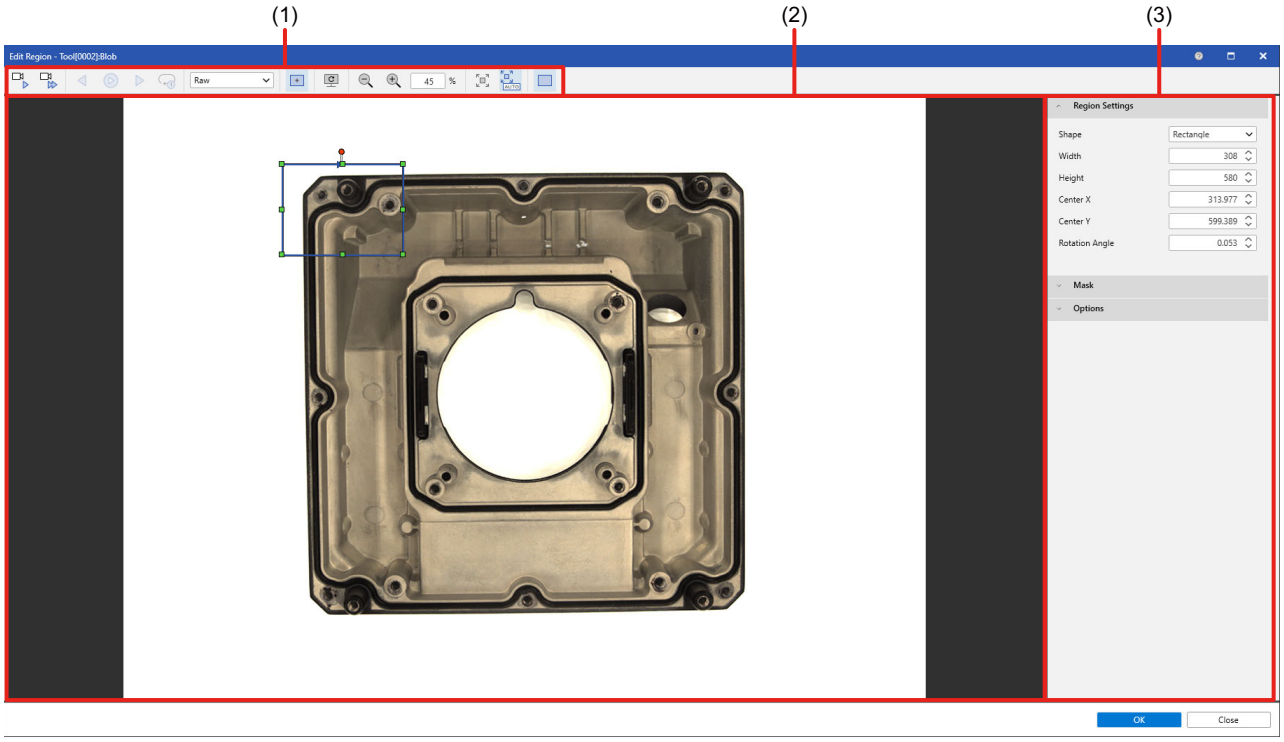
When [Operation] is [Soft Event], select the ID (0 to 31) of the soft event to be executed (default display: 0).

Command 1 to Command 8

When [Operation] is [Issue Command], configure commands to be executed (maximum of 8). For details on commands, see "Command".

[Edit Region] dialog

When you click a button for which [Edit Region] is configured as [Operation], the [Edit Region] dialog appears. In the dialog, you can make "Region Settings" in the same way as in the tool properties.



(1) Toolbar

The toolbar has the same functions as the one in [Image Viewer]. (→ "Screen Details") Only 1-screen display is available.

(2) Image

The image and regions (inspection region, search region, and mask region) of the target tool are displayed. You can move, rotate, and change the sizes of regions. (→ "Drawing a Region")

(3) Properties

The content of the [Region] tab of the [Properties] view of the target tool is displayed (excluding [Position Adjustment]). (→ "Region") You can configure each property when in Setup Mode.

Inserting a Link

#H011

You can set a link to an object inside and outside the Vision Dashboard by configuring a hyperlink for a cell. Insert and configure a link in the following steps:

1 Select a cell for link insertion.

2 Click the (Insert Object) icon on the toolbar.

3 Select [Insert Link] from the menu.

The [Insert/Edit Link] dialog appears. Configure the following items in this dialog.

Display String

If the selected cell is empty, enter a string to be displayed on the cell. The entered string is displayed in the format configured for the cell.

Point You cannot enter a string if the selected cell is not empty.

Link Type

Select the type of the link to be configured (External Link or Internal Link).

Address/Cell

Set the link destination. Configure an address when [Link Type] is [External Link], and configure a cell when [Link Type] is [Internal Link].

Point If you export cells in which a link is inserted as a template, the link destination will be updated in accordance with the position of the template placement.

Inserting a Chart

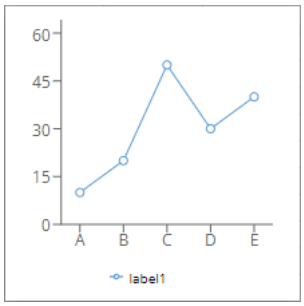
#H012

You can create and display a chart based on a dataset in the Vision Dashboard. By configuring the cells that refer to measurement results ("Configuring References") that you want to monitor as the elements of the char, you can visually grasp their conditions because the chart reflects changes of the measurement results.

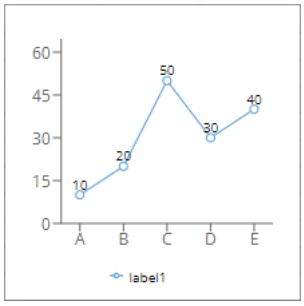
Types of charts

You can create the following types of charts:

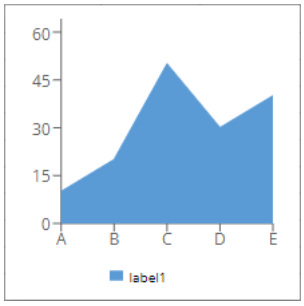
- Line Chart
  A line chart shows the trend of increase and decrease in data value by drawing straight lines between chronologically plotted points.



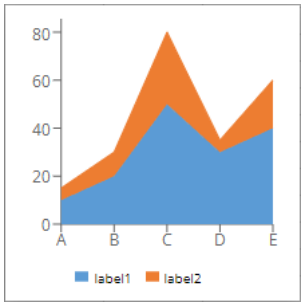
- Line Chart with Label
  Each plotted point is annotated by labels (names).



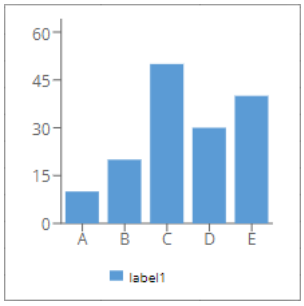
- Area Chart
  An area chart is a line chart in which the area between the chart line and the horizontal axis is filled with a color.



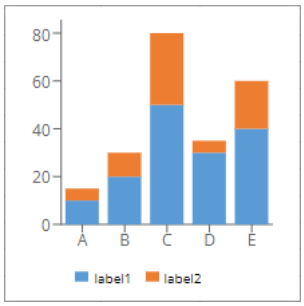
- Stacked Area Chart
  A stacked area chart is a stack of area charts of multiple elements. Areas between different chart lines are filled by different colors to show the proportion of each element to the whole volume.



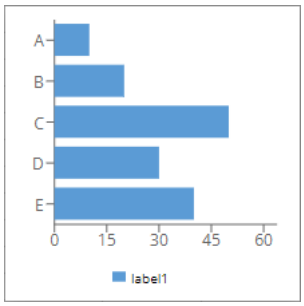
- Column Chart
  A column chart indicates each data size by the length of a column. The chart is used to compare different items by arranging vertical bars from left to right.



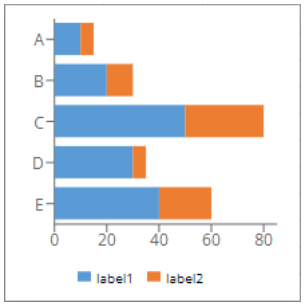
- Stacked Column Chart
  A stacked column chart is a chart in which column charts representing different elements by different colors are stacked vertically. The chart shows the proportion of each element to the whole volume.



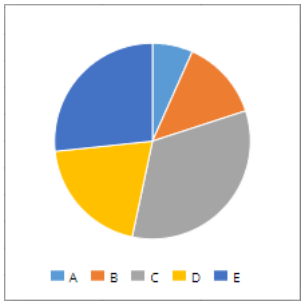
- Bar Chart
  A bar chart is the horizontal version of a column chart.



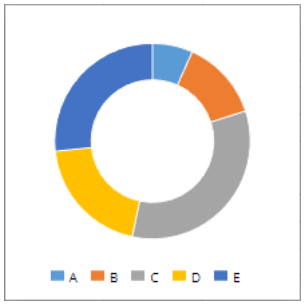
- Stacked Bar Chart
  A stacked bar chart is the horizontal version of a stacked column chart.



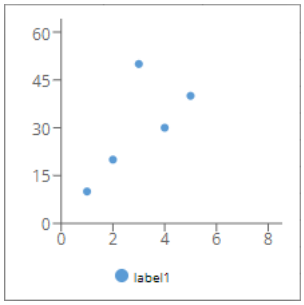
- Pie Chart
  A pie chart is a circle divided into sectors which show the proportion of each element to the whole volume. The chart is used to show component distribution ratio.



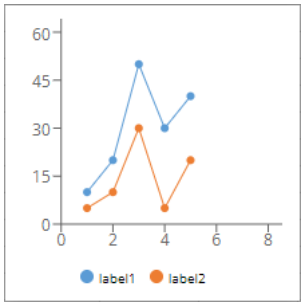
- Doughnut Chart
  A doughnut chart is a pie chart with a hole in the center. The data of different categories are represented by smaller and larger doughnuts around the center.



- Scatter Chart
  A scatter chart plots multiple elements on a plane to show the distribution and correlation among different elements. The chart is used to show the degree of variation of statistical data.



- Scatter with Straight Lines
  This chart is a scatter chart with straight lines connecting the plotted points.



Steps of inserting a chart

The procedure of inserting a chart is different between the cases of When creating a new chart and When editing an existing chart.

When creating a new chart

1 Select a cell range that contains the data that you want to create a chart from.

2 Click the (Chart) icon on the toolbar.

3 From the menu, select the type of the chart that you want to create.
A chart is created in the [Vision Dashboard] view, and the [Chart Properties] side panel is displayed in the right area of the [Vision Dashboard] view.

Point | Clicking the (Delete) icon deletes the chart.

4 Configure the data range and chart format. (→ "Configuring a chart")

When editing an existing chart

Point | Use the context menu to cut, copy, and paste a chart. You cannot use shortcut keys (Ctrl + x/c/v).

1 Select a chart.

2 Click the (Edit) icon that is displayed at the top-right corner of the chart.
In the right area of the [Vision Dashboard] view, the [Chart Properties] side panel is displayed.

Point | Clicking the (Delete) icon deletes the chart.

3 Configure the data range and chart format. (→ "Configuring a chart")

Configuring a chart

Switch between categories of chart configuration by selecting the [Data] tab or the [Format] tab in the [Chart Properties] side panel.

Data

In the [Data] tab, configure the range, series, and horizontal axis of the data to be displayed in the chart.

Example: Spreadsheet with 5 rows and 4 columns

Data Range

Configure the data range to be displayed in the chart. You can make reference to cells by clicking the icon.

Series Settings

If you select the [Use Head of Series for Series Name] check box, the first row (or first column) of the data range is used as labels. If you deselect the check box, you can edit labels in [Series Name] in the list below.

Series / Series Name

The series in the data range and their names are listed (maximum of 8). Select the check boxes of the data series to be used in the chart. If you deselect a series, it disappears from the chart. The color icon on the left of [Series Name] indicates the color of the series in the chart. Preconfigured eight colors are allocated in turn. To change a color, click its color icon. The color picker appears from which you can select a color.

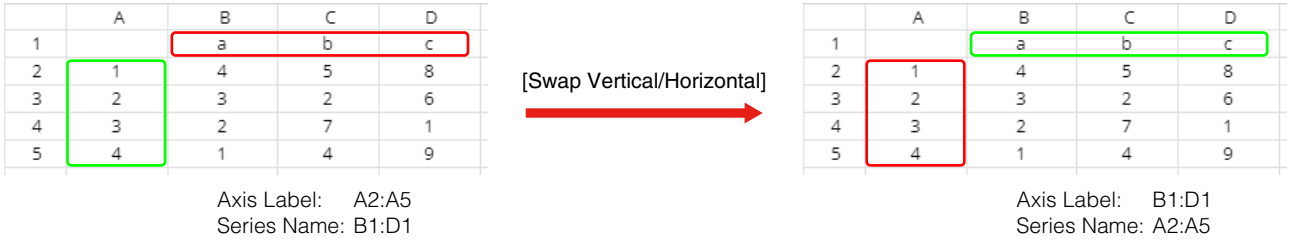
Point

The way of configuring a series is different in the case of pie charts and doughnut charts.

- Select a series by a radio button.
- At the position of a color icon, the icon is displayed. Click the icon to open the [Legend Color Settings] dialog. You can select the colors used in the legend from the color picker.

Horizontal Axis Label

The cell range used for the chart axis is displayed. Clicking the [Swap Vertical/Horizontal] button swaps the axis label and the series label. The data in the Vision Dashboard does not change.



Format

In the [Format] tab, configure the title, legend, and axis display format of the chart. The setting items vary depending on the chart types.

Title Settings

Configure the settings related to chart title display.

- **Display Title**: Configure whether to display the title (default display: OFF). Setting this item ON displays the title at the top-center position of the chart.
- **Title**: Configure the title text when [Display Title] is ON.
- **Font Size**: Configure the font size of the title when [Display Title] is ON.
- **Font Color**: Configure the font color of the title when [Display Title] is ON (default display: #000000).

Legend Settings

Configure the settings related to the legend display.

- **Display Legend**: Configure whether to display a legend (default display: ON).
- **Font Size**: Configure the font size of the legend when [Display Legend] is ON.
- **Font Color**: Configure the font color of the legend when [Display Legend] is ON (default display: #000000).
- **Legend Position**: Configure the display position (Top, Bottom, Left, or Right) of the legend when [Display Legend] is ON (default display: Bottom). Texts in the legend are listed horizontally when [Top] or [Bottom] is selected, and vertically when [Left] or [Right] is selected.

X-Axis Settings

Configure the settings related to the X axis (horizontal axis) of the chart.

- **Label**: Configure a text that is displayed as the X axis name.
- **Font Size**: Configure the font size of the X axis label.
- **Boundary Values**: Configure the minimum and maximum values displayed on the X axis. Turning the [Auto] toggle switch ON sets the minimum and maximum values in the data range automatically. If you turn it OFF, you can configure any values.

Y-Axis Settings

Configure the settings related to the Y axis (vertical axis) of the chart.

- **Label**: Configure a text that is displayed as the Y axis name.
- **Font Size**: Configure the font size of the Y axis label.
- **Boundary Values**: Configure the minimum and maximum values displayed on the Y axis. Turning the [Auto] toggle switch ON sets the minimum and maximum values in the data range automatically. If you turn it OFF, you can configure any values.

Chapter 9 Custom Screen

Custom Screen is a feature to customize the operation screen. You can create pages to display camera images, result data and other information, and place buttons, drop-down menus and other items. The pages created with Custom Screen can also be displayed in a web browser.

Overview of Functions

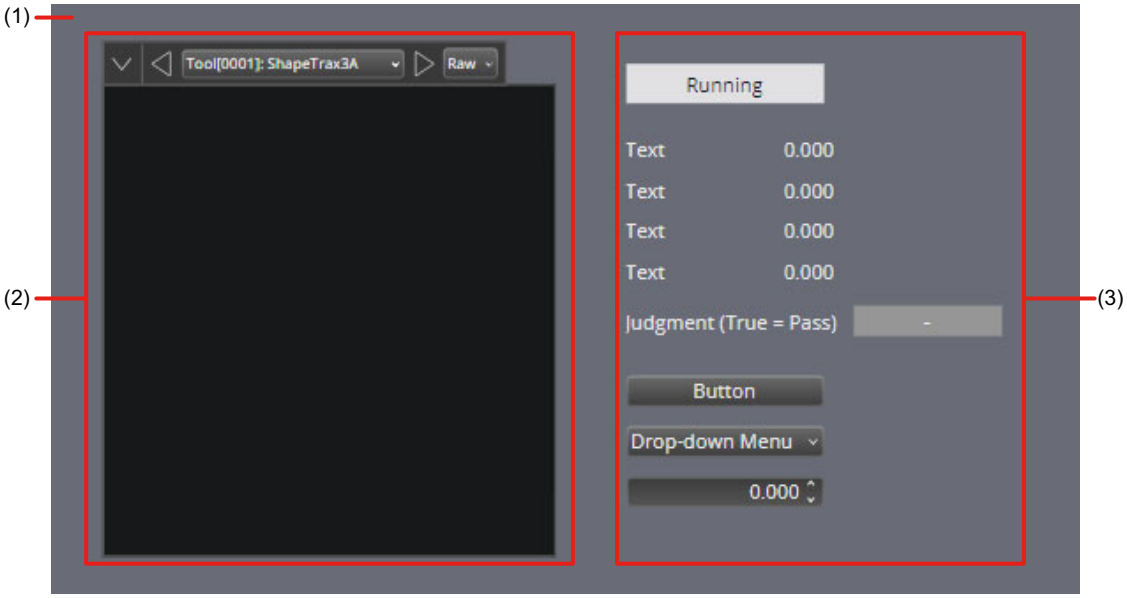
#I001

With Custom Screen, the operation screen can be customized. Custom screens are managed on a page-by-page basis. Create a screen by adding pages and then placing images, texts, numbers, buttons and other items on the added pages. The pages created with Custom Screen can also be displayed in a web browser.

The created pages can be used mainly in the following situations.

- Use them as the operation screen with VS Creator
- Display them by web browser on the display expansion monitor/unit and use it as the operation screen
- Display it on a web browser on a PC or tablet that does not have VS Creator installed and use it as the operation screen

Page Configuration of Custom Screen



(1) Page

This is the display screen. A maximum of 20 pages (ID 0 to 19) can be created for each program setting.

(2) Camera Image

Displays the captured images. A maximum of six camera images can be displayed per page.

(3) Parts

Displays images, strings, and numbers. Buttons and drop-down menus can also be added and operated. The following parts can be added.

- Image File
- Text

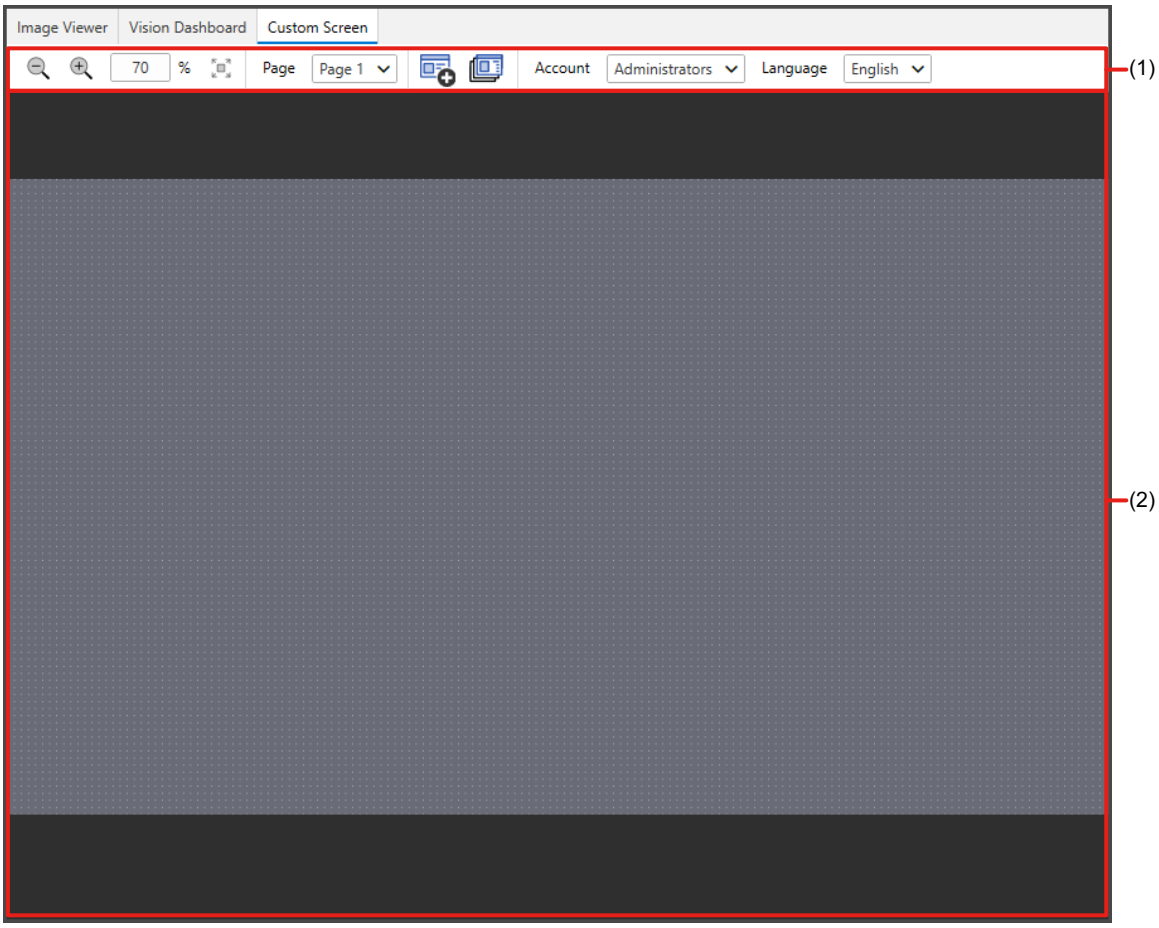
- Data
- PASS/FAIL
- Mode Display
- Tool Results List
- Tool Judgment List
- Rectangle
- Button
- Drop-down Menu
- Numeric Input Box
- Checkbox
- Toggle Switch
- Text Input Box
- Graph (Statistics)
- Graph (Yield Rate)

Reference A maximum of 1000 parts, including camera images, can be added per page.

Screen Details

#I002

Custom screens consist of a toolbar and pages. This section explains screen details and the functions the toolbar.



(1) Toolbar

The toolbar displays the functions used in the custom screen as buttons or drop-down menus. Hovering the cursor over a button displays the name of the button as a tooltip.

100 % (Zoom Out/Zoom In/Set magnification)

Click the button to change the display magnification of the page. You can also set the zoom rate by specifying a number.

(Fit)

Click this button to automatically adjust the display magnification so that the page is displayed entirely within the custom screen viewer.

Page Page 1 (Switch pages)

A list of pages is displayed in the pull-down menu. Select and switch pages.

(Add Page)

Click this button to display the [Create New] dialog. Set the page name and click the [OK] button to close the dialog and add pages.

→ Adding Pages

(Page list)

Click this button to display a list of pages. Select and switch pages. Also, click the [Add] button and open the [Create New] dialog to add pages.

Account Administrators (Switch permission groups)

The pull-down menu displays a list of permission groups set in [Global Settings] - [Account Settings] - [Permission Group]. Select and switch permission groups.

Reference
- Only users in permission groups with the full control permission level can switch permission groups.
- Parts to be added to the page include the permission group settings, and each permission group can be set to be shown, hidden, or grayed out. Switch permission groups to change the display of parts according to the settings.
- Switch permission groups while editing a page to confirm how the page looks in each permission group without switching accounts from the System menu.

Language English (Switch languages)

Displays a list of languages in the pull-down menu. Select and switch languages. The toolbar and PASS/FAIL display within the page and the mode display are displayed in the specified language.

Reference Switch languages while editing a page to confirm how the page looks in each language without switching accounts from the System menu.

(2) Page

This is an area where parts such as the Camera Image are placed. Right-click the page to add and set parts from [Add] in the displayed context menu. Select a page or part placed on the page to display the setting parameter on the [Properties] View.
→ Adding Parts

Adding Pages

#I003

Add pages in one of the following ways.

- Click the (Add Page) icon on the toolbar of the [Custom Screen] view
- Click the [Add] button in [Page List]
- Right-click [Page List] to click [Add] from the displayed context menu

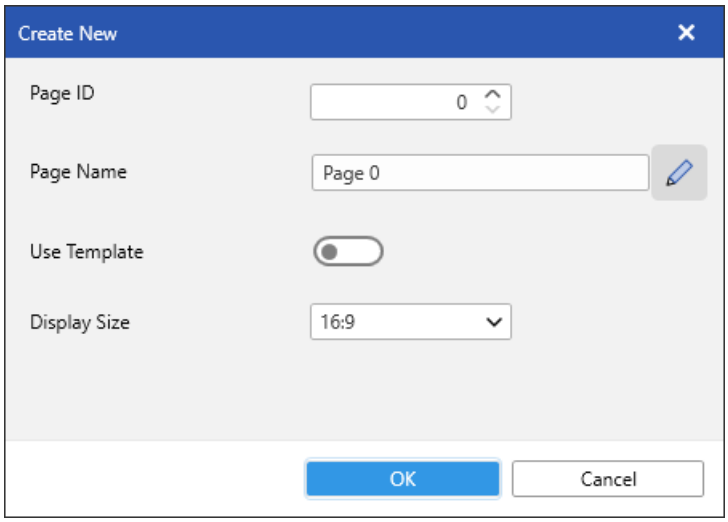
Click the icons or buttons above to display the [Create New] dialog. Set the ID and name of the page to be created.

Reference

- No page exists in its initial setting status immediately after a new program setting is created. Add a page using the method above to set a custom screen.
- A maximum of 20 pages can be created per program setting.

[Create New] Dialog

Set the following items to create a new page.



Page ID

Sets the ID of the new page to be created (0 to 19). In the initial state, the smallest number that does not exist at the time is displayed. Numbers that already exist cannot be set.

Page Name

Sets the name of the new page to be created. In the [Page Name] dialog that appears when the button is clicked, names can be set in multiple languages.

Use Template

Selects a page template file (.page) by the [Select] button that is displayed when enabled to add a page (default: disabled).
→ Page Template

Display Size

Selects the size (aspect ratio) of the new page to be created from the pull-down menu.

- 1:1

- 4:3
- 9:16
- 16:9 (default)

Page Properties

Select a page in the [Custom Screen] view to display the setting items of the page in the [Properties] View.

General

General

ID
Displays the page ID set when creating a new page.

Page Name
Displays the page name set when creating a new page. Set any desired name. In the [Edit] dialog that appears when the button is clicked, names can be set in multiple languages.

Display Control

Toolbar Display
Sets the behavior of the toolbar display.
- Display Only During Mouse Over (default): Move the mouse to the top of the page to display the toolbar.
- Always Display: The toolbar will always be displayed.
- Always Hide: The toolbar will not be displayed.

Permission Group Settings

Initial Displayed Page Settings
Sets the initial page for each permission group. Click the button to display the [Initial Displayed Page Settings] dialog. Select a page from the pull-down menu to set the initial page for each permission group.

Style

Style

Background Color
Sets the background color of the page.

Page Template

The created page can be registered as a [Template]. The setting operation can be proceeded by using the templates registered when adding pages with other program settings. Pages can also be exported/imported. Exported templates can be imported and shared with other PCs.

Registering a Template

Register the selected page as a template.

1 Click the (Page List) button on the toolbar of the [Custom Screen] view.
Displays [Page List].

2 Select the page to be registered from the [Page List] and right-click it.
Displays the context menu.

3 From the context menu, select [Register Template].
The [Save As] dialog appears.

4 Specify a folder as the location to save the template in.
The "Template" folder is displayed by default.

5 Set a name for the template.
The [File Name] is "Page*.page" by default (*: ID of the page to be registered). The [File Type] is fixed as ".page".

6 Click [Save].
The template is saved.

Exporting a Template

Save the selected page as a template file in the specified folder.

1 Click the (Page List) button on the toolbar of the [Custom Screen] view.
Displays [Page List].

2 Select the page to be exported from the [Page List] to right-click it.
A context menu appears.

3 From the context menu, select [Export].
The [Save As] dialog appears.

4 Specify a folder as the location to save the template in.

5 Set a name for the template.

The [File Name] is "Page*.page" by default (*: ID of the page to be exported). The [File Type] is fixed as ".page".

6 Click [Save].
The template is exported.

Importing a Template

Import a template file saved in a desired location.

1 Click the (Page List) button on the toolbar of the [Custom Screen] view.
Displays [Page List].

2 Right-click on the [Page List].
Displays the context menu.

3 From the context menu, select [Import].
Displays the [Open] dialog.

4 Specify the folder where the template is stored.

5 Select a template file.

6 Click [Open].
The template is imported, and the page is added.

Using a Template

The registered/exported template can be used when creating a new page .

1 Open the [Create New] Dialog
For details on adding pages, see "Custom Screen" -"Adding Pages".

2 Turn on [Use Template].
Displays the [Select] button.

3 Click the [Select] button.
Displays the [Open] dialog.

4 Specify the folder where the template is stored.
The "Template" folder is displayed by default.

5 Select a template file and click [Open].
The file name of the selected template is displayed in [Template to Use].

6 Click [OK].

The page is added from the template.

Adding Parts

#I004

Add parts in one of the following ways.

- Right-click the page to select and add parts from [Add] in the displayed context menu
- Add parts by dragging and dropping from the [Properties] view, [Results] view, or [Data List] view

When parts are added by dragging and dropping, the multiple relevant parts are added at the same time.

Example 1. When dragging and dropping the Minimum Match % of the ShapeTrax3A tool (tool's Setting Parameter)

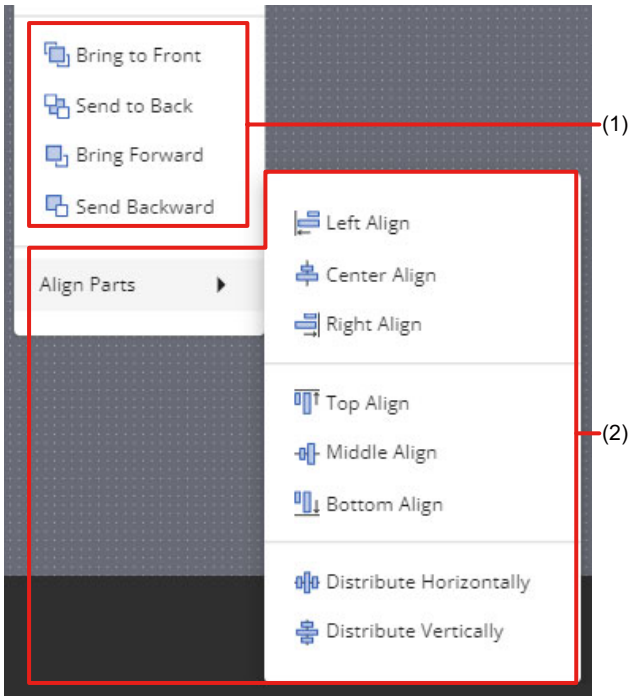
Text and Numeric Input Box are added.

Example 2. When dragging and dropping the Gray Intensity Average of the Intensity tool (tool's Result Data)

Text and Data are added.

Moving and Aligning Parts

Select and right-click a part on the page to move and align parts from the displayed context menu.



(1) Move

Move parts to the front or back. Select multiple parts to move them at the same time.

Movement Type

- Bring to Front

- Send to Back
- Bring Forward
- Send Backward

(2) Align

Select [Align Parts] to display the submenu. Select an alignment type while selecting multiple parts to align the parts according to the selected alignment type.

Alignment Type

- Left Align
- Center Align
- Right Align
- Top Align
- Middle Align
- Bottom Align
- Distribute Horizontally
- Distribute Vertically

Part Properties

Select a part in the [Custom Screen] view to display the setting items of the part in the [Properties] view. This section describes general settings common to all parts. See each part for other setting items.

General

General

Part ID
Displays the part ID. When adding a part, the smallest available ID that does not exist at that time will be automatically assigned.

Upper Left Coordinate X
Specifies the X coordinate of the position where the part is placed.

Upper Left Coordinate Y
Specifies the Y coordinate of the position where the part is placed.

Width
Specifies the width of the part.

Height
Specifies the height of the part.

Permission Group Settings

Sets whether to show or hide parts for each permission group.

Display Generation Settings

For the following parts, the display generation can be set.

- **Camera Image**: Sets which generation of images to display.
- **Text**: Sets which generation of results to reflect in the Conditional Value of Conditional Format.
- **Data**: Sets which generation of results to reflect in the data value and the Conditional Value of Conditional Format.
- **PASS/FAIL**: Sets which generation of results to reflect in the judged value.
- **Tool Result List**: Set which generation's results should be reflected in the tool result value.
- **Tool Judgment List**: Set which generation's results should be reflected in the tool judgment value.

This section describes the setting items of [Display Generation Settings].

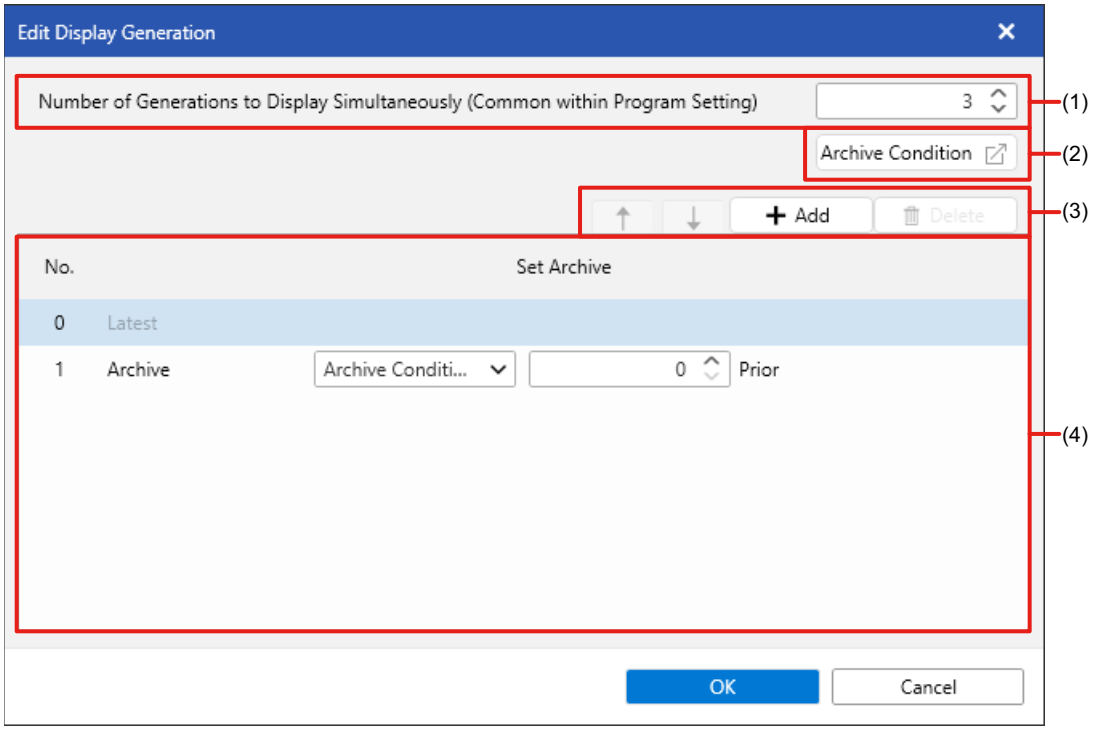
Generation to Display

Select a generation to display from the pull-down menu. Displays the generation set in the [Display Generation Settings] in the pull-down menu. The following two are displayed by default.

- **0**: Latest (default)
- **1**: Archive Condition 0: 0 (Prior)

Display Generation Settings

Sets a generation to display. Click the [Settings] button to display the [Edit Display Generation] dialog.



(1) Number of Generations to Display Simultaneously (Common within Program Setting)

Set the maximum number of generations to be displayed on the page (1 to 10; default: 3).

(2) Archive Condition

Click this button to display the [Archive Condition Settings] dialog. For details on the settings, see "Filmstrip"-"Confirm Archive"-"Archive Condition Settings".

(3) Arrows/Add/Delete

Sort, add, or delete generations. Click the [Add] button to add generations to the [Display Generation List]. Generations can be added up to the number of generations set in [Number of Generations to Display Simultaneously].

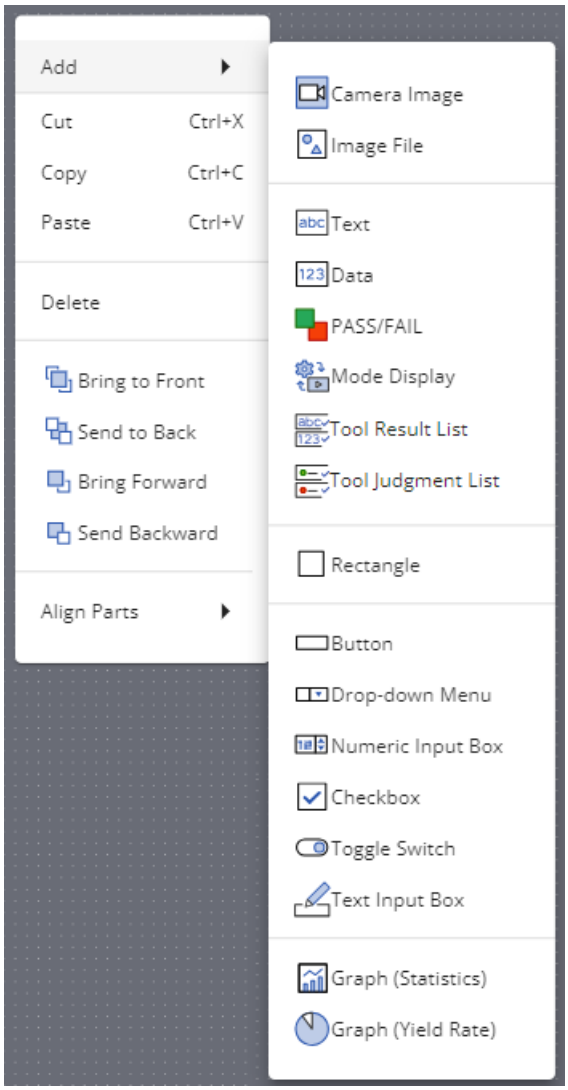
(4) Display Generation List

Displays a list of set generations. Specify an archive condition and generation (n generations back) that you want to use for each generation. If a value exceeding the number of archive times set in the specified archive condition is specified for generation (n generations back), the generation (n generations back) is displayed in red and a setting error occurs.

Parts

#I005

Right-click the page to add parts from [Add] in the displayed context menu. This section describes the setting items for each part. For general settings common to parts, see "Adding Parts" - "Part Properties" - "General".



Camera Image

Displays the current image and archived image on the page.

General

Sets the position of the part to be placed and other settings. This section describes the [Display Control]. For [General] and [Permission Group Settings], see "Adding Parts" - "Part Properties" - "General".

Display Control

Toolbar Display

Sets the behavior of the toolbar display for Camera Image. Hovering the cursor over a button displays the name of the button as a tooltip.

– Display Only During Mouse Over: Move the mouse to the top of the part to display the toolbar.
– Always Display (default): The toolbar will always be displayed.
– Always Hide: The toolbar will not be displayed.

Toolbar Display Position

Sets the display position of the toolbar for the camera image.
– Top: Displays the toolbar above the camera image.
– Bottom: Displays the toolbar below the camera image.

Style and Data

Style and Data

Display Target Tools

Selects tools to be displayed on the camera image part. Click the [Select] button to open the [Select Tool] dialog. Select the checkbox of a tool to be displayed and configure the following Initial Display Settings.
– **Displayed Tool**: Displays a list of selected tools in the drop-down menu. Select a tool to be set as the default display.
– **Graphics Display**: Sets whether to display the measurement graphic for the selected tool (default: ON).
– **Display All Regions**: Sets whether to display the inspection regions of all the selected tools (default: OFF).

Image Type

Selects the image types to be switched to in the camera image part. Click the [Image Setting] button to open the [Image Setting] dialog. Select the checkbox of the image types to be switched to and select which image type will be used as the default display.

Reference
- When displaying a custom screen on a web browser, nothing other than raw images can be used for archived images.
- To display filtered images and contrast images in a web browser, "Image Generation" must be enabled in the display target tools. For details on the settings, see "Measurement" - "Tool Common Settings Items" - "Image Generation".

Specify Zoom Ratio

Sets whether to specify the zoom ratio numerically (default: OFF). When turned ON, [Zoom Ratio (%)], [Zoom Center Point X], and [Zoom Center Point Y] can be specified.

Reference By referring to the detected position of the measurement tool from [Zoom Center Points X/Y], it is possible to dynamically zoom according to the detected results, such as zooming to the defect position detected by the Defect tool.

Display Image Resolution (Effective in the Web Browser Only)

Specifies the resolution of the image displayed in the camera image.
– Automatic (default)
– 1/1
– 1/2
– 1/4
– 1/8

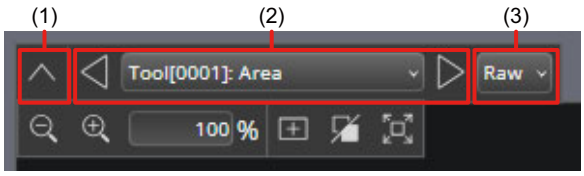
Reference This is applied when the custom screen is displayed in a web browser. On VS Creator, images are automatically reduced in the resolution according to the zoom ratio.

Display Generation Settings

The camera image part can display the latest current images and archived images. Here, set which image will be displayed in the camera image part. For details on the settings, see "Custom Screen" - "Adding Parts" - "Part Properties" - "Display Generation Settings".

Toolbar

The camera image has a toolbar. Change the zoom ratio in Run Mode and switch tools to be displayed and image types.
The display of the toolbar follows the [Toolbar Display] setting in the general settings. For details on the settings, see "Custom Screen" - "Parts" - "Camera Image" - "General" - "Display Control".



(1) Menu

Click this button to display the submenu.

(Zoom Out/Zoom In/Set magnification)

Click the button to change the display magnification of the image. You can also set the zoom rate by specifying a number.

(Graphics)

Show or hide the graphic on the camera image (default: enabled).

(Display All Regions)

Show or hide the inspection region of all measurement tools selected in the [Display Target Tools] in the [Style and Data] settings.

(Fit)

When clicked, the display magnification is automatically adjusted so that the image is displayed entirely within the camera image.

(2) Select Tool

Select the tool to be displayed on the camera image. The drop-down menu displays the tools selected in the [Display Target Tools] in the [Style and Data] settings in ascending order by tool ID. Click the < or > button to switch the tools in the reverse/sequential order of the drop-down menu.

(3) Image Type

Select the image type to be displayed on the camera image. The drop-down menu displays the image type selected in the [Display Target Tools] in the [Style and Data] settings.

Image File

Displays a desired image on the page.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style

Target File

Displays the selected file name. By default, no file has been selected and "----" is displayed. Select a file in the [Select File] dialog to be opened by clicking the folder icon to specify the image to be displayed.

Reference The image extensions that can be specified are "bmp", "png", "jpg (jpeg)", "gif", "svg", or "mp4".

Text

Displays a desired string on the page.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style

Text

Sets a string to be displayed. The maximum number of characters is 64 (or 21 double-byte characters). In the [Edit] dialog that appears when the button is clicked, names can be set in multiple languages.

Font Size

Sets the font size of the string to be displayed (10 to 192; default: 16).

Font Color

Sets the font color of the string to be displayed.

Font Style

Sets the font style of the string to be displayed.

- Standard (default)
- Bold

Background Color

Sets the background color of the part (default: OFF (Transparent)). When turned ON, the background is displayed in the specified color.

Alignment

Sets the alignment of the string to be displayed.

- Left (default)
- Center
- Right

Advanced Settings

Conditional Format

When the value of the dataset in [Conditional Value] is 1, the specified color is reflected in the font color and background color of the string to be displayed.

Conditional Value

Sets the evaluation value to determine whether to reflect the conditional format.

Font Color

Sets the color of a string to be displayed (default: ON). When turned ON, the characters are displayed in the specified color.

Background Color

Sets the background color of the part (default: OFF (transparent)). When turned ON, the background is displayed in the specified color.

Display Generation Settings

Sets which generation of results to reflect in the [Conditional Value] of [Conditional Format]. For details on the settings, see "Custom Screen" - "Adding Parts" - "Part Properties" - "Display Generation Settings".

Data

Displays the specified setting parameter, result data, or cell value on the page. Select an item to be displayed in the [Reference] dialog displayed when a part is added.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style

Font Size

Sets the font size of the data to be displayed (10 to 192; default: 16).

Font Color

Sets the font color of the data to be displayed.

Font Style

Sets the font style of the data to be displayed.

- Standard (default)
- Bold

Background Color

Sets the background color of the part (default: OFF (transparent)). When turned ON, the background is displayed in the specified color.

Alignment

Sets the alignment of a string to be displayed.

- Left
- Center
- Right (default)

Format

Sets the format of the data to be displayed.

- Standard (default)
- Number
- Date
- Time
- Percentage
- String
- User-defined

The following setting items vary depending on the selected [Format].

When [Standard]/[Number]/[Percentage] is selected

Number of Decimal Places

Sets the number of digits to be displayed after the decimal point (0 to 6; default: 3).

Digit Separator

Sets whether to insert a delimiter "," every three digits (default: OFF).

When [Date] is selected

Specified Format

Sets the date format.

– YYYY-MM-DD (default)
– MM-DD-YYYY
– DD-MM-YYYY

When [Time] is selected

Specified Format
Sets the time format.
– hh:mm:ss (default)
– hh:mm

When [String] is selected
There are no setting items.

When [User-defined] is selected

Specified Format
Sets a desired format.

Data

Data

Value
Displays the specified setting parameter, result data, or cell name. The value to be referenced can be changed from the [Reference] dialog displayed by clicking the [Link] button.

Conditional Format
When the value of the dataset in [Conditional Value] is 1, the specified color is reflected in the font color and background color of the string to be displayed.

Conditional Value
Sets the evaluation value to determine whether to reflect the conditional format.

Font Color
Sets the color of the characters to be displayed (default: ON). When turned ON, the characters are displayed in the specified color.

Background Color
Sets the background color of the part (default: OFF (transparent)). When turned ON, the background is displayed in the specified color.

Display Generation Settings
Sets which generation of results to reflect in the [Data Value] and the [Conditional Value] of [Conditional Format]. For details on the settings, see "Custom Screen" - "Adding Parts" - "Part Properties" - "Display Generation Settings".

PASS/FAIL

Display PASS/FAIL on the page according to the specified judged value. Select a judged value to be referenced in the [Reference] dialog displayed when a part is added.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style and Data

Style and Data

Judged Value

Displays the specified judged value. The judged value to be referenced can be changed from the [Reference] dialog displayed by clicking the [Link] button.

Font Size

Sets the font size of the data to be displayed (10 to 192; default: 16).

Font Style

Sets the font style of the data to be displayed.

- Standard (default)
- Bold

Invert Judgment

Sets whether to invert the PASS/FAIL display judgment (default: OFF).

- When disabled
  Displays "PASS" when the [Judged Value] is "TRUE" or "1" and "FAIL" when the [Judged Value] is "FALSE" or "0".
- When enabled
  Displays "PASS" when the [Judged Value] is "FALSE" or "0" and "FAIL" when the [Judged Value] is "TRUE" or "1".

Display Generation Settings

Sets which generation of results to reflect in the [Judged Value] in [Style and Data]. For details on the settings, see "Custom Screen" - "Adding Parts" - "Part Properties" - "Display Generation Settings".

Mode Display

Displays "Setting"/"Running" on the page according to the operation mode of the VS camera.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style

Font Size

Sets the font size of the string to be displayed (10 to 192; default: 16).

Font Style

Sets the font style of the string to be displayed.

- Standard (default)
- Bold

Tool Result List

Displays the results in the Results view for each tool on the page.

General

Set the position of the part to be placed and other settings. For details, see "Adding Parts"-"Part Properties"-"General".

Style

Configure a font color and background color.

Font Color

Configure a font color (default display: #e9e9e9).

Background Color

Configure a fill color (default: ON).

Data

Configure display target tools and display generation.

Display Target Tools

Select the tools to be displayed on the tool result list. Click the [Select] button to open the [Select Tool] dialog. Select the checkbox of the tools to be displayed and select a tool to be set as the default display.

Display Generation Settings

Set which generation of results to reflect in the tool result list. For details on the settings, see "Custom Screen"-"Adding Parts"-"Part Properties"-"Display Generation Settings".

Tool Judgment List

Display the the judgment of each tool.

General

Set the position where the part will be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style

Set a font color and background color.

Font Color

Set a font color (default display: #e9e9e9).

Background Color

Set a filling color (default: ON).

Display Execution Time

Set whether to display the execution time (default: ON).

Data

Set display target tools and the display generation.

Display Target Tools

Select the tools to be displayed in the tool judgment list. Click the [Select] button to display the [Select Tool] dialog box. Select the check boxes of the tools you wish to display and select the tool that you wish to make the default display.

Display Generation Settings

Set which generation of judgments to reflect in the tool judgment list. For details on the settings, see "Custom Screen" - "Adding Parts" - "Part Properties" - "Display Generation Settings".

Rectangle

Displays a desired rectangle on the page.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" -"General".

Style

Line Thickness

Sets the line thickness of the rectangle to be displayed (1 to 999; default: 1).

Line Color

Specifies the line color of the rectangle to be displayed.

Fill

Sets whether to fill the rectangle (default: ON). When turned ON, the rectangle is filled in the specified color.

Fill Color

Specify a filling color for the displayed rectangle.

Button

Displays the buttons on the page and execute the set operation when clicked.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style and Data

Label

Configures the string that is displayed on the button. The maximum number of characters is 64 (or 21 double-byte characters). In the [Edit] dialog that appears when the button is clicked, names can be set in multiple languages.

Font Size

Sets the font size of the string to be displayed on the buttons (10 to 192; default: 16).

Font Color

Sets the font color of the string to be displayed on the buttons.

Font Style

Sets the font style of the string to be displayed.

- Standard (default)
- Bold

Background Color

Sets the background color of the part (default: ON). When turned ON, the background is displayed in the specified color.

Setting List

Selects and sets an operation to be executed when the button is clicked from the pull-down menu. A maximum of eight operations can be set.

- **None** (default)
- **Issue Command**: Sets a command to be executed in [Operation Setting].
- **Issue Soft Event**: Sets a Soft Event ID to be issued in [Event ID].
- **Switch Page**: Sets a switch target page in [Switch Target]. The pull-down menu displays a list of pages added to the custom screen.
- **Edit Region**: Sets the target tool to edit the region in [Target Tool].

Drop-down Menu

Displays a drop-down menu on the page and change the referenced setting parameter/cell to the set value when a menu item is selected. Select a setting parameter/cell to be referenced in the [Reference] dialog displayed when a part is added.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style and Data

Value

Displays the name of specified setting parameter/cell. The value to be referenced can be changed from the [Reference] dialog displayed by clicking the [Link] button.

If a cell is referenced, a value must be set in that cell beforehand. If a cell other than a numeric cell is referenced, a reference error occurs and the value cannot be changed.

Font Size

Sets the font size of a string to be displayed on the drop-down menu (10 to 192; default: 16).

Font Color

Sets the font color of a string to be displayed on the drop-down menu.

Background Color

Sets the background color of the part (default: ON). When turned ON, the background is displayed in the specified color.

Setting List

Adds an item to be displayed on the drop-down menu from the [Add] button. A maximum of 60 items can be added.

Text

Sets a string to be displayed on the drop-down menu of the added item. In the [Edit] dialog that appears when the button is clicked, names can be set in multiple languages.

Value

Sets a value to be reflected when the added item is selected in the drop-down menu.

Numeric Input Box

Displays the numeric input box on the page and changes the referenced setting parameter/cell to the entered value. Select a setting parameter/cell to be referenced in the [Reference] dialog displayed when a part is added.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style and Data

Value

Displays the name of specified setting parameter/cell. The value to be referenced can be changed from the [Reference] dialog displayed by clicking the [Link] button.

Reference If a cell is referenced, a value must be set in that cell beforehand. If a cell other than a numeric cell is referenced, a reference error occurs and the value cannot be changed.

Font Size

Sets the font size of a number to be displayed in the numeric input box (10 to 192; default: 16).

Font Color

Sets the font color of a number to be displayed in the numeric input box.

Background Color

Sets the background color of the part (default: ON). When turned ON, the background is displayed in the specified color.

Number of Decimal Places

Sets the number of digits to be displayed after the decimal point (0 to 6; default: 3).

Digit Separator

Sets whether to insert a delimiter "," every three digits (default: OFF).

Upper Limit Value

Sets the upper limit value that can be set in the numeric input box.

Lower Limit Value

Sets the lower limit value that can be set in the numeric input box.

Step Value

Sets a value to be incremented or decremented when clicking the up and down arrows in the numeric input box (0.001 to 9999.000; default: 1.000).

Checkbox

Displays a checkbox on the page to turn ON/OFF the referenced setting parameter/cell.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style and Data

Value

Displays the name of specified setting parameter/cell. The value to be referenced can be changed from the [Reference] dialog displayed by clicking the [Link] button.

If a cell is referenced, TRUE or FALSE must be set in that cell beforehand.

Background Color

Sets whether to display the background color of the part (default: ON).

Toggle Switch

Displays a toggle switch on the page to turn ON/OFF the referenced setting parameter/cell.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style and Data

Value

Displays the name of specified setting parameter/cell. The value to be referenced can be changed from the [Reference] dialog displayed by clicking the [Link] button.

Reference If a cell is referenced, TRUE or FALSE must be set in that cell beforehand.

Background Color

Sets whether to display the background color of the part (default: ON).

Text Input Box

Displays a text input box on the page to reflect the entered string to the referenced setting parameter/cell.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style and Data

Text

Displays the name of specified setting parameter/cell. The value to be referenced can be changed from the [Reference] dialog displayed by clicking the [Link] button.

Reference If a cell is referenced, a string must be set in that cell beforehand. If a cell with no string set is referenced, a reference error occurs and the string cannot be reflected.

Font Size

Sets the font size of a string to be displayed in the text input box (10 to 192; default: 16).

Font Color

Sets the font color of a string to be displayed in the text input box.

Background Color

Sets the background color of the part (default: ON). When turned ON, the background is displayed in the specified color.

Graph (Statistics)

Creates a graph using the archive data of the specified tool and displays this graph on the page.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style and Data

Style and Data

Target Tool
Displays a list of [Statistics] tools in the [Task] View in the drop-down menu. Select a tool to be displayed on the graph.

Series
Click the [Add] button to add series to be displayed on the graph. A maximum of eight series can be added.

Item
Displays a list of statistical targets set in the [Statistics] tool selected in [Target Tool] on the pull-down menu. Select a statistical target to be displayed on the graph.

Series Name
Displays the item name of the statistical target selected in [Item]. The name can be changed to a desired name.

Color
Sets the color of the series to be displayed on the graph.

Graph Format

Font Size
Sets the font size of strings and numbers to be displayed on the graph (10 to 64; default: 12).

Background Color
Set the background color of the part (default: ON). When turned ON, the background is displayed in the specified color.

Display Legend
Sets whether to display a legend on the graph (default: ON).

Display Axis Label
Sets whether to display an axis label on the graph (default: ON).

Y-Axis Range

Specify Minimum Value/Specify Maximum Value
Sets the minimum/maximum value to be displayed on the Y axis (default: OFF). When turned ON, a desired value can be set. When turned OFF, the minimum/maximum value within the data range can be automatically set.

Graph (Yield Rate)

Creates a graph using the number of Pass/Fail counts of the specified judgment result and displays this graph on the page.

General

Sets the position of the part to be placed and other settings. For details, see "Adding Parts" - "Part Properties" - "General".

Style and Data

Style and Data

Graph Type

Sets a graph type.

- Pie Graph (default)
- Bar Graph

Specify Individually

If the judgment results to be referenced are Individually specified for the number of Pass counts and the number of Fail counts, set to ON (default: OFF).

When [Specify Individually] is set to OFF

Specify

Displays a list of the "Total Status" and all tools with judgment results on the [Task] View in the pull-down menu. Specify an item to be used as the judgment result.

When [Specify Individually] is set to ON

Pass Count/Fail Count

Specifies an item to be used as the judgment result of Pass counts and Fail counts from the [Reference] dialog displayed by clicking the [Link] button.

Graph Format

Font Size

Sets the font size of strings and numbers to be displayed on the graph (10 to 64; default: 12).

Background Color

Sets the background color of the part (default: ON). When turned ON, the background is displayed in the specified color.

Display Legend

Sets whether to display a legend on the graph (default: ON).

Web Browser Display

#I006

The pages created with the Custom Screen can be displayed in a web browser. Using the web browser display, even on a PC without VS Creator installed, the operation status of VS cameras on the same network can be checked and setting parameters assigned to the parts can be changed by launching a web browser.

Operating Environment

Web browser

- Google Chrome 122 or later
- Microsoft Edge 122 or later
- Safari 16 or later

Maximum number of simultaneous connections

5 clients

Display by Web Browser

Connect to the device to display the pages created with the Custom Screen in a web browser.

1 Connect to the device using one of the following methods.

Method 1. Enter the IP address of the target device to be connected in the address bar of the web browser (example: 192.168.0.10).

Method 2. Right-click the device to be displayed in the device list on the [Connect to Device] screen to select [Display by Web Browser] from the displayed context menu.

Connect to the device to display the login screen.

Reference

- If the account settings have not been set and the account setting file Account.acc does not exist, the login screen is skipped.
- When connecting using Method 2, if the [User Name] and [Password] set in the account information of the destination device are set to [Startup User] in the [VS Creator Settings], the login screen is not displayed and the [User Name] and [Password] entry can be omitted. You will log in automatically to the device and the pages are displayed.
- The first character string of the URL will be “http://” when [Communication Method] in [HTTP Settings] in the Global Settings is set to [HTTP] mode or [None], or when a device certificate is not registered in [HTTPS] mode. The first character string of the URL will be “https://” when a device certificate is registered in [HTTPS] mode.

2 Enter [User Name] and [Password] then click the [OK] button.

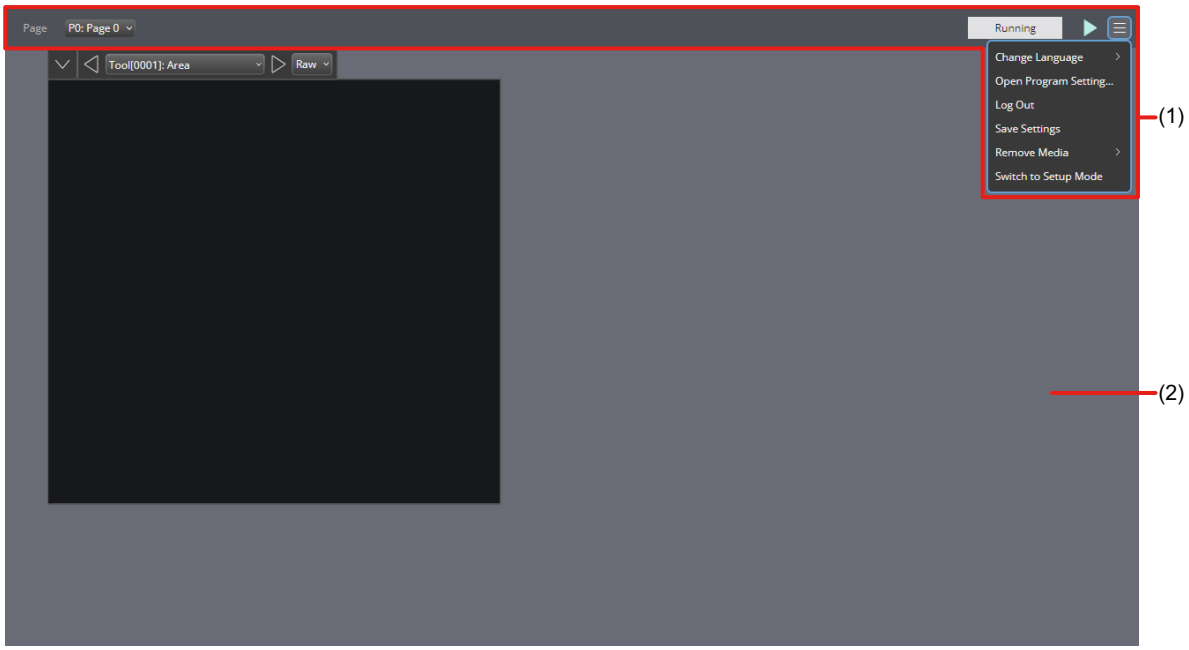
Logs in to the device and the page is displayed.

Reference The page displayed by default depends on the permission group of the logged-in user and the [Permission Group Settings] of the page. For details on the settings, see "Custom Screen" - "Adding Pages" - "Page Properties" - "Permission Group Settings".

Point
- A maximum of five clients can be connected to a single device at the same time.
- When multiple clients are connected to a single device, the client that has switched to the Setup Mode obtains editing privileges. Other clients cannot edit. For details on the editing privileges, see "Main Screen" - "System" - "Change Mode" - "Function overview" - "Editing Rights".
- If one PC connects to one device from the VS Creator and a web browser, it is counted as two clients.
- If one PC connects to one device from multiple web browsers, each web browser is counted as one client.

Screen Details

When the page created with the Custom Screen is displayed in a web browser, the toolbar for the page is also displayed. This section explains screen details and the functions of the toolbar.



(1) Toolbar

Move the mouse to the top of the page to display the toolbar.

Reference The toolbar display control (Display Only During Mouse Over (default)/Always Display/Always Hide) can be set from the page properties. For details on the settings, see "Custom Screen" - "Adding Pages" - "Page Properties" - "Display Control".

Page P0: Page 0 (Switch Page)

Switches the page to be displayed. The drop-down menu displays a list of pages set in the program setting. Select and switch pages.

Running (Mode Display)

Displays the operation mode of the connected device. Displays "Running" when the device is in the Run Mode and "Setting" when the device is in the Setup Mode.

(Trigger Button)

Click this button to enter a single trigger on the device.

(Menu)

Click this icon to open the submenu.

Switch to Setup Mode/Switch to Run Mode

Switches the operation mode of the connected device. [Switch to Setup Mode] is displayed during the Run Mode, and click this to switch to the Setup Mode. [Switch to Run Mode] is displayed during the Setup Mode, and click this to switch to the Run Mode.

Open Program Setting...

Click this to display the [Open Program Setting] dialog. Select and open the program setting from the list.

Save Settings

Click this to display a message which confirms whether to save the settings. Click the [OK] button to save the settings.

Change Language

Click this to display a list of languages. Select and switch languages. The default value depends on the language setting of the web browser.

Fit

Enlarges/reduces the page display to fit the window size of the web browser.

Remove Media

Click this and select a media from the displayed submenu to display a message which confirms whether or not to eject the media. Click the [OK] button to make the media ready to be removed.

Log Out

Click this to display a message which confirms whether or not to log out. Click the [OK] button to log out and display the login screen.

Reference When the account settings have not been configured and the account settings file Account.acc does not exist, logout is disabled.

(2) Page

Displays the page selected in [Switch Page].

Reference When connecting to a VS camera that has open a program setting where a page has not been set, a message "Failed to load the custom screen." appears and no page is displayed.

Difference from the [Custom Screen] View

This section explains the difference between displaying the created page in the [Custom Screen] view of VS Creator and displaying it in a web browser.

Reference
- The "[Custom Screen] View" here refers to the custom screen displayed on the VS Creator main screen. It is different from the "Custom Screen Viewer" browser that is a dedicated browser for PC display units.
- The page can be displayed and operated with the web browser. A page cannot be created using the web browser. Use VS Creator to create a page.

Run Mode

There is no difference in page display or part operations between the [Custom Screen] view (VS Creator) and the web browser.

Reference The toolbars displayed at the top of the page differ.
- Custom Screen (VS Creator): "Custom Screen" - "Screen Details" - "Toolbar"
- Web browser: "Custom Screen" - "Web Browser Display" - "Screen Details" - "Toolbar"

Setup Mode

[Custom Screen] View (VS Creator)

Parts that involve operations, such as buttons and drop-down menus, cannot be operated. Selecting a part displays the part setting items on the [Properties] view.

Web Browser

Parts that involve operations, such as buttons and drop-down menus, can be operated in the same way as in the Run Mode.

Reference
- When referring to a setting parameter that can be set by reference from a part that operates a setting parameter, the setting parameter can be changed by operating the part in either the Run Mode or the Setup Mode.
- A setting parameter that cannot be set by reference from a part that operates a setting parameter cannot be referenced.

Chapter 10 Filmstrip

The [Filmstrip] view displays the images associated with the tool selected on the [Task] view in thumbnails. Using this, you can check the inspection results of images stored in the archive and execute simulations using any image. You can switch to one of the following functions depending on your purpose.

- "Archive Review" function: Displays archived images and their result data.
- "Simulation Execution" function: Executes a simulation using the specified image.

Archive Review

"Archive Review" displays the archived image selected in the [Filmstrip] view and the resulting data on the main screen. You can review images and result data for individual archived images. The archive review function from Filmstrip is available in Run Mode.

Overview of Functions

#J001

When you display the archived images of a past inspection in the [Filmstrip] view in thumbnails and select a specific archived image, the selected image will appear in [Camera Image] in the [Image Viewer] view. And the result data will be displayed in the [Results Overview] View and [Tool Results] View. When you switch tools in the [Task] view, the camera image will also be switched. See "Archive Reviewing Procedure" for details of the operation procedure.

Point The conditions for archiving should be set in "Archive Condition Settings" in advance.

Screen Layout

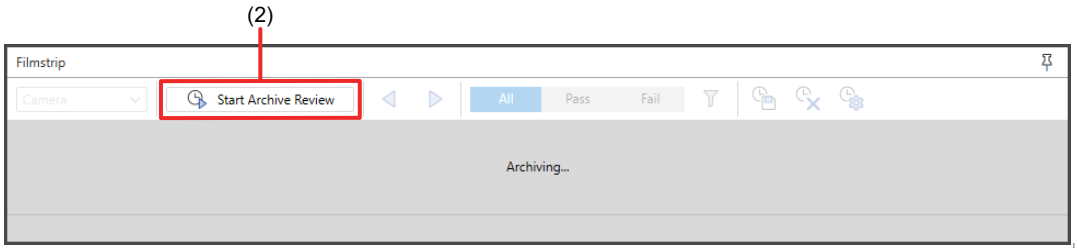
#J002

This section describes the screen layout and functions of the [Filmstrip] view. There are two main types of screens: Screens Before/After Archive Review and Screen During Archive Review.

Screens Before/After Archive Review

Run Mode

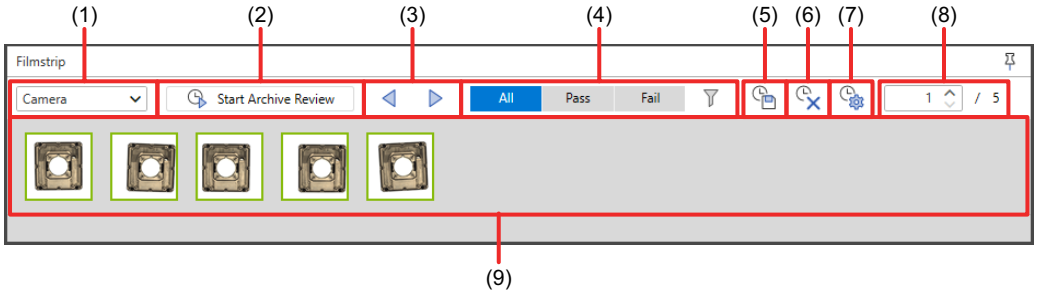
Archiving is enabled in Run Mode and "Archiving..." is displayed in the [Filmstrip] view. Archived images are not displayed.



Point If no archive condition is enabled, you will see the message "There is no archive condition enabled." and archiving will be disabled.

Setup Mode

Archived images are displayed in the [Filmstrip] view.



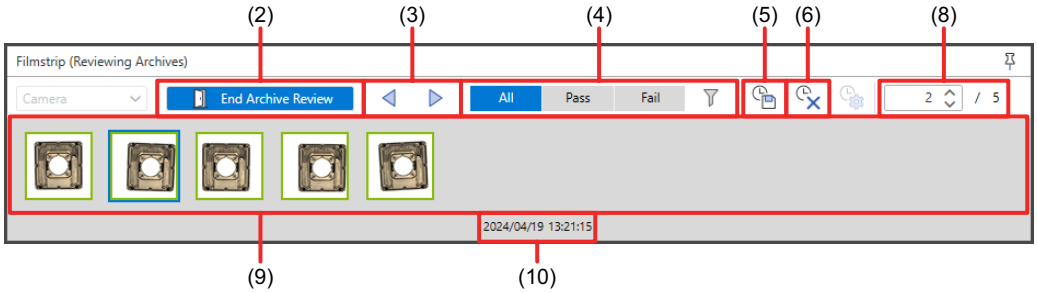
Screen During Archive Review

Run Mode

Click the [Start Archive Review] button to display archived images in the [Filmstrip] view. Clicking on an archived image displays the image and the result data at the time of the archive on the main screen.

Setup Mode

Select [Execute] - [Archive Review] - [Start Archive Review] from the main menu to display the image and the result data on the main screen.



(1) Image Selection

Select the stored location for images to be loaded from the drop-down menu. You cannot make any changes in Run Mode and while reviewing archives in Setup Mode.

- **Camera**: Displays images stored in the memory of the VS camera.
- **PC**: Displays images saved on the PC.
- **SD Card**: Displays images stored in the SD card of the VS camera.

Point If the device is a simulator, images stored on the PC can be displayed in the [Filmstrip] view even in Run Mode.

Reference Select [Execute] - [Archive Review] - [Start Archive Review] from the menu bar to automatically change the image selection to [Camera].

(2) Start Archive Review/End Archive Review

When you click the [Start Archive Review] button, the state changes to "Reviewing Archives" and the button name changes to [End Archive Review]. Clicking on an archived image in this state will display the image in the [Image Viewer] view and the result data in the [Results Overview] view and the [Tool Results] view. Click the [End Archive Review] button to exit the "Reviewing Archives" state.

Point
- In Run Mode, archiving will stop in the "Reviewing Archives" state but the operation will continue. Click the [End Archive Review] button to resume archiving.
- In Setup Mode, select [Execute] - [Archive Review] - [Start Archive Review / End Archive Review] from the menu bar to start or end archive review.

(3) ◁ (Previous Image) / ▷ (Next Image)

Switches the selected archived image.

Reference You can also switch them by selecting [Execute] - [Archive Review] - [Previous Image/ Next Image] in the menu bar.

(4) Display Filter

Selects the display conditions for archived images.

- **All** (default): Displays all images. Each image is surrounded by a frame in the total status color.
- **Pass**: Displays only total status "Pass" images.
- **Fail**: Displays only total status "Fail" images.

Clicking the (Select Archive Condition for Display) button opens the [Display Target] dialog. You can select the archive condition for the archived images to be displayed in the [Filmstrip] view from the drop-down menu. The selection cannot be made during archive review.

- **All**: Applies all archive conditions enabled in [Archive Condition Settings].
- **n**: **Archive Condition n** (n: 00 to 31): The archive conditions enabled in [Archive Condition Settings] are displayed. Displays images that meet the selected archive condition in thumbnails.

(5) Export Archived Images

Click the button to open the [Export Archived Images] dialog. You can export the displayed archived images.

(6) Clear Archived Data

Click the button to delete the images archived in the memory.

Reference In addition to this function, the archived data will be cleared if the image changes due to actions such as changing the resolution with the capture tool. Changing the settings parameters will not clear the archived data.

(7) Archive Condition Settings

Click the button to open the [Archive Condition Settings] dialog. You can set the archive conditions. This can be selected in Setup Mode.

(8) Selected Archived Images/Total Number of Archived Images

Displays the position of the selected archived image from the beginning and the total number of archived images. Select from the drop-down menu or enter a value in the numeric input box to specify an archived image to be displayed.

(9) Archived Image

The [Filmstrip] view displays the images that have been archived in thumbnails. New images are added to the far right. The archived images that match the conditions specified in Display Filter will be displayed.

Display in Run Mode

Thumbnails are not displayed during archiving in Run Mode; and "Archiving..." is displayed instead. When you start archive review, the [Filmstrip] view displays the previously archived images in thumbnail format.

(10)Date & Time Display

Date and time information (YYYY.MM.DD hhmmss) of the selected archived image is displayed.

Export Archived Images

#J003

You can save the archived images displayed in the [Filmstrip] view. For example, if you export a misjudged image, you can later use that image to adjust the setting parameters. You can also capture images first and then create program settings later.

Point

- Archived images cannot be saved while archiving is in progress in Run Mode.
- Archived images filtered by the display conditions set in Display Filter are applicable.
- The result data for each image will not be saved.

Click the (Export Archived Images) button to open the [Export Archived Images] dialog. You can set the following items in this dialog.

Saving Folder Specification Method

Sets whether to change the save destination for image files from the default folder.

- **Default Folder** (default): Image files are saved in the simulator program settings folder on the computer.
  - For devices and simulators linked to devices
    (Simulator Base Path)\(MAC Address)\EM\VS\Camera\BackupFiles\(Program Number_Program Name)\SimulationImages.
  - For simulators
    (Simulator Base Path)\(Simulator Name)\EM\VS\Camera\BackupFiles\(Program Number_Program Name)\SimulationImages

  Point If the target program setting is on a microSD card, “EM” above changes to “SD”.

- **User-selected Folder**: Any save destination can be set. To change the save destination, click the [Select Folder] button and set the save destination in the dialog box that appears.

Save Destination Folder

Displays the destination where the image files will be saved. Click the [Open Folder] button to view the saved image files.

File Format

Selects the save format (PNG/BMP/JPG) for the image files (default: PNG).

Output File Name Sample

Displays a save file name following the default naming convention.

Save

Click the button to save the image with the above settings.

Archive Condition Settings

#J004

Click the (Archive Condition Settings) button to open the [Archive Condition Settings] dialog. You can set the archive conditions.

Point The archive conditions can be modified in Setup Mode.

Reference The [Archive Condition Settings] dialog can also be opened by selecting [Settings] - [Archive Condition Settings] in the menu bar.

Archive Condition List

The currently set archive conditions are displayed (up to 32 items). You can edit the archive conditions individually.

Reference The default settings are "Archive Condition 00" (archive when the main task is judged Fail, archive count = 5) and "Archive Condition 01" (archive when the main task is judged Pass, archive count = 5). These can be changed as necessary.

The information displayed in each column is as follows.

- **Enabled**: Displays a check mark when the archive condition is enabled.
- **No.**: Displays the archive condition number (0 to 31).
- **Name**: Displays the name of the set archive condition.
- **Target**: Displays the conditions (evaluation target and value) for the set image archiving.
- **Archive Count**: Displays the set archive count (1 to 30000).
- **Buffer Mode**: Displays the behavior (Overwrite/Do Not Overwrite) when the set [Archive Count] is reached.

To copy/paste/clear an archive condition, select the condition and then click the respective button on the right of the list, or select the respective item from the context menu.
To edit an archive condition, open the [Condition Settings] dialog in one of the following ways (→ "Edit Archive Condition"):

- Select an archive condition and click the (edit) button.
- Right-click on an archive condition and select [Edit] from the context menu.
- Double click on an archive condition.

Edit Archive Condition

#J005

In the [Archive Condition Settings] dialog, select the archive conditions, then click the (Edit) button, or double-click the archive conditions to display the [Condition Settings] dialog. Edit the conditions when archiving the histories.

Enable Archive Condition

You can enable/disable the selected archive condition. When turned ON, a check mark will appear in the [Enabled] column of the archive condition in "Archive Condition List". Images and result data are stored in the memory as archive data when the enabled archive conditions are met.

Name

You can set the name of the selected archive condition (default: Archive Condition n (n: 00 to 31), up to 64 characters). In the [Name] dialog that appears when you click on the button, you can set the name in multiple languages.

Archive Condition

You can select how to determine whether or not to archive. Subsequent setting items will vary depending on the selected method.

- **Always Archive**: Archiving is performed at all times. [Target] and [Evaluation Value] are not set.
- **Refer to Task Judgment Value** (default): Archiving is performed when the judgment result of the task selected in [Target] matches [Evaluation Value]. This option is used when you decide whether to archive or not according to the total status result.
- **Refer to Tool Judgment Value**: Archiving is performed when the judgment result of the tool selected in [Target] matches [Evaluation Value].
- **Refer to Vision Dashboard Cell**: Archiving is performed when the cell selected in [Target] is "TRUE".

Target

Point This item does not appear if you select [Always Archive] in [Archive Condition].

Select the target (task/tool/cell) to be referenced for judgment. The target displayed will vary depending on the method selected in [Archive Condition].

If [Refer to Task Judgment Value] is Selected

The names of the tasks on the [Task] view are displayed in a drop-down menu in ascending order by ID (default: Task[000]: Main Task). Archiving is performed when the judgment result of the selected task matches [Evaluation Value]. In the initial state, the judgment value of the main task (Task[000]:) is treated as the total status value.

If [Refer to Tool Judgment Value] is Selected

The names of the tools on the [Task] view that are to be judged are displayed in a drop-down menu in ascending order by ID (default: the tool with the smallest ID). Archiving is performed when the judgment result of the selected tool matches [Evaluation Value].

If [Refer to Vision Dashboard Cell] is Selected

The cell number on the Vision Dashboard is displayed (default: A1). Click the button on the right to open the [Reference] dialog where you can specify any cell on the Vision Dashboard. Archiving is performed when the referenced cell is "TRUE".

Evaluation Value

Point This item does not appear if you select [Always Archive] or [Refer to Vision Dashboard Cell] in [Archive Condition].

You can set the evaluation value (Pass/Fail) for judging whether or not to archive (default: Fail). Archiving is performed when the judgment result of the [Target] matches the evaluation value. Archiving is not performed in the case of a mismatch or execution error.

Archive Count

You can set the archive count between 1 and 30000 (default: 5).

Buffer Mode

You can set the behavior when the archiving reaches [Archive Count].

- **Overwrite** (default): Continues archiving by overwriting data starting from the oldest measurement.
- **Do Not Overwrite**: Stops the archiving. Resumes archiving when the device is reset, or the data in the archive condition is cleared.

Result Data

You can set whether or not to archive the result data.

- **Archive** (default): Archives images and result data. The result data are displayed in the [Results Overview] view during Archive Review.
- **Do Not Archive**: Does not display the result data in Archive Review because it is not included in the archive.

Image Selection

Click the [Select] button to open the [Archive Target Image Selection] dialog. The dialog shows all the tools on the [Task] view that output images. Choose the tool you wish to archive images for and select its check box. If you select [All Images], all tasks and all tools will be selected. Whether they are selected by default or not depends on each tool.

Archive Reviewing Procedure

#J006

This section describes the archive reviewing procedure.

Point

- When in Run Mode and archiving is in progress, "Archiving..." is displayed in the [Filmstrip] view. Archived images are not displayed.
- You cannot edit tasks or properties during archive review.

1 Click the [Start Archive Review] button.

The state will change to "Reviewing Archives". The most recent archived data is displayed in the [Filmstrip] view.

Reference In Setup Mode, select [Execute] - [Archive Review] - [Start Archive Review] to also enter the “Archive Review in Progress” state.

2 Select the archived image you wish to review.

The archived image and the corresponding result data are displayed. If you wish to review another archived image, click the ◁ / ▷ buttons to switch between archived images. You can also switch between archived images by clicking directly on them in the [Filmstrip] view.

3 Click the [End Archive Review] button.

The archive review will end.

Simulation Execution

"Simulation Execution" is a function that simulates the results of executing program settings using the images displayed in the [Filmstrip] view. You can use previously saved images or any images that you have prepared separately.

Overview of Functions

#J007

A simulation allows you to prepare the images to be inspected in advance, load them into the [Filmstrip] view and execute a simulation to verify the operation before processing them on the actual device. The archived images can be also directly referenced.
By reviewing the images step by step, you can grasp the processing flow and the result data for each tool. The execution results can be used as a reference when modifying the task configuration or tool settings. It also eliminates the need to verify the operation on the actual device each time you make a modification. Simulations can be executed in Setup Mode. You can also make edits while a simulation is being executed.
See "Simulation Execution Procedure" for details of the operation procedure.

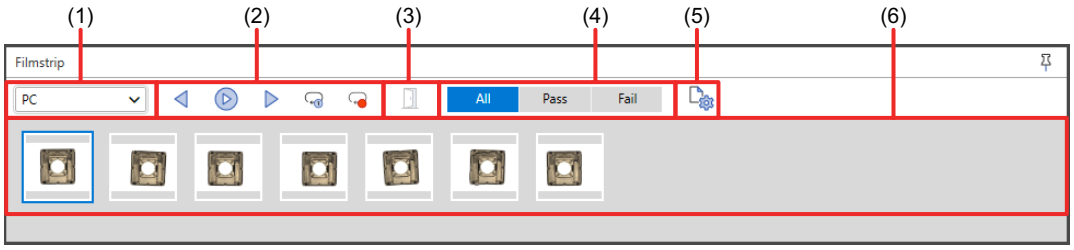
Screen Layout

#J008

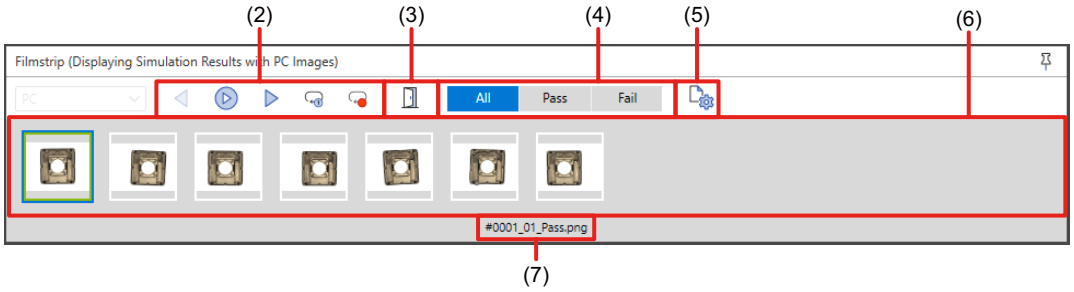
This section describes the screen layout and functions of the [Filmstrip] view.

Reference When using a simulator, even in Run Mode, thumbnails can be still displayed in the filmstrip. Click the (trigger) button to display the next thumbnail.

Screen Before/After Simulation Execution



Screen During Simulation Execution



(1) Image Selection

Select the destination for images to be loaded from the drop-down menu. If [SD Card] is selected, select the folder containing the images from .

(2) Operation Buttons

- (Previous Image): Executes a simulation using the image to the left of the selected thumbnail image.
- (Repeat Image): Executes a simulation again with the selected thumbnail image.
- (Next Image): Executes a simulation using the image to the right of the selected thumbnail image.
- (Stop After 1 Round): Executes a simulation once each from the selected thumbnail image to the rightmost thumbnail image.
- (Stop at Total Status Fail): Executes a simulation once each from the leftmost thumbnail image to the rightmost thumbnail image. The execution stops when an image with total status "Fail" is reached.

Reference You can also execute simulations from [Execute] - [Simulation Execution] - [Previous Image/Repeat Image/Next Image/Stop After 1 Round/Stop at Total Status Fail in the menu bar].

(3) Return to Displaying Current Image

Clicking the button while a simulation is being executed will revert the image displayed in the [Image Viewer] view to the input image. In addition, the results for the input image are displayed in the [Results Overview] view and the [Tool Results] view.

(4) Display Filter

A judgment result (Pass/Fail) is assigned to the image using which a simulation has been executed. You can filter the images displayed by selecting [Pass] or [Fail].

(5) Recording/Simulation Image Settings

Click the button to open the [Recording/Simulation Image Settings] dialog. You can set the storage location for images that have been recorded or to be used in the simulation.

(6) Thumbnail Image

The [Filmstrip] view displays the images that have been set in "Simulation Image Settings" in thumbnails.

(7) Image File Name Display

Displays the generation and file name (#nnnn file name) of the selected image file.

Recording/Simulation Image Settings

#J009

The [Recording/Simulation Image Settings] dialog appears when you select [Settings] - [Recording/Simulation Image Settings] from the menu bar. You can configure the following settings in this dialog:

- Recording Settings: Sets the save location and file format for the recorded images.
- Simulation Image Settings: Sets the storage location and acquisition method for images to be loaded in the simulation.
- Simulation Execution Option: Sets the behavior option for when executing a simulation.

Reference The [Recording/Simulation Image Settings] dialog can also be accessed by clicking the (Recording/Simulation Image Settings) button on the toolbar.

Recording Settings

You can set the save location and file format for the recorded images (→ [Record]).

Saving Folder Specification Method

Sets whether to change the save destination for image files from the default folder.

- **Default Folder** (default): Image files are saved in the simulator program settings folder on the computer.
  - For devices and simulators linked to devices
    (Simulator Base Path)\(MAC Address)\EM\VS\Camera\BackupFiles\(Program Number_Program Name)\SimulationImages.
  - For simulators
    (Simulator Base Path)\(Simulator Name)\EM\VS\Camera\BackupFiles\(Program Number_Program Name)\SimulationImages

Point If the target program setting is on a microSD card, “EM” above changes to “SD”.

- **User-selected Folder**: Any save destination can be set. To change the save destination, click the [Select Folder] button and set the save destination in the dialog box that appears.

Save Destination Folder

Displays the destination where the image files will be saved. Click the [Open Folder] button to view the saved image files.

File Format

Selects the save format (PNG/BMP/JPG) for the image files (default: PNG).

Simulation Image Settings

You can set the storage location and file specification method for images to be loaded in a simulation.

Loading Folder Specification Method

Sets whether to change the stored location for images to be loaded from the default folder.

- **Default Folder** (default): Images in the simulator program settings folder on the computer are loaded.
  - For devices and simulators linked to devices
    (Simulator Base Path)\(MAC Address)\EM\VS\Camera\BackupFiles\(Program Number_Program Name)\SimulationImages.
  - For simulators
    (Simulator Base Path)\(Simulator Name)\EM\VS\Camera\BackupFiles\(Program Number_Program Name)\SimulationImages

> **Point** If the target program setting is on a microSD card, “EM” above changes to “SD”.

- **User-selected Folder**: Any storage location can be set. To change the storage location, click the [Select Folder] button and set the storage location in the dialog box that appears.

Loading Folder

The storage location of loaded images is displayed. Click the [Open Folder] button to view the saved image files.

Simulation Image Detailed Settings

Click the button to open the [Simulation Image Detailed Settings] dialog. You can set the file specification method, etc.

Simulation Execution Option

> **Point** This item cannot be set if there are no cameras with LumiTrax Mode enabled.

You can set whether to generate LumiTrax images anew from the LumiTrax source images and execute a simulation using the image (default: OFF). Even if you select the [Regenerate LumiTrax Images] check box, the default value (OFF) will be restored when the capture mode is switched.

Simulation Image Detailed Settings

The [Simulation Image Detailed Settings] dialog displays a list of images that will be loaded into the filmstrip when a simulation is executed. You can set the following items as necessary.

- Loading Folder: Displays the image storage location. This can be changed as necessary.
- Specification Method: Sets whether images are automatically assigned based on the image file name or specified arbitrarily.
- Switch Tasks: You can switch between tasks to check and set the simulation image for each task.
- Image List: Displays the images to be used in matrix format. Set this option if you wish to load the images manually.

Loading Folder Specification Method

Sets whether to change the stored location for images to be loaded from the default folder.

- **Default Folder** (default): Images in the SimulationImages folder in the program setting folder are loaded.
  - For devices and simulators linked to devices
    (Simulator Base Path)\(MAC Address)\EM\VS\Camera\BackupFiles\(Program Number_Program Name)\SimulationImages.
  - For simulators
    (Simulator Base Path)\(Simulator Name)\EM\VS\Camera\BackupFiles\(Program Number_Program Name)\SimulationImages

Point If the target program setting is on a microSD card, “EM” above changes to “SD”.

- **User-selected Folder**: Any storage location can be set. To change the storage location, click the [Select Folder] button and set the storage location in the dialog box that appears.

Loading Folder

The storage location of loaded images set under [Simulation Image Settings] - [Loading Folder] in the [Recording/Simulation Image Settings] dialog is displayed. You can change the storage location in the dialog that appears when you click the [Select Folder] button. The changed storage location will be applied to [Loading Folder].
Click the [Open Folder] button to view the saved image files.

Specification Method

You can set how the simulation image is assigned. The selected method will be applied to all tasks.

- **Automatic Assignment by the File Name** (default): Image files stored in [Loading Folder] are automatically assigned according to the file name. You can check the execution order in the filmstrip. This cannot be edited.
- **Specify Manually**: Sets any image for each Capture No. manually (→ "Image Setting Method").

Point Switching [Specify Manually] to [Automatic Assignment by the File Name] will unassign images in all tasks.

Switch Tasks

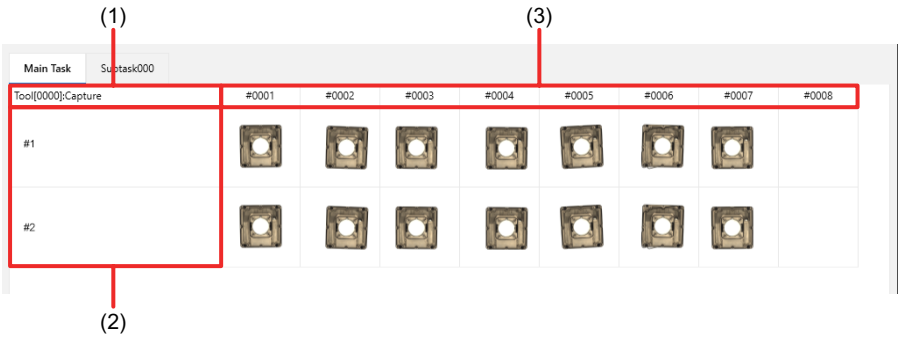
The names of the main task and subtasks with a Capture tool are displayed in tab format. Clicking on a tab will display the Image List of the images used in that task.

Reference Subtasks without a Capture tool are not displayed in tabs.

Image List

The images to be used in the task selected in "Switch Tasks" are listed in thumbnails. Images are displayed in a matrix of Capture No. (rows) and measurement count (columns). You can see which images are measured during simulation and in what order.

Point If [Automatic Assignment by the File Name] was selected in [Specification Method], images are displayed but cannot be edited. If you have selected [Specify Manually], you can set the images individually (→ "Image Setting Method").



(1) Tool Name: Name of the Capture tool set in the task (default: Tool[0000]: Capture).

(2) Capture No.: Displayed when multiple images (1 to 10) are to be captured. "Image Type" is also displayed in LumiTrax Mode or MultiSpectrum Mode.

(3) Measurement Count: Number of measurements (1 to 10000) is displayed.

Image Setting Method

If you have selected [Specify Manually] in "Specification Method", you can set the images in Image List using one of the following methods:

- Context Menu Operation
- Drag & Drop to Register Images

Context Menu Operation

Right-click on a blank frame or image and select the operation you wish to perform from the context menu.

- **Assign Image**: Places the image selected in the [Open] dialog.
- **Unassign Image**: Erases the placed image from the list. You can select the target from the submenu.
  - **Image**: Erases only the selected image. The frame containing the erased image will become blank.
  - **Column**: Erases all images of the measurement No. (column) containing the selected image. The erased column will be filled.
  - **All**: Erases all images in the image list. All image frames will become blank.

Point
- Deleting images from the image list does not delete the images in Loading Folder.
- Images can also be deleted using the Del key. You can also use the Shift and Ctrl keys to delete multiple images.

- **Insert Column**: Inserts a blank frame for one column to the left of the selected image.
- **Open File**: Opens the image in the Windows viewer or an associated application.
- **Open Folder**: Displays Loading Folder in the Windows Explorer.

Reference [Open File] and [Open Folder] can be selected even if you have selected [Automatic Assignment by the File Name] in [Specification Method].

Drag & Drop to Register Images

You can register images by dragging and dropping image files from the Windows Explorer to a blank frame in the image list. When you drag and drop an image onto a registered frame, the image will be registered in a blank frame to the right of that frame. The image files are copied from the source folder to Loading Folder at this time.

Simulation Execution Procedure

#J010

This section describes the procedure for executing a simulation using a simulation image file or an archived image file.

Point When an event that triggers a task occurs while a simulation image or an archived image is displayed, the camera image in the [Image Viewer] view switches to the latest input image, and the result data and judgment results will also be updated.

1 Switch to Setup Mode.

2 Select the destination for images to be loaded from the [Image Selection] drop-down menu.
The simulation images or archived images are displayed in the [Filmstrip] view.

3 Click the Operation Buttons for simulation execution.
A simulation is executed using a simulation image or an archived image and the results are displayed. You can also execute a simulation by clicking a simulation image or an archived image in the [Filmstrip] view.

Chapter 11 Properties

The [Properties] view displays the settings (properties) of tools/tasks/groups. You can create and execute program settings by setting each property appropriately.

Overview of Functions

#K001

When you select a tool/main task/subtask/group in the [Task] view, the [Properties] view will display the setting items corresponding to the selection. When you modify a setting in the [Properties] view, the change will be reflected in other views.

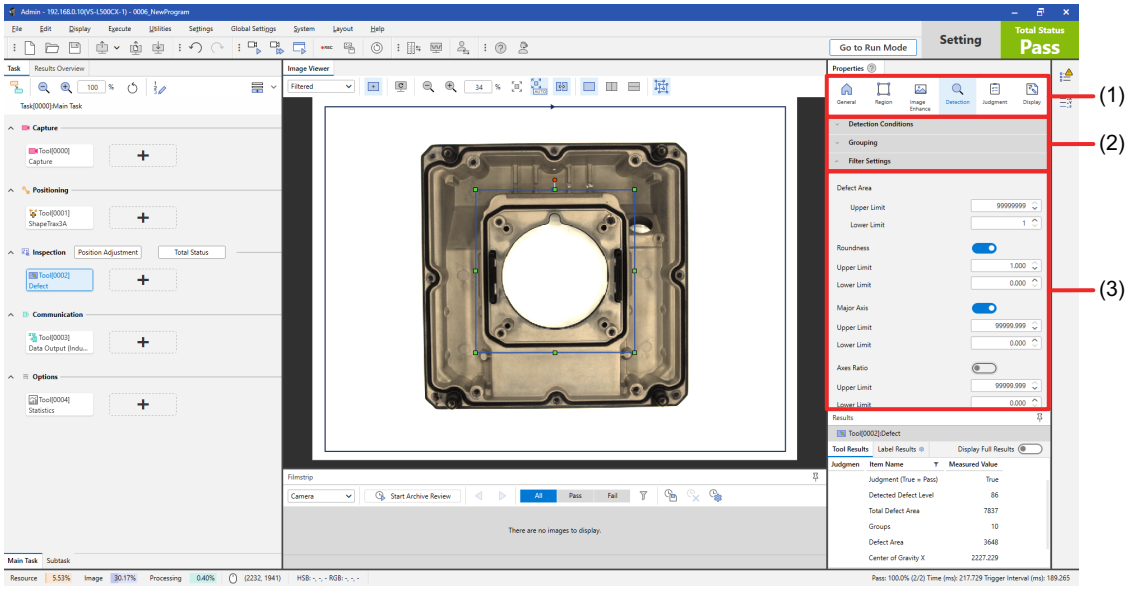
Reference For example, if you change the size of the inspection region in the [Properties] view, the size of the frame representing the inspection region displayed in the camera image in the [Image Viewer] will change. Conversely, modifying the frame of the inspection region in the [Image Viewer] will change the values of the setting item in the [Properties] view accordingly.

See the "Properties" section of each tool/task/group for more details on the setting items.

Screen Layout

#K002

The settings displayed in the [Properties] view vary depending on what you select, but the view's screen layout and basic operations are the same. This section explains the screen layout and the common operations.



(1) Tab

Setting items are categorized by category. You can click on the corresponding category tab to access the desired settings. The tab selected by default will vary depending on the selection target.

(2) Accordion Menu

Accordion menus are displayed within setting categories. Click the [V] button at the left end of the menu to expand the accordion menu and display the setting items. The accordion menu expanded by default will vary depending on the selection target.

(3) Setting Items

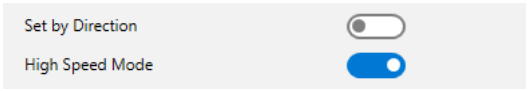
Setting items are displayed when you expand the accordion menu.

Point

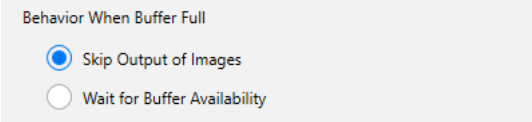
- The names and values of setting items with errors are shown in red.
- If an error occurs within the dialog for setting the details, the button name will be shown in red.

The following interfaces are available depending on the setting items:

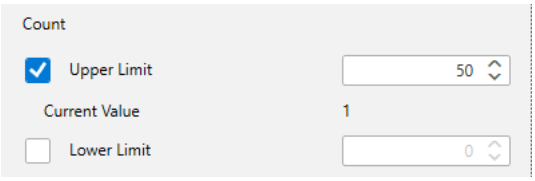
- Toggle switch: Used for settings that are simply turned ON/OFF or enabled/disabled.



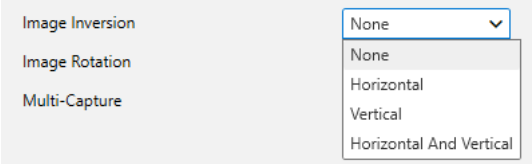
  - OFF or disabled: The ● is on the left side and the toggle switch is grayed out.
  - ON or enabled: The ● is on the right side and the toggle switch is shown in blue.
- Radio buttons: Select only one from multiple available options. The radio button for the selected item is shown in blue.



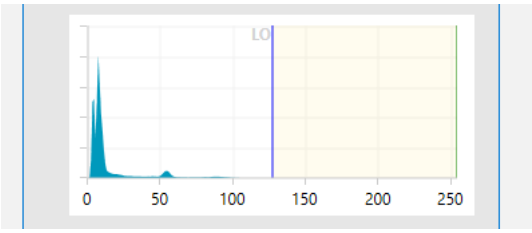
- Check box: Select one or more from multiple available options. The check boxes for the selected items will be selected.



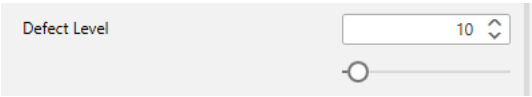
- Drop-down menu: Select only one of the menu items.



- Bar: For items for which the threshold value can be set visually, such as image enhancement binarization, you can set the value by dragging and dropping the bar representing the threshold value to the left or right.



There is also the slider bar with which the value is set by sliding the knob left or right.



- Text box: Enter a string or number. Some items can reference setting parameters, result data, and cells.

For more details on how to set them, see "Properties Setting Method".

Properties Setting Method

#K003

You can enter a string or a number if the setting item is a text box. For some items, you can reference setting parameters and result data in the data list or cells in the Vision Dashboard instead of entering them directly. See the respective reference for information on each setting method.

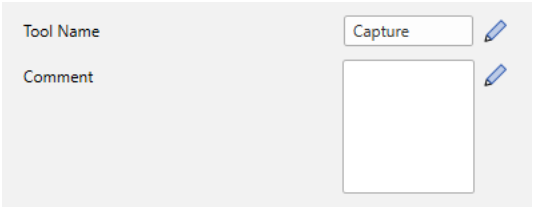
- Enter Text or Numbers Directly
  You can configure settings by directly entering text or numbers in the text boxes.
- Reference Setting Parameters/Result Data/Cells
  You can configure settings by referencing setting parameters and result data in the data list or cells in the Vision Dashboard instead of entering them into the text boxes.
- Dragging and dropping from the data list
  You can configure settings by dragging and dropping setting parameters or result data from the [Data List] view instead of entering them into the text boxes.

Enter Text or Numbers Directly

You can configure settings by directly entering text or numbers in the text boxes.

Enter Text

You can enter text in text boxes such as [Tool Name], [Comment], and [Registered String] in the OCR2 tool. Some items allow you to enter setting parameters, result data, and cell numbers directly.

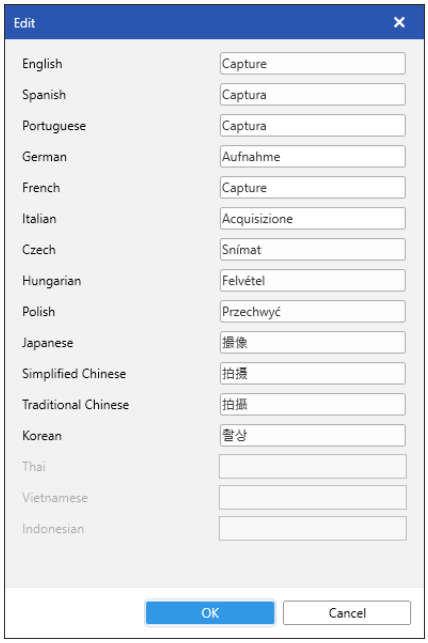


If there is to the right of the text box, clicking on it will open a dialog. Strings can be entered in the following languages, which are displayed when languages are switched with "Language".

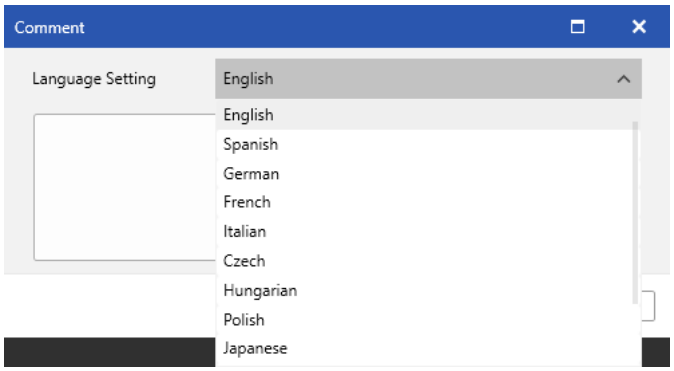
English/Spanish/Brazilian Portuguese/German/French/Italian/Czech/Hungarian/Polish/ Japanese/Simplified Chinese/Traditional Chinese/Korean/Thai/Vietnamese/Indonesian

There are two input methods for each language.

- When there is an input field for each language

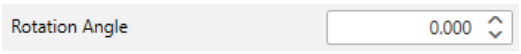


- By switching languages from the drop-down menu



Enter Numbers

You can enter numbers in text boxes such as [Width], [Height], [Rotation Angle], [Upper Limit/Lower Limit], and [Line Thickness]. You can also increase or decrease the numbers with ⇕. No strings can be entered in these text boxes.

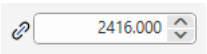


Reference Setting Parameters/Result Data/Cells

You can configure settings by referencing setting parameters and result data in the data list or cells in the Vision Dashboard instead of entering them into the text boxes.

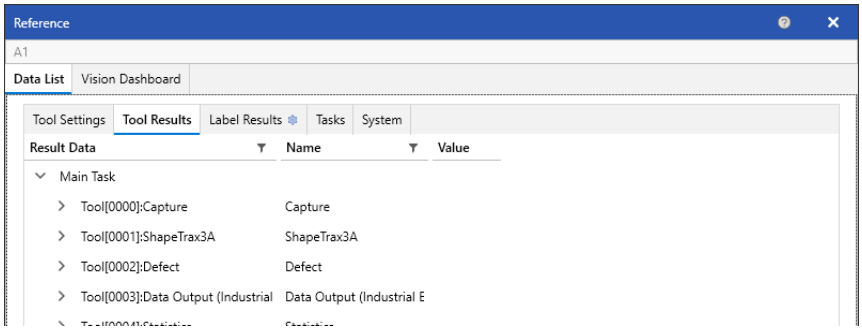
1 Hover the mouse cursor over a setting item.

The 🔗 (Reference) icon appears to the left of the text box.



2 Click the 🔗 icon.

The [Reference] dialog appears.

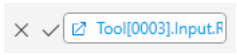


3 Click the tab according to the item you wish to reference.

- Setting parameters: Click the [Data List] tab → [Tool Settings] tab. The list of setting parameters is displayed.
- Result data: Click the [Data List] tab → [Tool Results] tab. The list of result data is displayed.
- Cells: Click the [Vision Dashboard] tab. The Vision Dashboard is displayed.

4 Select the item you wish to reference.

The name of the selected setting parameter or result data, or the cell number of the selected cell is displayed in the text box.



Point When referencing cells, you can set a series of text boxes by selecting multiple cells. You can also select non-adjacent cells.

Reference If you uncheck the [Open the dialog when the link button is pressed] check box in the [Reference] dialog, the [Reference] dialog will not appear the next time you click the icon. The text box will appear as shown below.

In this case, you can set the reference by directly selecting a setting parameter or result data in the [Data List] view or a cell in the [Vision Dashboard] view.

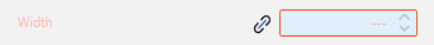
- Select the item you wish to reference and click the icon to confirm the setting.
  - –If you have referenced a setting parameter or result data, the text box will appear in light blue and the current number will be shown in gray.
  - –If you have referenced a constant cell, the text box will appear in light blue and the cell number will be shown in black. Changes to either cells or properties will reflect to each other.
  - –If you have referenced a formula cell, the text box will appear in light blue and the cell calculation result will be shown in gray.
- Click the icon to cancel the setting.
- Click the icon in the text box to open the [Reference] dialog.

5 Click the [OK] button.

The reference relationship is now confirmed. The text box turns light blue and displays the value of the referenced item.

Point

- In the following tools, the text box will not appear in light blue even if you set the reference relationship. The name of the setting parameter or result data, or the cell number is displayed instead of a number.
  - –Data Input (Industrial Ethernet) Tool
  - –Data Output (Industrial Ethernet / Non-Procedural / FTP/Storage) Tool
  - –Statistics Tool/Yield Rate Tool/Data History Tool
- After the reference relationship has been confirmed, clicking the ✕ icon that appears when the mouse cursor is placed over the setting item will cancel the reference relationship.
- When a number cell is referenced, changes to either cells or properties will reflect to each other.
- When a formula cell is referenced, changes to cells will be reflected to properties but you cannot make changes to the properties.
- A setting error will occur when the data types do not match. The name of the setting item is displayed in red, and "-" appears in red in the text box.



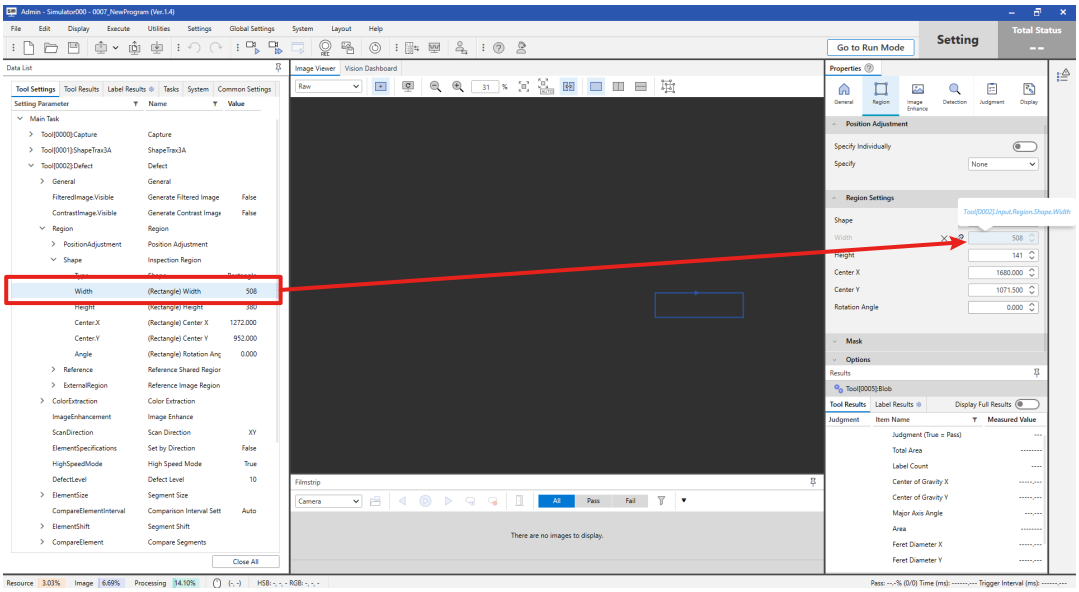
- Numbers shown in gray cannot be changed. Any changes to the referenced item will be reflected in the properties.
- Clicking the 🔗 icon to the left of the text box will return you to step 2.

Reference

After the reference relationship has been confirmed, placing the mouse cursor over the text box will display the referenced setting parameter, result data or cell number in a tooltip.

Dragging and dropping from the data list

You can configure settings by dragging and dropping setting parameters or result data from the [Data List] view instead of entering them directly into the text boxes.



1 Drag and drop a setting parameter or result data from the [Data List] view into the text box of the setting item in the [Properties] view.

The setting is now confirmed. The text box will appear in light blue and the current number will be displayed in gray.

Point

- If the mouse cursor changes to a ⃠ (Forbidden) mark when you drag and drop, it means that the data types do not match and you cannot use it.
- In the following tools, the text box will not appear in light blue because they do not reference a value. The name of the setting parameter or result data is displayed instead of a number.
  - –Data Input (Industrial Ethernet) Tool
  - –Data Output (Industrial Ethernet / Non-Procedural / FTP/Storage) Tool
  - –Statistics Tool/Yield Rate Tool/Data History Tool
- If there are multiple setting parameters or result data you wish to reference, you can drag and drop multiple selected items at once. However, the names of setting items whose data types do not match are displayed in red and cannot be set.
- Numbers shown in gray cannot be changed. Any changes to the referenced item will be reflected in the properties.
- Hovering the mouse cursor over a setting item displays the × icon, and clicking it restores the state before the setting.

Reference

- Click the 🔗 icon to the left of the text box to open the [Reference] dialog. This dialog displays the same content as the [Data List] view.
- Placing the mouse cursor over a text box will display the name of the setting parameter or result data in a tooltip.

Chapter 12 Error Check

Setting errors that are currently occurring are listed in the [Error Check] view. You can check the source and details of setting errors, identify the tool that caused the error on the [Task] view, as well as jump from the error code to the appropriate section of the user's manual (this document).

Overview of Functions

#L001

The [Error Check] view is normally iconized and stored in the left Sidebar (auto-hide state). Click [Error Check] in the sidebar to display the [Error Check] view on the main screen. The [Error Check] view provides the following functions:

- The source, error code, and details of the setting error that is currently occurring are displayed (→ "Error List").
- Selecting a setting error and clicking the [Jump to Source] button will select the error source tool on the [Task] view (→ "Jump to Source").
- Clicking on an error code takes you to the corresponding section of the User's Manual (this document) (→ "Error Code").

Reference A setting error is a condition in which the tool or function being set cannot function properly because of invalid setting values. For example, it can occur in the following cases:

- When an invalid tool is referenced for the region tool
- When the tool specified in the position adjustment setting has a reference error
- When the library file set in the OCR2 tool does not exist
- When the code type is not set in the 1D/2D Code Reader tool

Setting Error Display in Other Views

When a setting error occurs, an error display in the pertinent part in the error source tool will also appear in the views below:

- [Properties] view: Displays the name of the setting item and the value of the text box in red (→ "Properties").
- [Task] view: Displays the (Setting Error) icon in the tool (→ "Task").

Error Occurrence

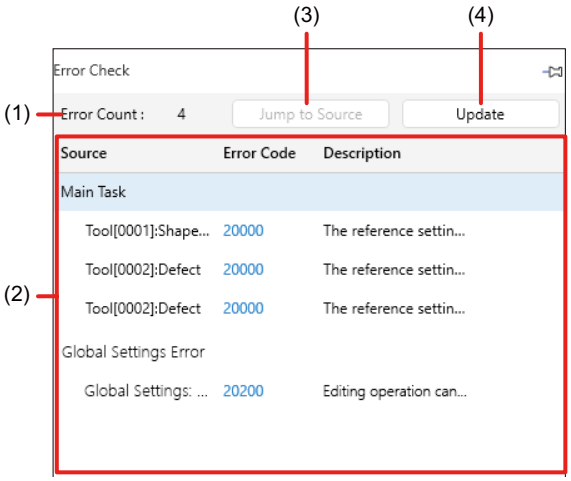
The following errors can occur with VS Cameras. For details on errors other than setting errors, see the corresponding references in "Appendix" - "Error Code List."

- System Error (Error Code: 10000 to 19999)
- Setting Error (Error Code: 20000 to 29999)
- Setting Failures (Error Code: 30000 to 39999)
- Execution Error (Error Code: 40000 to 49999)

Screen Layout

#L002

This section explains the screen layout and operations of the [Error Check] view.



(1) Error Count

The total number of setting errors that are currently occurring.

(2) Error List

The source, error code, and details of the setting error are displayed row by row.

Source

The name of the task where the error occurs is displayed as a "heading". The name of the tool with the setting error is displayed directly under the task.

Point If an error occurs in the Global Settings, [Global Settings Error] is displayed at the same level as the task and the setting name is displayed at the same level as the tool, respectively.

Error Code

The error code of the setting error that is currently occurring is displayed. Clicking on the error code will open a dialog with the corresponding troubleshooting in the manual.

Description

The error message and the name of the setting parameter are displayed.

(3) Jump to Source

Selecting a setting error and clicking the button will select the error source tool on the [Task] view.

Reference You can also double-click a setting error to select the corresponding tool.

(4) Update

Click to update the error list. The error list is automatically updated when program settings are loaded. If you have resolved an error, you can check whether the error has been removed from the list by updating it manually.

Chapter 13 Control/Data Output

The VS Series uses terminals and industrial Ethernet and non-procedural communication to control devices and output data related to image processing.
This section provides an overview of control and data output on the VS Series and explains the control and data output methods via terminals/industrial Ethernet as well as commands.

Overview of Control/Data Output Settings

#M001

The VS Series supports multiple interfaces and performs device control and data output based on functions assigned to terminals or bit/byte regions.

Control Methods/Interfaces Available in the System

The VS Series supports the following methods for control and data output.

External Terminal (Power I/O Interface)

The system supports input and output of data assigned to each terminal of the power I/O interface.
→ Control/Data Output via External Terminals

EtherNet/IP

The system supports input of data from PLC devices and output of data assigned to the bit region/byte region with cyclic communication or message communication via EtherNet/IP.
→ Control/Data Output via EtherNet/IP

PROFINET

The system supports input of data from PLC devices and output of data assigned to the bit region/byte region with data I/O communication or record data communication via PROFINET.
→ Control/Data Output via PROFINET

PLC-Link

This communication method can input/output data assigned to the byte region with PLC devices directly to the DM (data memory) of the connected PLC.
→ Control/Data Output via PLC-Link

Non-Procedural Communication

The system supports the input/output of data from/to external devices via non-procedural communication using the Ethernet interface.
→ Control/Data Output via Non-Procedural Communication

SD Card Output

You can output the result data and image data to the SD card in the VS camera.

FTP Client/Server Functions

You can output the result data and image data from the VS camera to the FTP server. In addition, by directly accessing the VS camera's internal storage or SD card from an external FTP client, you can send/receive/delete files and create/delete folders.
→ FTP Client/Server Function

Commands

The built-in commands are used for basic input/output operation and are provided by default. The commands can be issued via Industrial Ethernet or non-procedural communication to control this device and output data.

→ Control via Commands

The Flow for the Control and Data Output Setting

This section shows the typical flow for setting the system control and data output. For more details on the description and setting procedures of each interface, refer to the sections describing the individual interface.

Selecting an Interface

Select an interface and communication mode according to the purpose.

Typical selection examples

To perform trigger inputs or total status outputs at high speed

– Power I/O Interface

To easily achieve command control and data output with a PLC

– EtherNet/IP Interface
– PROFINET Interface
– PLC-Link Interface

> **Point** EtherNet/IP, PROFINET, and PLC-Link are mutually exclusive and cannot be used simultaneously.

To communicate with a PC

– Ethernet Interface (Non-procedural communication, FTP output)

Changing the Interface and Communication Mode Settings

In the [Global Settings] menu or [Connect to Device] screen, change the settings according to the interface and communication mode to be used.

Ethernet interface

Set the basic parameters such as the VS camera's IP address and port numbers to be used.
→ Network Settings, Non-Procedural Communication Settings, Target FTP Settings, HTTP Settings, Device's FTP Server Settings, OPC UA Settings, DNS Server Settings

EtherNet/IP interface

Set the EtherNet/IP communication settings, function assignment to bit addresses, etc.
→ Industrial Ethernet Settings

PROFINET interface

Set the PROFINET communication settings, function assignment to bit addresses, etc.
→ Industrial Ethernet Settings

PLC-Link interface

Set the PLC link communication settings, addresses, etc.

→ Industrial Ethernet Settings

Power I/O Interface

Assign the terminal control functions to terminals and set the output time and other items.
→ Terminal I/O Settings

Changing the Data Output Settings of the VS Camera

To output data, change the settings of the data output tool and image output tool for the interface to be used.
→ Communication
It may not be possible to set data input/output if the Global Settings have not been set properly beforehand.

Control/Data Output via External Terminals

This section describes the device control and data output through the external terminals (power I/O interface) of the VS camera.

Overview of Control/Data Output via External Terminals

#M002

The VS camera is equipped with a power I/O connector (OUT3 pin, IN1 pin, and IN/OUT2 pin (switched by setting)) as its external terminal.

Functions available with the external terminals

In addition to supplying a 24 V power supply to the device, the terminals can offer the following control input/output and data output functions when assigned with relevant functions:

- **Control**: Controls capture-related operations such as triggers, and other operations such as resets.
- **Status**: Outputs the status of the unit, such as "error".
- **Total Status Output**: Outputs the total status.

Operation Flow

Checking specifications/Wiring

Identify and wire the terminals to be used for data output/control.
Check the [Terminal I/O Monitor] dialog box to see if the wiring is correct.
→ Preparing External Terminal Connections

▼

Controlling/Outputting Data

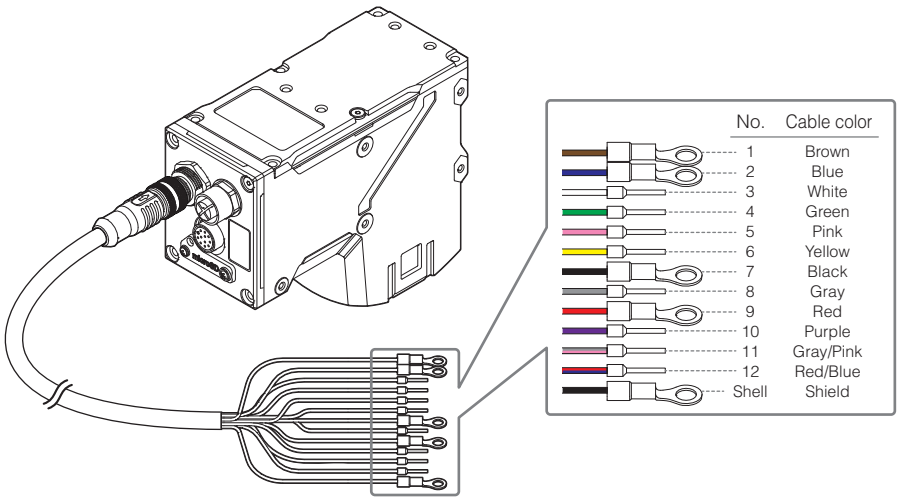
Assign functions to each terminal according to the purpose of control/data output, and set the Input Terminal Filter Length and the Output Type. External terminal settings are configured in [Terminal I/O Settings] in the [Global Settings] menu.
→ Controlling the VS Camera via External Terminals

Preparing External Terminal Connections

#M003

Checking the terminal assignment of the VS camera

The specifications of the power I/O connector are as follows.



Pin layout

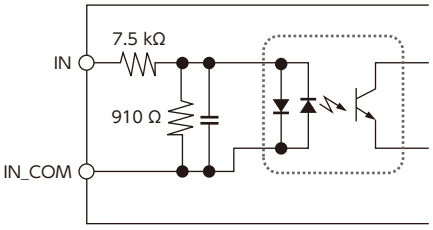
No.	Terminal name	Terminal explanation	Signal direction	Assigned default state	Cable color*1	Circuit diagram
1	24V	Power supply input: DC24V	-	-	Brown	-
2	0V	Power input: GND	-	-	Blue	-
3	IN_COM	Common for inputs	IN	-	White	Input
4	F_IN0	High-speed general purpose input 0	IN	Trigger	Green	Input
5	F_IN/OUT0	High-speed general purpose input/output 0	OUT(IN)*2	Trigger Ready	Pink	Input/ Output
6	F_OUT0	High-speed general purpose output 0	OUT	Pass	Yellow	Output
7	0V	Power input: GND	-	-	Black	-
8	F_OUT1	High-speed general purpose output 1	OUT	Fail	Gray	Output
9	24V	Power supply input: DC24V	-	-	Red	-
10	F_OUT2	High-speed general purpose output 2	OUT	Error0 Status	Purple	Output
11	F_IN/OUT1	High-speed general purpose input/output 1	OUT(IN)*2	Strobe	Gray/Pink	Input/ Output
12	OUT_COM	Common for outputs	OUT	-	Red/Blue	Output

*1: This is the cable color of the power supply I/O cables (2m/5m/10m) for high-performance cameras (OP-88810/OP-88811/OP-88812 (sold separately)).

*2: These can be switched by setting. The initial assigned value is OUT.

Wiring

Input circuit diagram

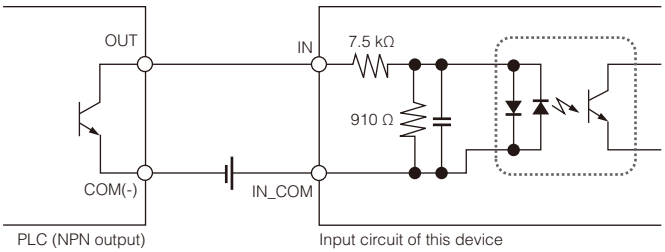


Reference The IN terminal to be connected depends on the assigned function.

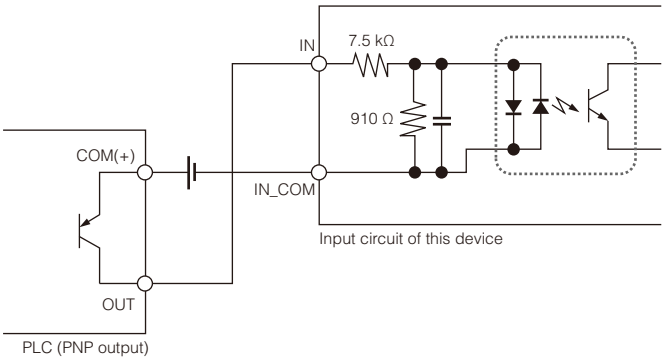
- Max. applied voltage: 26.4 V
- ON voltage: 19 V or greater
- ON current: 3 mA or greater
- OFF voltage: 5 V or less
- OFF current: 1 mA or less

Example of connections

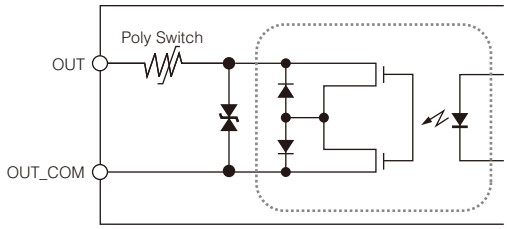
When connecting an NPN PLC output to the device's input



When connecting a PNP PLC output to the system input



Output circuit diagram



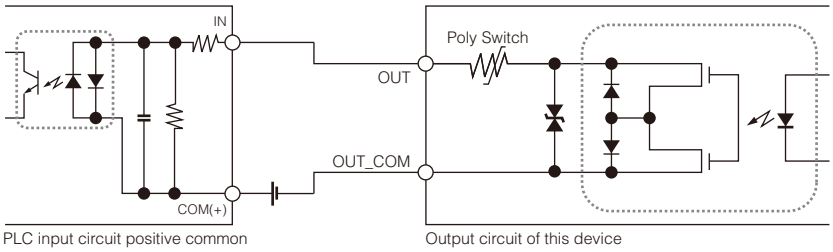
Reference The OUT terminal to be connected depends on the assigned function.

- Max. applied voltage: 30 V
- Max. sink current: 50 mA
- Leakage current: 0.1 mA or less
- Residual voltage: 1.4 V or less (50 mA), 1.0 V or less (20 mA)

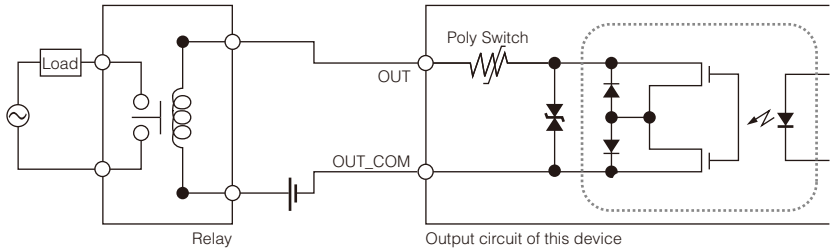
Point Since this device utilizes a photo MOSFET in the output elements, any one of the NPN inputs, or PNP inputs is connectable.

Connection example: when connecting this device's outputs via a positive common

When connecting the output from the device to a PLC with a positive common

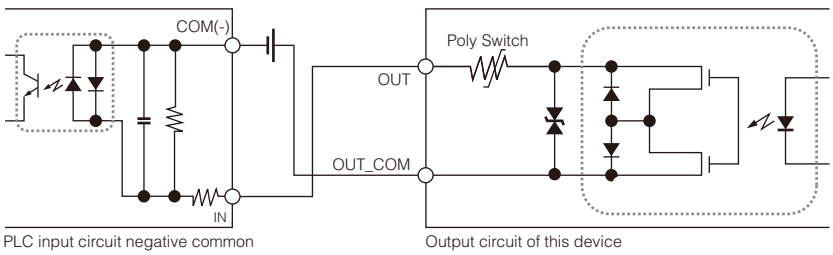


When connecting the output from the device to a relay

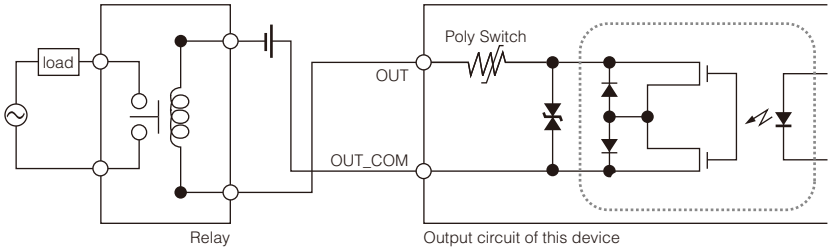


Connection example: when connecting this device's outputs via a negative common

When connecting the output from the device to a PLC with a negative common



When connecting the output from the device to a relay



Verifying the Wiring State Using the I/O Monitor

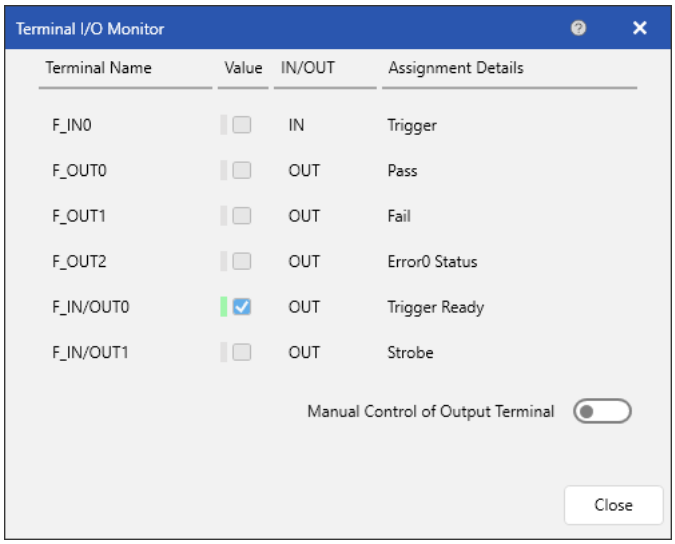
Check if the signal input to the VS camera and the signal output from the VS camera are performed correctly.

Checking the Input Signal

Input a trigger signal from the PLC or synchronization sensor to the VS camera and check that the trigger is correctly input.
You can check whether the trigger signal is correctly input to the VS camera on the terminal I/O monitor.

1 Switch to Setup Mode.
→ Change Mode

2 From the [Utilities] menu, click on [Terminal I/O Monitor].
The [Terminal I/O Monitor] screen appears.



3 Input a trigger signal from the PLC to the device and check that the [F_IN0] check box is selected. If the signal is correctly input from the PLC to the device, the check box will be selected.

Point If the signal input time is short, the screen refresh rate cannot keep up and the check box may not be selected even if the signal was correctly input. Input the signal for a sufficiently long amount of time.

4 Once you have confirmed that the data has been input correctly, click [Close] to close the dialog box.

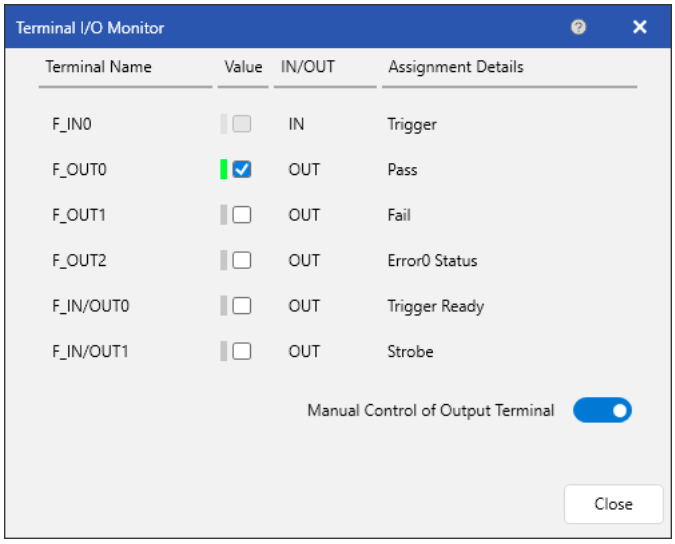
Checking the Output Signal

Check whether a signal is output correctly from the VS camera to the PLC. On the I/O monitor, forcibly output a signal output by the VS camera and check that you can recognize that signal on the PLC.

1 Switch to Setup Mode.
→ Change Mode

2 From the [Utilities] menu, click on [Terminal I/O Monitor].
The [Terminal I/O Monitor] screen appears.

3 Click on [Manual Control of Output Terminal] to enable it.
Ticking the [Value] field of each terminal will turn that terminal ON.



4 Check if the output signal of the ticked terminal can be recognized by the PLC.

5 Once you have confirmed that the data has been output correctly, click [Close] to close the dialog box.

Controlling the VS Camera via External Terminals

#M004

You can control the VS camera directly by assigning functions to the external I/O terminals. The following functions can be used for control for different purposes.

Reference
- Refer to "Changing the External Terminal Input/Output Settings" for information on assigning functions to each terminal.
- For timing charts related to the direct control, refer to "Timing Chart".

Functions Used for Direct Control

Inputting Trigger/Outputting Strobe Light

Trigger (Trigger Input)

You can input the trigger signal for the [Capture] tool that is waiting for a trigger, in sync with the rising edge.

Point
Trigger can only be assigned to the F_IN0 terminal.

Trigger Ready (Trigger Input Enabled)

It is output when trigger input is possible. When this output is off, the corresponding trigger input is ignored.

Flash 1 to Flash 5 (Output Strobe Light 1 to 5)

This is the strobe output for external lighting equipment. In the [Light] tab of the [Capture] tool, you can set the output start point, output time, etc. individually.

Outputting the Tool Tolerance Judgment

Pass (Total Status Pass)

High (1) is output when the tool's total status is True (Pass).

Fail (Total Status Fail)

High (1) is output when the tool's total status is True (Fail).

Strobe (Terminal Output Strobe)

This is the signal for synchronization of terminal outputs.

Result Request (Terminal Output Control)

This is the handshake signal for the terminal output.

Controlling VS Cameras

Trigger Disable (Trigger Acceptance Disabled)

High (1) disables the acceptance of triggers and stops the operation of the [Capture] tool.

Point

- [Capture] tools whose [Wait for Trigger Input] is disabled (i.e. captures in conjunction with the capture process regardless of the trigger signal) will also stop operating.
- If Trigger Disable is set to High (1) during a capture, the capture will continue until the necessary image capture is completed.
- When Trigger Disable is High (1), trigger inputs are disabled and no more new images are captured. If, however, unused images remain in the image capture buffer, the Capture tool continues operation. Therefore, even if Trigger Disable is set to High (1), the processing of the inspection itself may not stop for some time.

Reset (Reset Input)

Used to reset the VS camera (leading edge synchronization).

Point

- After Reset is input during tool execution, the Reset process is executed when the tool execution process enters the waiting state.
- The Trigger Ready output, which was High(1) while waiting for a trigger input, is forcibly set to Low(0) by the Reset process. After the Reset process is complete, the Trigger Ready output is set to High(1) when the Capture tool enters the trigger input waiting state.

Error0 Clear / Error1 Clear (Error 0 to 1 Clear Input)

This clears the state of Error0 or Error1 (Rising edge synchronization).

Output Disable (Disable Output)

High (1) disables archiving and stops subsequent outputs.

Point

- When Output Disable is High(1), data output to the buffer is disabled but images and data that are already in the output buffer are not cleared. Therefore, even if Output Disable is set to High(1), output may not stop for some time. Output is stopped when all stored images and data have been output.
- If Output Disable becomes High (1) during image/data output, the output will not be stopped.
- If Output Disable is High (1) just before the start of image/data output, the output is not performed. Once output is stopped, it does not start again even if Output Disable becomes Low (0) afterwards.
- When [Output Type] under [Terminal I/O Settings] is set to [Sync with STO], the updating of Pass/Fail is stopped and the current state is retained when Output Disable is High (1). The Strobe output executes a series of output operations to the end.

Go to Run (Switch to Run Mode)

High (1) switches the operation mode to Run Mode.

Go to Setting (Switch to Setup Mode)

High (1) switches the operation mode to Setup Mode.

Image Capture Buffer Clear (Clear Image Capture Buffer)

High (1) clears the image buffer capacity being used for the image capture buffer.

Point If Image Capture Buffer Clear becomes High (1) during a capture, the buffer will be cleared at the end of that Capture No.

Soft Event 0 to Soft Event 31 (Issue Soft Event 0 to 31)

High (1) issues a Soft Event.

Tool Buffer Clear

Clears the buffers of various tools.

Reset Output Data

Initializes the output terminal and clears the output region of the industrial Ethernet to 0. Also clears the buffer for data output. The items to be initialized are shown below.

- Output terminal:
  - Pass
  - Fail
  - Output Data Buffer Status
- Output region of the industrial Ethernet:
  - Pass
  - Fail
  - Result Ready
  - Output Data Buffer Status
  - Program Storage
  - Program Number
  - Total Count
  - Tool Judge
  - Output Data
- Data output:
  - Terminal
  - Industrial Ethernet
  - Non-procedural communication
  - FTP
  - Storage

Point The buffer for image output is not subject to clearing.

Checking the VS Camera Status

Error0 Status/Error1 Status (Status of Error0/Error1)

This is output when an error occurred due to the cause assigned to Error0 or Error1. The assignment to Error0/Error1 for each error cause can be changed in [System Error Settings] in the [Global Settings] menu.

Run Status (Output Run Status)

It outputs the current operation mode of the VS camera (0: Setup Mode, 1: Run Mode).

Camera Exposure Busy (Camera exposure in progress signal)

It outputs High (1) when the VS camera is in the middle of an exposure.

Output Image Busy

Output High(1) when images are being output.

Output Data Buffer Status

Output High(1) when data remains in the data output buffer.

Output Data Busy

Output High(1) when data is being output.

Output Image Buffer Status

Output High(1) when images remain in the image output buffer.

Processing Status (Flow processing)

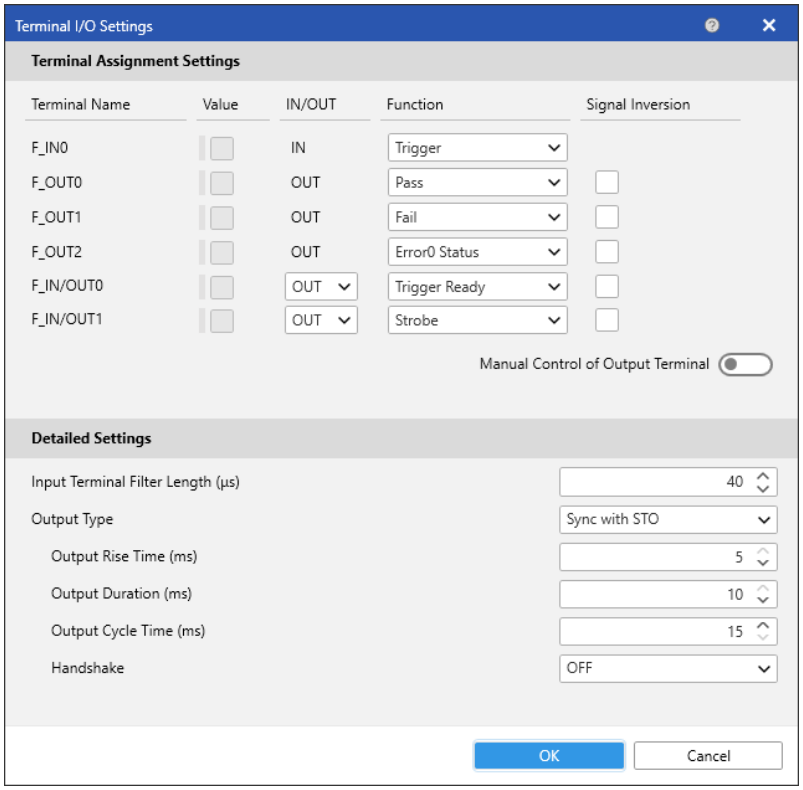
It outputs High (1) when image processing is in progress (from task or capture start to task completion). Low (0) will be output during image/data output.

Changing the External Terminal Input/Output Settings

In [Terminal I/O Settings] of the [Global Settings] menu, change the settings related to the assignment of functions and input/output for each terminal.

1 Select [Terminal I/O Settings] from the [Global Settings] menu.
The [Terminal I/O Settings] dialog box will appear.

2 If necessary, change the settings related to the assignment of functions and input/output for each terminal.
→ Layout of the Screen

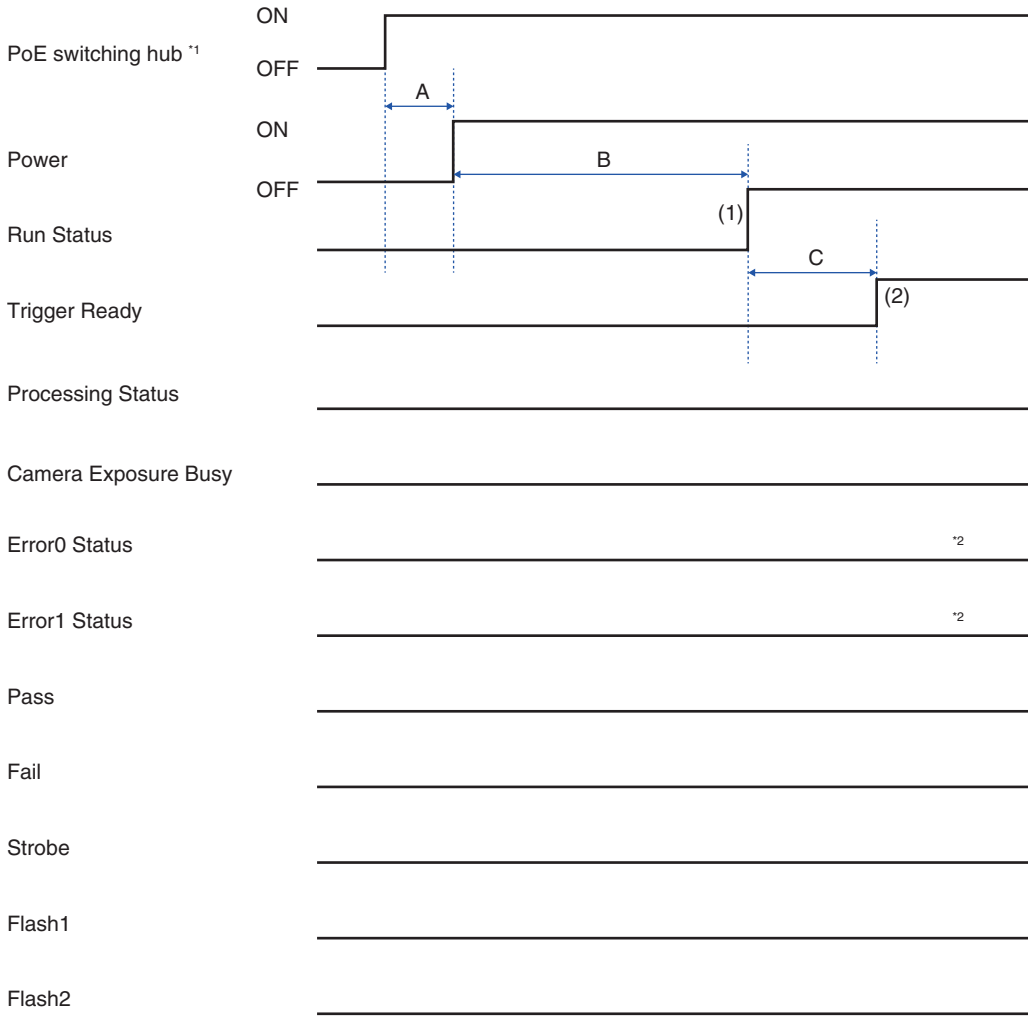


3 When settings are complete, click [OK].
This saves the settings and closes the dialog box.

Timing Chart

#M005

Typical operations at startup



A: 1 sec or longer, B: 30 sec or longer, C: 5 ms or longer

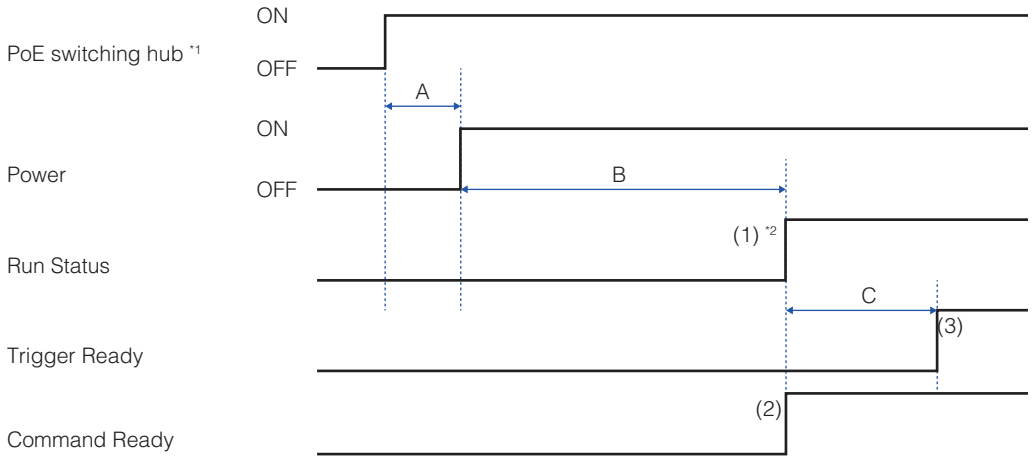
(1) If [Startup Mode Setting] is set to [Setup Mode], Run Status will remain OFF.
If [Startup Mode Setting] is set to [Run Mode], Run Status will turn ON after startup.

(2) When the first Capture tool is executed, Trigger Ready turns ON.
After Trigger Ready turns ON, the input of Trigger is accepted.

*1: Waveform when started with the PoE power supply. When started up with a 24V power supply, Power will turn ON directly.

*2: This is the waveform when no system error occurs at startup. If a system error occurs immediately after startup is completed, Error Status will turn ON.

Typical Operation at Startup (When EhterNte/IP, PROFINET is Used)



A: 1 sec or longer, B: 30 sec or longer, C: 5 ms or longer

(1) If [Startup Mode Setting] is set to [Setup Mode], Run Status will remain OFF.
If [Startup Mode Setting] is set to [Run Mode], Run Status will turn ON after startup.

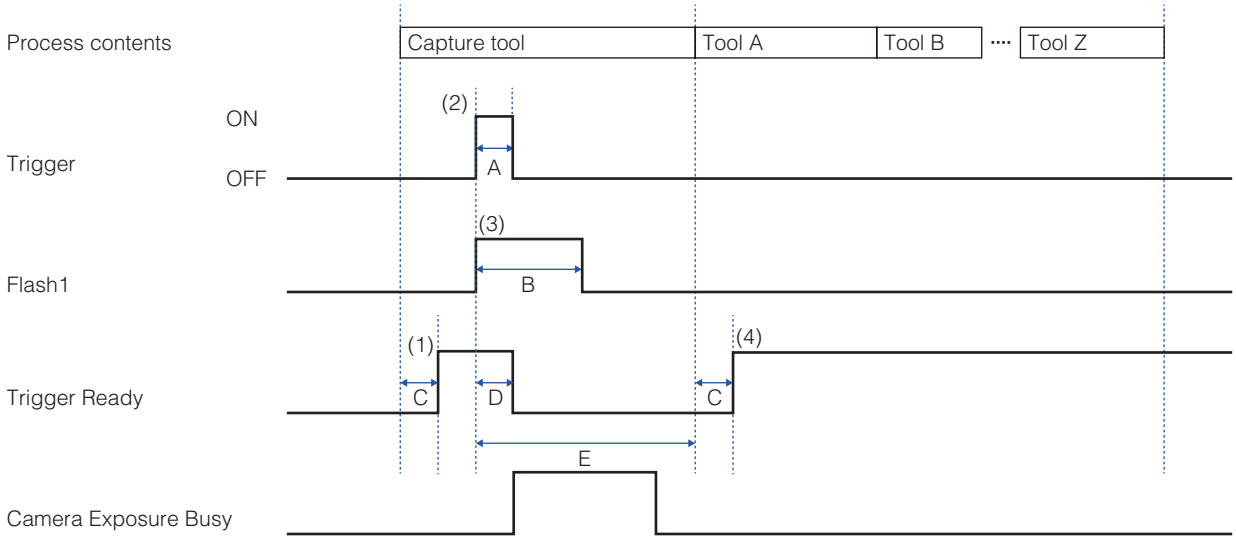
(2) Command Ready turns ON when it is already possible to receive commands. If [Startup Mode Setting] is set to [Run Mode], Command Ready turns ON after Run Status turns ON.

(3) When the first Capture tool is executed, Trigger Ready turns ON.
After Trigger Ready turns ON, the input of Trigger is accepted.

*1: Waveform when started with the PoE power supply. When started up with a 24V power supply, Power will turn ON directly.

*2: This is the waveform when EtherNet/IP or PROFINET is used. Timing is different from the Run Status output by I/O terminals.

Typical operations with a single trigger (When the image capture buffer is reserved for one fixed image)



A: Minimum trigger input time	1 ms or more
B: Flash output time	Depends on setting
C: Trigger Ready rising response delay	0 ms to 5 ms (Delay time varies depending on tool settings)
D: Trigger Ready falling response delay	1 ms or less

E: Image capture/transfer time (depends on Capture tool settings)

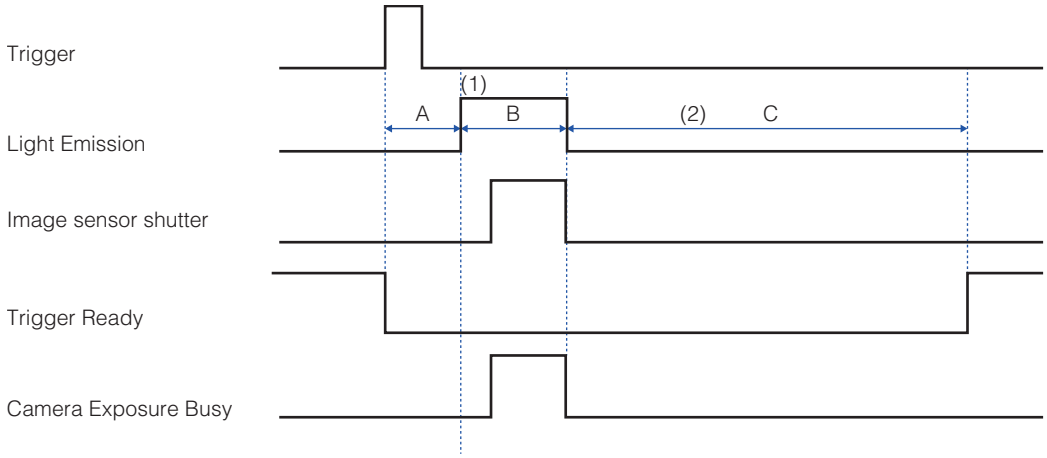
(1) When the process moves to the Capture tool for the first time after the power is turned on, the image capture buffer operation starts. Trigger Ready turns ON and the device starts waiting for a trigger input.

(2) The input of Trigger is accepted while the Trigger Ready output is ON. When a trigger is input, an image is captured and transmitted by the camera. Trigger Ready turns OFF during this time.

(3) The trigger input turns on FLASH for the specified duration (can be changed with setting). See "Image capture and FLASH output timing for the trigger operation" for details.

(4) If there is free space in the image capture buffer after the capture/transfer process is completed, Trigger Ready turns ON even during image processing, allowing for the next trigger to be input.

Typical operation when using overdrive lighting with the capture tool



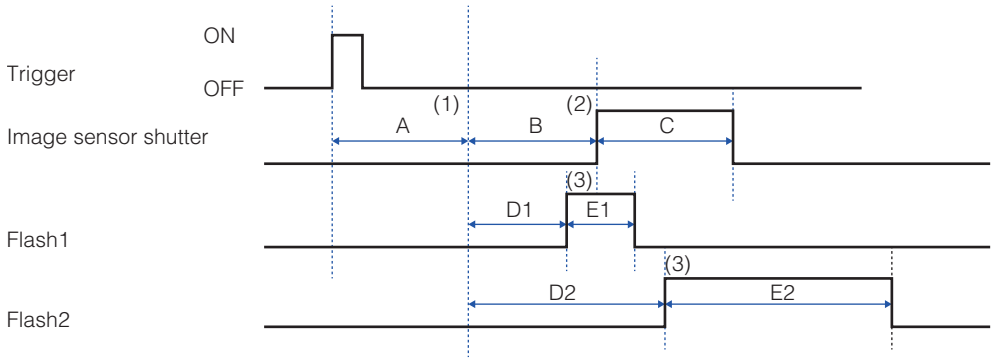
A: Trigger delay time, B: Lighting time, C: Lighting disabled time

(1) The lighting duration depends on the camera model and capture settings and is calculated automatically.

(2) After overdrive lighting, the lights are disabled only for the time required for heat dissipation and charging of the lights. During this time, Trigger Ready is turned OFF and the trigger input is ignored.
The lighting disabled time depends on the lighting time, overdrive factor setting, and camera's power supply method (24V power supply/PoE power supply) and is automatically calculated.

Image capture and FLASH output timing for the trigger operation

The timing at which the lights actually emit light with respect to the timing at which the Flash output of this device rises varies depending on factors such as the response time of the lights used.



A: Trigger delay time + 60 µs (normally open) or 200 µs (normally closed) (response delay 0 to 5 µs)

B: Exposure delay time

C: Exposure time

D1, D2: Lighting delay time

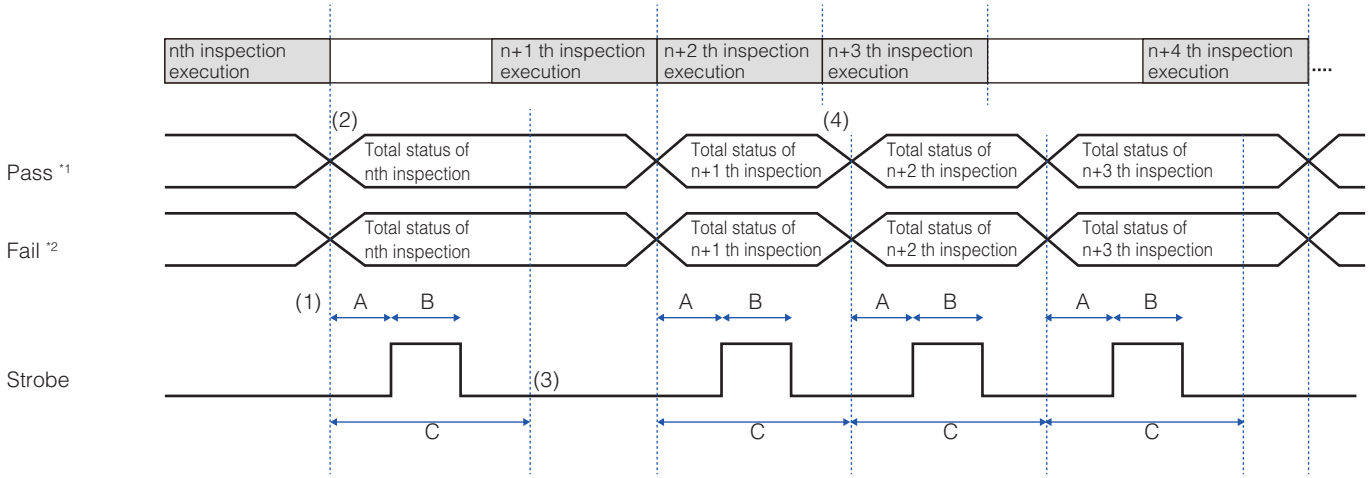
E1, E2: Output time settings

(1) After accepting the Trigger input, the image sensor's exposure timing and Flash output timing operations are started based on the trigger delay setting time.

(2) Exposure of the image sensor starts after the set trigger delay time + exposure delay time has elapsed.

(3) Flash output will start after the set trigger delay time + lighting delay time has elapsed.
The Flash output time is the length of time the Flash output is turned on.
The lighting delay time and Flash output time can be set with respect to each Flash output.

Pass/Fail Operations (Sync with STO)



A: Output rising time, B: Output time, C: Output cycle time

(1) When [Output Type] under [Terminal I/O Settings] is set to [Sync with STO], the Strobe output turns ON when the Pass/Fail output is updated. Time A to C can be changed with settings.

(2) When the main task inspection is completed, the total status is output to Pass and Fail.

(3) If the next inspection is not completed within the output cycle time (C) after starting the Strobe output operation, the Pass/Fail output is retained and waits for the next inspection to be completed.

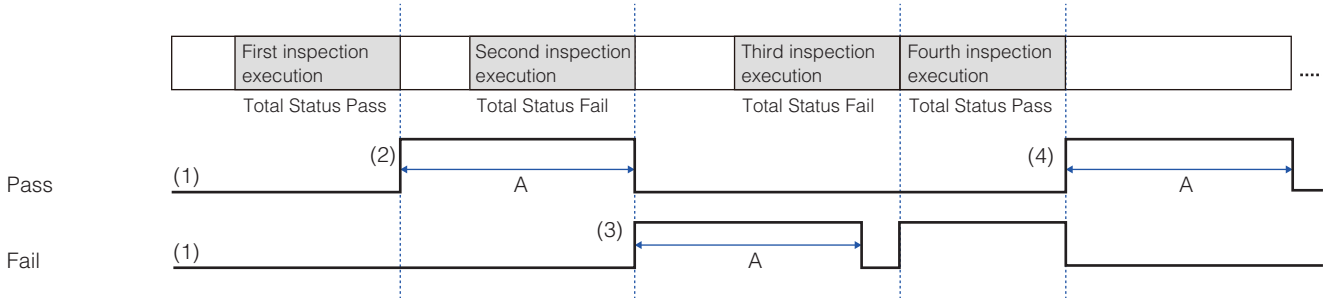
(4) If the next inspection is completed before the output cycle time (C) elapses after starting the Strobe output operation, the Pass/Fail output is updated after the output cycle time (C) has elapsed.

*1: OFF: Fail/Not judged yet, ON: Pass

*2: OFF: Pass, ON: Fail/Not judged yet

Pass/Fail Operations (One Shot)

Strobe is not output when [One Shot] is selected.



A: One shot time

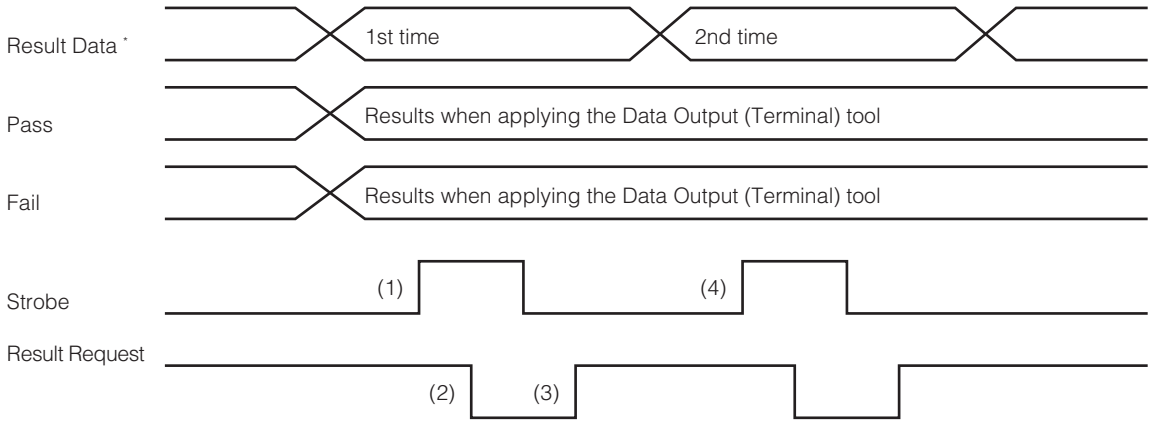
(1) When the total status is not judged yet, both Pass/Fail are OFF.

(2) When the total status is Pass, the Pass output will be ON for the time specified in the one shot time setting from the end of the inspection.

(3) When the total status is Fail, the Fail output will be ON for the time specified in the one shot time setting from the end of the inspection.

(4) If the next inspection is completed before the one shot output completes, Pass/Fail are updated immediately after the completion of the next inspection.

Pass/Fail Operations (With Handshake)



(1) The first data is output to the terminal to which Result Data* is assigned.
Output the total status (Pass/Fail) when executing the data output (terminal) tool (when storing in the buffer).
Once the data is output, Strobe rises.

(2) Strobe is lowered at the fall of Result Request.

(3) At the rising edge of Result Request, Result Data* and the total status (Pass/Fail) switch to the next output data.

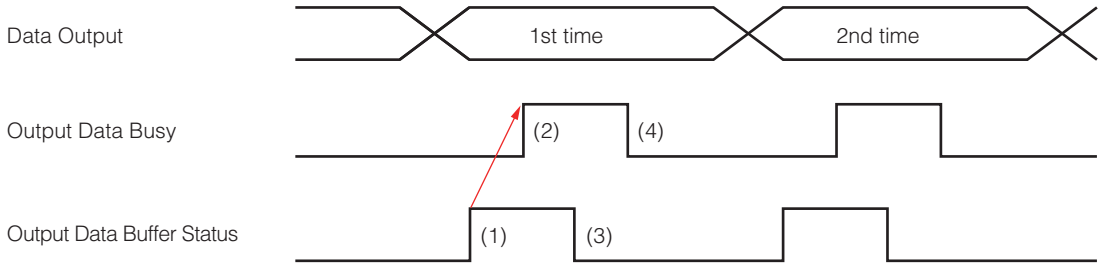
(4) When the data has switched, Strobe rises.

(5) Thereafter, repeat (2) through (4).

Busy Operations

Both terminals and Fieldbus operate in the same way.

Data



(1) When measurement is performed, the data to be output is stored in a buffer and Output Data Buffer Status rises.

(2) To move data from the buffer to another output buffer for output, Output Data Busy rises.

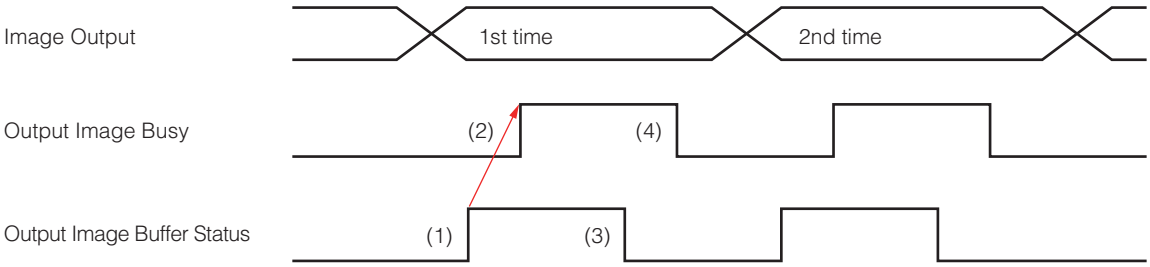
(3) Once the data has been moved to the output buffer, the buffer becomes empty and Output Data Buffer Status is lowered.

(4) Once the data has been output, Output Data Busy is lowered.

(5) Thereafter, repeat (1) through (4).

* Even if data is not output using Data Output Tool, Output Data Buffer Status rises for total judgment output.

Image



(1) When image output tool is performed, the image to be output is stored in a buffer and Output Image Buffer Status rises.

(2) To start outputting the image stored in Output Image Buffer Status, Output Image Busy rises.

(3) Once the image has been output, the buffer becomes empty and Output Image Buffer Status is lowered.
Output is complete at the same time, and Output Image Buffer Status is lowered.

(4) Once the image has been output, Output Image Busy is lowered.
The buffer becomes empty at the same time, and Output Image Buffer Status is lowered.

(5) Thereafter, repeat (1) through (3).

Control/Data Output via EtherNet/IP

This section describes device control and data output via EtherNet/IP.

Overview of Control and Data Output via EtherNet/IP

#M006

This is an open industrial communication standard developed and maintained by the ODVA (Open DeviceNet Vendor Association, Inc.). This device is compliant with the conformance test Version.CT19. The EtherNet/IP functions supported by this device are as follows:

Fixed-cycle Communication (Implicit)

Cyclic communication at RPI (Request Packet Interval) communication cycle intervals allows high-speed control at intervals of several ms to several tens of ms (implicit communication). It is easier to write PLC programs because you can control the VS camera by referencing and updating the variables and devices in the PLC without considering communication.

Controlling the VS camera

Commands can be instructed via cyclic communication and used to control the VS camera.

Outputting data

The [Data Output (Industrial Ethernet)] tool allows you to set the data to be output to the bit region/byte region, and output the data with cyclic communication.

Inputting Data

Using the [Data Input (Industrial Ethernet)] tool, you can reference the byte region data input from the PLC from the setting parameters of other tools and the Vision Dashboard.

I/O control

You can assign control-related functions to the data sent/received via cyclic communication and input/output them in the same way as the power supply I/O connector.

Point

- Settings for fixed-cycle communication, such as cycle (RPI), data size, timeout time, and send trigger are performed on the PLC-side. When using cyclic communication with the VS camera, set the RPI to a value of 5 ms or more. Also, when selecting COS (Change of State) using a PLC (Keyence KV-3000/5000/5500/7300/7500/8000, KV-Nano, etc.) where the send trigger can be selected, set the Inhibit Time will be 5 ms or more.
- Even when RPI has been set to 5 ms or more, the VS Camera may exhibit processing delays and communication may temporarily time out or disconnect when used with other communications such as device measurement setting, commands or FTP. When this occurs, review the cyclic communication settings and use conditions. Be sure to perform verification of the performance before actual operation.
- When there are multiple devices connected together on the network that includes EtherNet/IP devices, there can be a heavy load on the network which may result in constant/temporary communication delays or packet losses. Perform a thorough verification before operation.
- EtherNet/IP cannot be used at the same time with other communication protocols.

Explicit Message Communication

This function can be used for communication applications that do not require punctuality like that of implicit fixed-cycle communication (Explicit message). It can be used when performing EtherNet/IP communication with a PLC that does not support implicit fixed-cycle communication (such as the SLC5/05 series).

Operation Flow

#M007

Control/data output via EtherNet/IP is performed as follows.

Checking specifications

- Check if the PLC to be connected is a model which supports EtherNet/IP connection.
- Check the assignment status of input and output data.

→ Preparing EtherNet/IP connection

▼

Changing EtherNet/IP settings

Configure the settings for EtherNet/IP communication between the device and the PLC.
Main setting items: PLC type, cyclic communication data size, input/output data assignments

→ Changing EtherNet/IP settings

▼

Establishing the EtherNet/IP link

Supply power to the device and initiate EtherNet/IP cyclic communication. You can check whether a link has been established with cyclic communication from the [Utilities] menu - [Industrial Ethernet Communication Monitor] - [Communication Status].

▼

Executing necessary processing

Data output

Measurement result data assigned to the data output region can be output to the PLC.

- The measurement result data is written to the data output region assigned by the [Data Output (Industrial Ethernet)] tool and sent to the PLC.
- Result Ready (data transmission complete) turns ON and the PLC is notified that data has been transmitted.
- Completion of data reading by the PLC will be notified to this unit by Result Ack (data read complete) becoming ON.

→ Outputting measurement data via cyclic communication of EtherNet/IP (Data Output)

Data input

You can assign data in the data input region from the PLC to the setting parameters of respective tools and cells of the vision dashboard.
You can load the input data received from the PLC at the timing when the data input tool is executed and reference them as measurement parameters in each tool.

I/O control

With assignment of the function related to the terminal control, the I/O control can be used.

→ I/O Control via cyclic communication of EtherNet/IP

Command control

The command specified by the PLC can be executed.

- When Command Request (command execution) ON is received, the command specified by Command Number is executed with Command Parameter as argument.
- When command execution is complete, Command Complete (command execution complete) turns ON to notify the PLC that the command has been executed.

→ Controlling the VS Camera via cyclic communication of EtherNet/IP (Command Control)

Preparing EtherNet/IP connection

#M008

Model compliant with EtherNet/IP connection

For details of the setting procedures for each PLC, refer to the instruction manual provided with the PLC.

Keyence Corporation PLC

PLC type	EtherNet/IP Communication unit	Version of firmware
KV-3000	KV-EP21V	Ver.2 or later
KV-5000	KV-EP21V	Ver.2 or later
KV-5500	- (Built-in port in the unit or KV-EP21V)	Ver.2 or later
KV-7300	KV-EP21V	-
KV-7500	- (Built-in port in the unit or KV-EP21V)	-
KV-8000	- (Built-in port in the unit or KV-EP21V)	-
KV Nano	KV-NC1EP	Ver.1 or later

Rockwell Automation, Inc. PLC

ControlLogix type PLC

PLC type	EtherNet/IP Communication unit	Version of firmware
1756 ControlLogix	1756-ENBT, 1756-EN2T	Ver.13 or later
	1756-L81E	Ver.32 or later
1769 CompactLogix	- (Built-in port in the unit)	Ver.32 or later

SLC5/05 type PLC

PLC type	EtherNet/IP Communication unit	Version of firmware
1763 MicroLogix 1100	- (Built-in port in the unit)	16.000 or later
1747 SLC5/05	- (Built-in port in the unit)	OS firmware level Series C, FRN 10 or later

Point EtherNet/IP communication may not be established due to the difference in Revision. In that case, select Disable Keying in the Module Definition dialog.

Omron Corporation PLC

PLC type	EtherNet/IP Communication unit	Version of firmware
SYSMAC CJ2	- (Built-in port in the unit or CJ1W-EIP21)	V1.0 or later
SYSMAC CJ1	CJ1W-EIP21	V1.0 or later
SYSMAC CS1	CS1W-EIP21	V1.0 or later
SYSMAC NJ	- (Built-in port in the unit)	V1.13 or later

Mitsubishi Electric Corporation PLC

PLC type	EtherNet/IP Communication unit	Version of firmware
iQ-F	FX5-ENET/IP	CPU unit (1.3.10 or later), Communication unit (1.104 or later)
iQ-R	RJ71EIP91	CPU unit (56 or later), Communication unit (02 or later)

EtherNet/IP communication specifications

Cyclic communication*1 (Implicit communication)	No. of connections	Maximum 32
	Communication size	Follow the PLC connection settings. • Up to 248 bytes (Connection with Rockwell's SLC5/05) • Up to 496 bytes (Connection with Rockwell's ControlLogix/CompactLogix) • Up to 1436 bytes (Connection with Keyence's KV series and Omron's SYSMAC CJ2/CJ1/CS1/NJ)
	Transmission trigger	Follow the PLC connection settings. • Cyclic • COS*2
	Instance ID	• 100: Input data (transmission of device) • 101: Output data (reception of device) (254 for InputOnly connection)
Message communication (Explicit message)	No. of connections	Maximum 32
	Compliant Explicit message method	UCMM/Class3
Conformance test		Complying with Version.CT19

*1: The communication status becomes [Connected] when either a two-way communication (Exclusive Owner) connection or an InputOnly connection is established.

*2: Only the PLC that supports COS (Keyence's KV-3000/5000/5500/7300/7500/8000, KV-Nano, etc.) can be specified. When the COS transmission trigger is selected, the VS camera sends the data at the timing when the transmission data is changed. (If the transmission data is not changed, it sends the data at the specified RPI (communication cycle) intervals.) If the transmission data is continuously changed, the transmission is held during InhibitTime (minimum transmission interval). Moreover, the targets for checking for changes in the send-data are [Result Ready] and [Command Complete].

How to distinguish between using explicit message communication or implicit fixed-cycle communication

The message communication function will be required for EtherNet/IP communication with PLC devices that do not support cyclic communication (SLC5/05 series, etc.).

Point

- Since the explicit message communication performs TCP/IP communication, it is not suitable for a high speed control when compared to the implicit cyclic communication using UDP.
- Although the explicit message communication is a communication through TCP/IP, the data may not be delivered depending on the network status. Design the control (e.g. re-sending with time-out) at the PLC considering such a case.

Example of input data settings (VS series → Keyence KV-8000 series)

Example of the following Industrial Ethernet settings for KV-8000 series with one VS series unit connected (B**** and W**** in the table are examples of allocations of link relays and link register addresses of KV-8000.)

- Command start address: 0012
- Command size: 28
- Data input start address: 0040
- Data input size: 456

Setting status	Address (byte)	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Bit area	0000	B007 Reserved	B006 Reserved	B005 Reserved	B004 Reserved	B003 Reserved	B002 Reserved	B001 Reserved	B000 Trigger Ready
	0001	B00F Reserved	B00E Reserved	B00D Reserved	B00C Reserved	B00B Reserved	B00A Reserved	B009 Reserved	B008 Trigger Ack
	0002	B017 Error1 Status	B016 Error0 Status	B015 Reserved	B014 Run Status	B013 Result Ready	B012 Reserved	B011 Fail	B010 Pass
	0003	B01F Reserved	B01E Reserved	B01D Program Load Complete from SD Card	B01C Program Load Complete	B01B Reserved	B01A Command Ready	B019 Command Error	B018 Command Complete
	0004	B027 Soft Event 7 Ack (Assignable)	B026 Soft Event 6 Ack (Assignable)	B025 Soft Event 5 Ack (Assignable)	B024 Soft Event 4 Ack (Assignable)	B023 Soft Event 3 Ack (Assignable)	B022 Soft Event 2 Ack (Assignable)	B021 Soft Event 1 Ack (Assignable)	B020 Soft Event 0 Ack (Assignable)
	0005	B02F Assignable	B02E Assignable	B02D Assignable	B02C Assignable	B02B Assignable	B02A Assignable	B029 Assignable	B028 Assignable
	0006	B037 Assignable	B036 Assignable	B035 Assignable	B034 Assignable	B033 Assignable	B032 Assignable	B031 Assignable	B030 Assignable
	0007	B03F Assignable	B03E Assignable	B03D Assignable	B03C Assignable	B03B Assignable	B03A Assignable	B039 Assignable	B038 Assignable
	0008	B047 Tool Judge	B046 Tool Judge	B045 Tool Judge	B044 Tool Judge	B043 Tool Judge	B042 Tool Judge	B041 Tool Judge	B040 Tool Judge
	0009	B04F Tool Judge	B04E Tool Judge	B04D Tool Judge	B04C Tool Judge	B04B Tool Judge	B04A Tool Judge	B049 Tool Judge	B048 Tool Judge
	0010	B057 Tool Judge	B056 Tool Judge	B055 Tool Judge	B054 Tool Judge	B053 Tool Judge	B052 Tool Judge	B051 Tool Judge	B050 Tool Judge
	0011	B05F Tool Judge	B05E Tool Judge	B05D Tool Judge	B05C Tool Judge	B05B Tool Judge	B05A Tool Judge	B059 Tool Judge	B058 Tool Judge
	0012	W000 Error0 Code (Assignable)							
	0013								
	0014	W001							
	0015								
	0016	W002 Error1 Code (Assignable)							
	0017								
	0018	W003							
	0019								
	0020	W004 Program Number (Assignable)							
	0021								
	0022	W005							
	0023								
	0024	W006 Total Count (Assignable)							
	0025								
	0026	W007							
	0027								

Setting status	Address (byte)	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Command Region	0028	W008 Command Result							
	0029								
	0030	W009							
	0031								
	0032	W00A Command Data 1							
	0033								
	0034	W00B							
	0035								
	0036	W00C Command Data 2							
	0037								
	0038	W00D							
	0039								
	0040	W00E Command Data 3							
	0041								
	0042	W00F							
	0043								
	0044	W010 Command Data 4							
	0045								
	0046	W011							
	0047								
	0048	W012 Command Data 5							
	0049								
	0050	W013							
	0051								
	0052	W014 Command Data 6							
	0053								
	0054	W015							
	0055								

Setting status	Address (byte)	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Data output Region	0056	W016 Output Data1							
	0057								
	0058	W017							
	0059								
	0060	W018 Output Data2							
	0061								
	0062	W019							
	0063								
	0064	W01A Output Data3							
	0065								
	0066	W01B							
	0067								
	0068	W01C Output Data4							
	0069								
	0070	W01D							
	0071								
	0072	W01E Output Data5							
	0073								
	0074	W01F							
	0075								
	…								
	0484	W0EC Output Data108							
	0485								
	0486	W0ED							
	0487								
	0488	W0EE Output Data109							
	0489								
	0490	W0EP							
	0491								
	0492	W0F0 Output Data110							
	0493								
	0494	W0F1							
	0495								

Example of output data settings (Keyence KV-8000 series → VS series)

Example of the following Industrial Ethernet settings for KV-8000 series with one VS series unit connected (B**** and W**** in the table are examples of allocations of link relays and link register addresses of KV-8000.)

- Command start address: 0028
- Command size: 28
- Data input start address: 0056
- Data input size: 440

Setting status	Address (byte)	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Bit area	0000	B067 Reserved	B066 Reserved	B065 Reserved	B064 Reserved	B063 Reserved	B062 Reserved	B061 Reserved	B060 Trigger
	0001	B06F Reserved	B06E Reserved	B06D Reserved	B06C Reserved	B06B Reserved	B06A Reset	B069 Output Disable	B068 Trigger Disable
	0002	B077 Error1 Clear	B076 Error0 Clear	B075 Go to Setting	B074 Go to Run	B073 Result Ack	B072 Result Handshake Enable	B071 Reserved	B070 Reserved
	0003	B07F Reserved	B07E Reserved	B07D Program Load Execute from SD Card	B07C Program Load Execute	B07B Reserved	B07A Reserved	B079 Reserved	B078 Command Request
	0004	B087 Soft Event 7 (Assignable)	B086 Soft Event 6 (Assignable)	B085 Soft Event 5 (Assignable)	B084 Soft Event 4 (Assignable)	B083 Soft Event 3 (Assignable)	B082 Soft Event 2 (Assignable)	B081 Soft Event 1 (Assignable)	B080 Soft Event 0 (Assignable)
	0005	B08F Assignable	B08E Assignable	B08D Assignable	B08C Assignable	B08B Assignable	B08A Assignable	B089 Assignable	B088 Assignable
	0006	B097 Assignable	B096 Assignable	B095 Assignable	B094 Assignable	B093 Assignable	B092 Assignable	B091 Assignable	B090 Assignable
	0007	B09F Assignable	B09E Assignable	B09D Assignable	B09C Assignable	B09B Assignable	B09A Assignable	B099 Assignable	B098 Assignable
	0008	W0F2 Program Number							
	0009								
	0010	W0F3							
	0011								
Command region	0012	W0F4 Command Number							
	0013								
	0014	W0F5							
	0015								
	0016	W0F6 Command Parameter 1							
	0017								
	0018	W0F7							
	0019								
	0020	W0F8 Command Parameter 2							
	0021								
	0022	W0F9							
	0023								
	0024	W0FA Command Parameter 3							
	0025								
	0026	W0FB							
	0027								
	0028	W0FC Command Parameter 4							
	0029								
	0030	W0FD							
	0031								
Command region	0032	W0FE Command Parameter 5							
	0033								
	0034	W0FF							
	0035								
	0036	W100 Command Parameter 6							
	0037								
	0038	W101							
	0039								

Setting status	Address (byte)	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Data input region	0040	W102 Input Data 1							
	0041								
	0042	W103							
	0043								
	0044	W104 Input Data 2							
	0045								
	0046	W105							
	0047								
	0048	W106 Input Data 3							
	0049								
	0050	W107							
	0051								
	0052	W108 Input Data 4							
	0053								
	0054	W109							
	0055								
	0056	W10A Input Data 5							
	0057								
	0058	W10B							
	0059								
	…								
	0484	W1E0 Input Data 112							
	0485								
	0486	W1E1							
	0487								
	0488	W1E2 Input Data 113							
	0489								
	0490	W1E3							
	0491								
	0492	W1E4 Input Data 114							
	0493								
	0494	W1E5							
	0495								

Changing EtherNet/IP settings

#M009

To communicate with the PLC via EtherNet/IP, you need to configure settings such as the destination PLC type, cyclic communication data size, and send/receive-data assignment.

Point Assignment of the send-data, such as measurement tool settings and result data, system properties, and Vision Dashboard cell contents, are configured using the [Data Output (Industrial Ethernet)] tool. For the setting method, also refer to the description of the [Data Output (Industrial Ethernet)] tool.

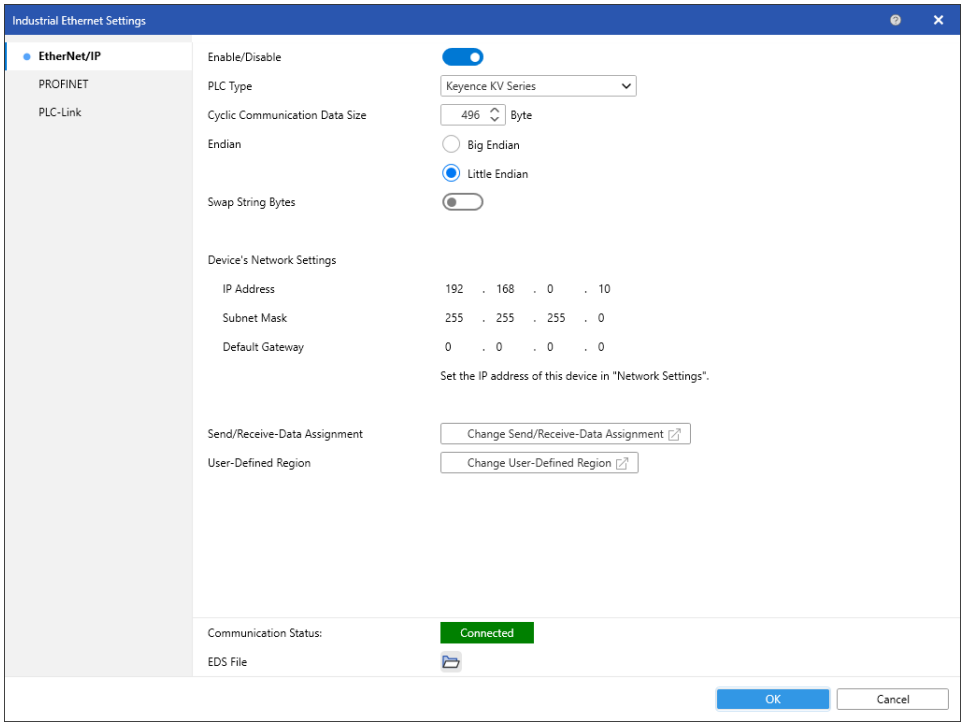
1 Select [Industrial Ethernet Settings] from the [Global Settings] menu.
The [Industrial Ethernet Settings] dialog box appears.

2 Click [EtherNet/IP].

3 Enable [Enable/Disable].

Point If one of the communication protocols is enabled at the timing when you try to enable another protocol, a confirmation message will appear asking whether to disable the currently enabled communication protocol. Click [OK] to disable the currently enabled communication protocol and switch to the new communication protocol.

4 If necessary, change the settings such as the PLC type to connect to, the cyclic communication data size, and the send/receive-data assignment.
→ Layout of the Screen (for EtherNet/IP and PROFINET)



5 When settings are complete, click [OK].
This saves the settings and closes the dialog box.

Point If you have changed the protocol enable/disable, the PLC type, or cyclic communication data size, you will see a reboot confirmation message after clicking [OK]. A reboot is required for the settings to take effect.

- [Save and Reboot Now]: Save the global settings and the program setting and reboot the device.
- [Reboot Later]: Closes the message. Rebooting the device using [Reboot] in the [System] menu will apply the settings.

Outputting measurement data via cyclic communication of EtherNet/IP (Data Output)

#M010

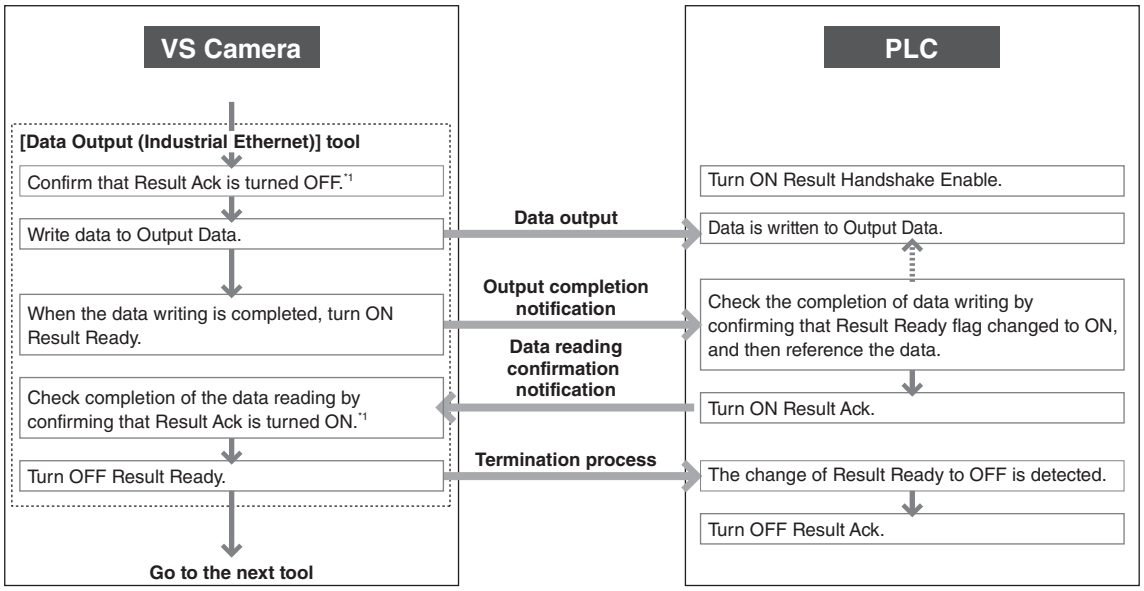
The settings and results data of the measurement tool, system properties, cell contents of the Vision Dashboard, etc., that have been assigned to the send data with the [Data Output (Industrial Ethernet)] tool, are output to the PLC via EtherNet/IP cyclic communication.

Point EtherNet/IP cannot be used at the same time with other communication protocols.

Data Output Flow

You can set the data to be output using the [Data Output (Industrial Ethernet)] tool. Use the following procedures for outputting data from the VS camera by EtherNet/IP.

Reference
- When outputting EtherNet/IP data output in Setup Mode, enable Data (Industrial Ethernet) in Output Check Settings.
- With EtherNet/IP, images and other binary data cannot be output.

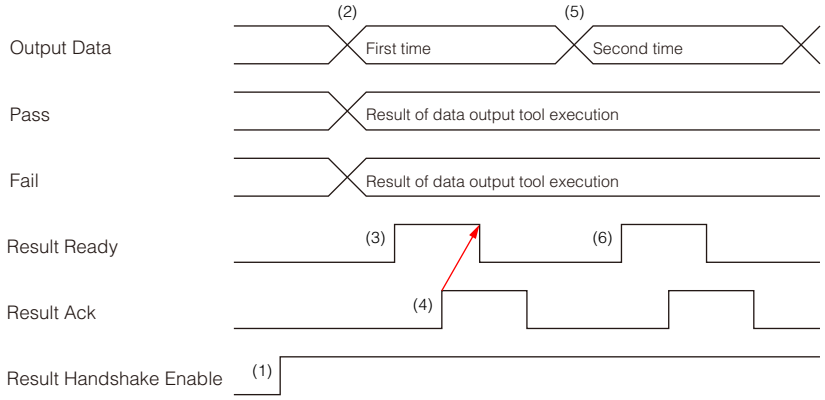


*1: This is the procedure when handshake is set to ON. When handshake is set to OFF, regardless of the Result Ack flag status, the VS camera overwrites the corresponding data memory when the [Data Output (Industrial Ethernet)] tool is executed, and the Result Ready remains ON. If the process requires writing completion confirmation by detecting the change of Result Ready from OFF to ON, turn ON Result Ack to turn OFF Result Ready.

Point
- Be careful that the data range used for data output does not overlap the command response data.
- When the result data of the [Data Output (Industrial Ethernet)] tool is output, Pass, Fail, and Total Count are output to the fixed-assigned area at the execution of the [Data Output (Industrial Ethernet)] tool. They are not output at the end of the task.

Timing Chart

When handshake is ON



(1) The PLC raises Result Handshake Enable.

(2) The first data is stored in the Output Data region.
Stores the total status (Pass/Fail) when executing the data output tool (when storing in the buffer).

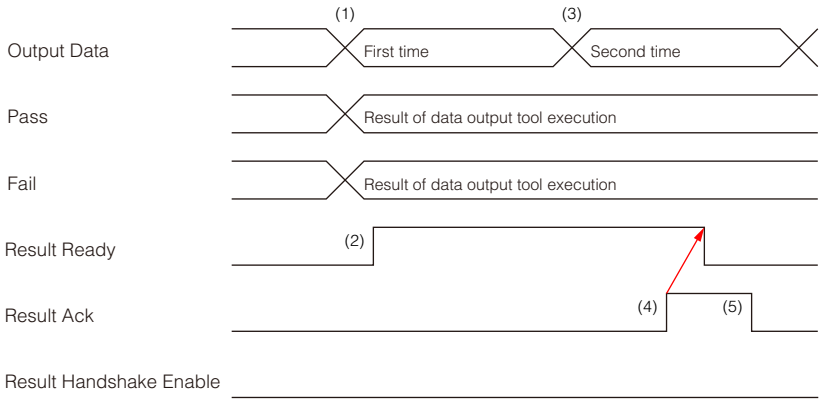
(3) The VS camera raises Result Ready when the data is stored.

(4) When the PLC finishes reading data, it raises Result Ack to signal the completion of data read.
At the rise of Result Ack, the VS camera drops Result Ready.

(5) With the fall of Result Ack, the next update data is output if there is any.

(6) The VS camera raises Result Ready when the next data is set.

When handshake is OFF



(1) The first data is stored in the Output Data region.
Stores the total status (Pass/Fail) when executing the data output tool (when storing in the buffer).

(2) The VS camera raises Result Ready when the data is stored.

(3) When handshake is OFF, the next data is set regardless of the fall of Result Ack.

(4) When the PLC raises Result Ack, The VS camera raises Result Ready.

(5) The PLC drops Result Ack.
With this, the VS camera knows when to set the next data.

I/O Control via cyclic communication of EtherNet/IP

#M011

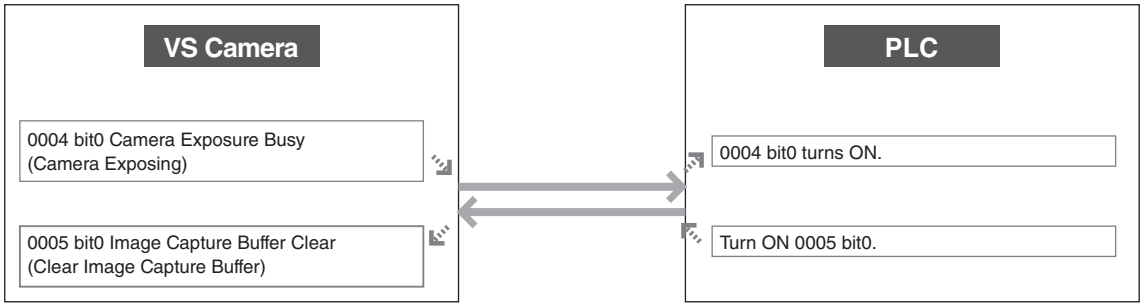
Change the settings to perform via EtherNet/IP the same input/output as the power I/O interface.

Point EtherNet/IP cannot be used at the same time with other communication protocols.

I/O Control Flow

By assigning the functions related to terminal control to bit devices, you can use multiple I/O signals with a single LAN cable.

Reference With EtherNet/IP, images and other binary data cannot be output.



Point Although each I/O signal is interlocked with operation of the terminal block, the EtherNet/IP performs regular communications. If the signal fluctuates at high speed, the EtherNet/IP may not be able to pick up some of these fluctuations. Set the RPI value considering the signal change time used.

Controlling the VS Camera via cyclic communication of EtherNet/IP (Command Control)

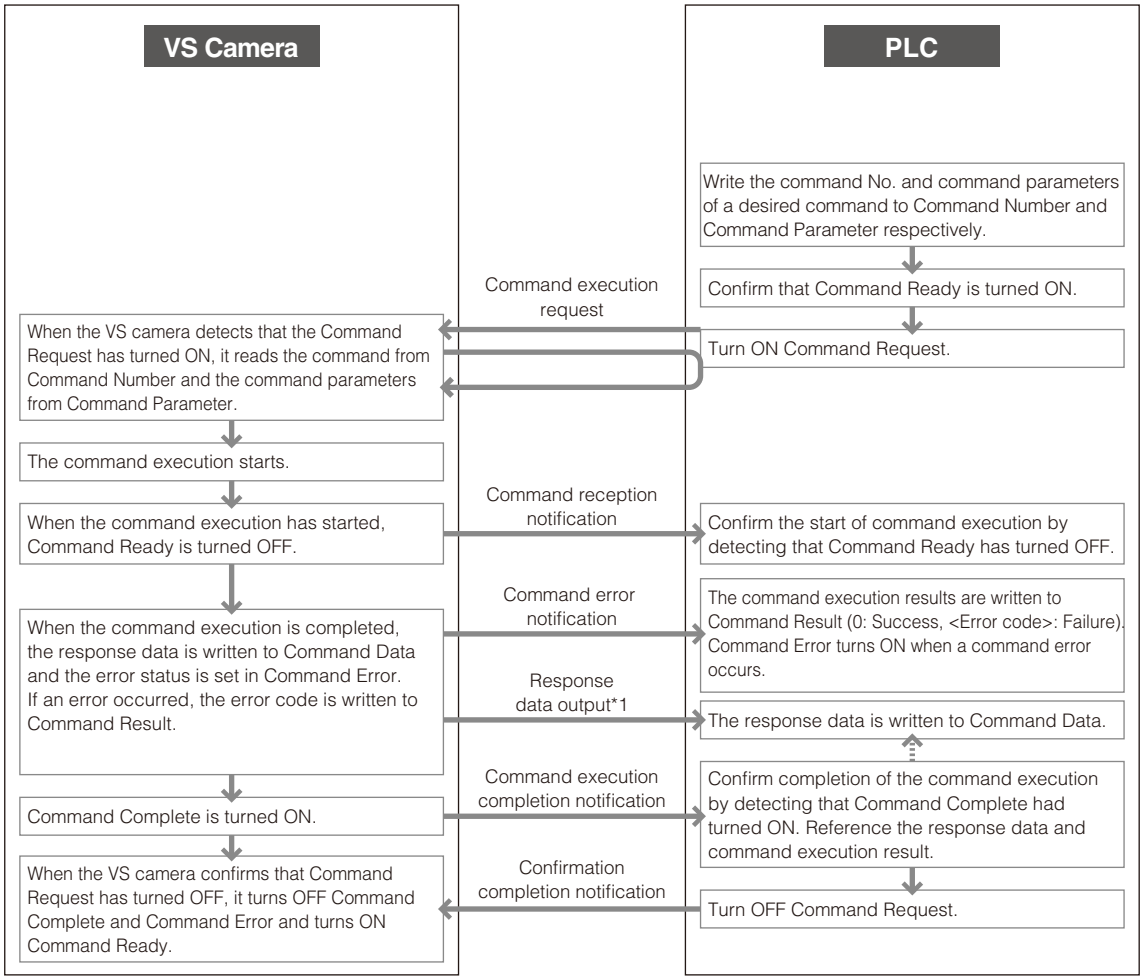
#M012

Commands configured from the PLC can be executed at a desired timing.

Point EtherNet/IP cannot be used at the same time with other communication protocols.

Command Processing Flow with EtherNet/IP

Use the following procedure for using commands to control the VS camera with the EtherNet/IP.

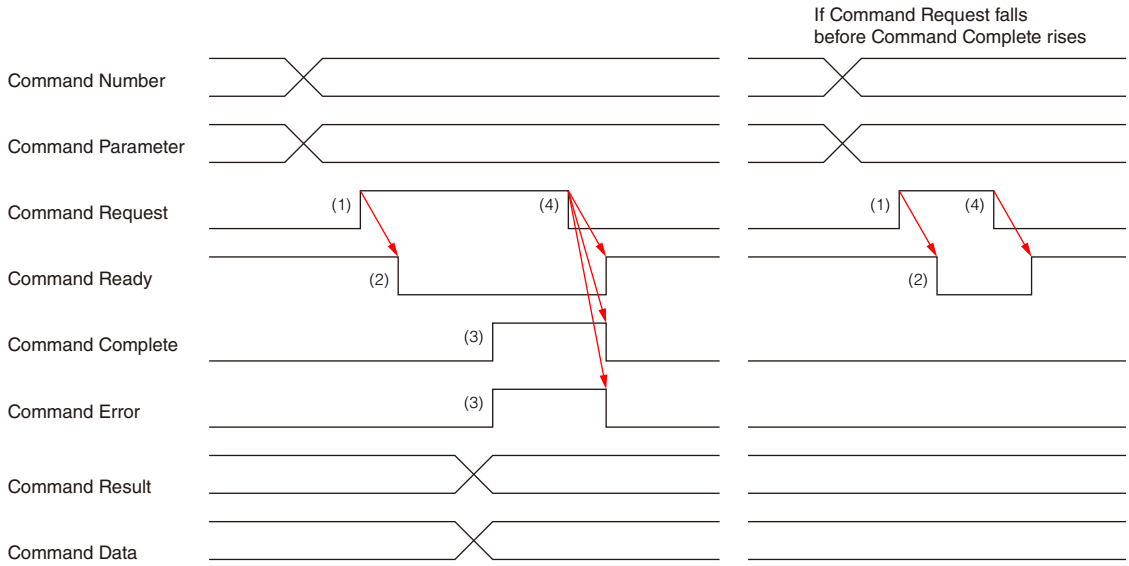


*1: No response data will be output to the Command Data for commands without response data.

Reference When a command error occurs, the command execution result is written to Command Result (0: Success, <Error code>: Failure).

Point In order to confirm that the VS camera has set Command Complete to ON from the PLC side, you need to keep Command Request ON until Command Complete is turned ON. If Command Request is set to OFF before Command Complete is set to ON, Command Complete will not be set to ON even if the command is completed.

Timing Chart



(1) Load Command Number and Command Parameter at the rising edge of Command Request.

(2) Command Ready falls when command acceptance is completed.

(3) At the completion of a command execution, the execution results are stored in Command Result and Command Data and the Command Complete will rise.
Command Error also rises if an error occurs.
If Command Request has fallen at this timing, Command Complete and Command Error will not rise.

(4) Command Ready rises at the fall of Command Request.
Command Complete and Command Error are also lowered at the same time.

Point In order to confirm that the VS camera has set Command Complete to ON from the PLC side, you need to keep Command Request ON until Command Complete is turned ON. If Command Request is set to OFF before Command Complete is set to ON, Command Complete will not be set to ON even if the command is completed.

Communicating with the another device via EtherNet/IP message communication

#M013

Message communication can be used for EtherNet/IP communication with PLC devices that do not support cyclic communication or for communication that does not require punctuality like that of cyclic communication.
→ EtherNet/IP communication specifications

Object configuration

This device's EtherNet/IP functions include the following objects. These objects can be accessed using message communications.

Class (Object name)	Class ID	Instance ID
Identity Object	1 (01Hex)	1 (01Hex)
Message Router Object	2 (02Hex)	1 (01Hex)
Assembly Object	4 (04Hex)	100 (64Hex)
		101 (65Hex)
Connection Manager Object	6 (06Hex)	1 (01Hex)
Vision System Object	104 (68Hex)	1 (01Hex)
Port Object	244 (F4Hex)	1 (01Hex)
TCP/IP Interface Object	245 (F5Hex)	1 (01Hex)
EtherNet Link Object	246 (F6Hex)	1 (01Hex)
LLDP Management Object	265 (109Hex)	1 (01Hex)
LLDP Data Table Object	266 (10AHex)	1 (01Hex)

Reference
- For detailed procedures for issuing the message with the PLC device in use, refer to the PLC operation manual.
- This manual primarily explains the Assembly Object and the Vision System Object. For other objects, refer to the EtherNet/IP specifications (www.odva.org) issued by ODVA.

Notation for description

To explain the attribute and service of the object, the following terms are used.

Notation of data

The bit position in the data is described by Bit n. (Bit0 represents LSB.)
The array type data is shown by []. Example: DWORD[10] (DWORD type, array of 10 elements)

Data type

The data type is specified by the EtherNet/IP specifications as follows:

Data type	Description	Range	
		Minimum	Maximum
BOOL	Boolean	0 : FALSE	1 : TRUE
SINT	Short integer	-128	127
INT	Integer	-32768	32767

Data type	Description	Range	
		Minimum	Maximum
DINT	Double precision integer	-2^{31}	$2^{31}-1$
USINT	Unsigned short integer	0	255
UINT	Unsigned integer	0	65535
UDINT	Unsigned double precision integer	0	$2^{32}-1$
BYTE	Bit string: 8 bits	-	-
WORD	Bit string: 16 bits	-	-
DWORD	Bit string: 32 bits	-	-
REAL	Floating point number	Range of single-precision floating point	

Reference All values are stored in little endian.

ClassID : 4 (04Hex) Assembly Object

The same data which is sent/received in the cyclic communication can be directly accessed/controlled in the message communication.
This is used when you want to control a model not compliant with the cyclic communication (e.g. Rockwell's SLC5/05) in the same data format as the cyclic communication.

Point Note that in the message communication, regular control like that of the cyclic communication cannot be performed.

Instance : 100 (64Hex)

It is the information for input assembly, and the information sent by the device in the cyclic communication.

Attribute

Attribute ID	Access	Name	Data type	Details
3 (03Hex)	Get	data	BYTE array	This is the information specified in [Send/Receive-Data Assignment] under the [Global Settings] menu - [Industrial Ethernet Settings]. It includes the device status, command execution results, results data, and other information.
4 (04Hex)	Get	size	UINT	Attribute3 size (byte unit) This is the size specified in [Cyclic Communication Data Size] under the [Global Settings] menu - [Industrial Ethernet Settings].

Example of input assembly data format

The input assembly configuration follows [User-Defined Region] in the [Global Settings] menu - [Industrial Ethernet Settings].
As an example, the configuration in the case of the setting below is shown:

- **Cyclic communication data size**
  496 bytes
- **Command**
  - **Start address**: 0028

- **Size**: 28

• **Data output**

- **Start address**: 0056
- **Size**: 440

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0000	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Trigger Ready
0001	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Trigger Ack
0002	Error1 Status	Error0 Status	Reserved	Run Status	Result Ready	Reserved	Fail	Pass
0003	Reserved	Reserved	Program Load Complete from SD Card	Program Load Complete	Reserved	Command Ready	Command Error	Command Complete
0004	Soft Event 7 Ack (Assignable)	Soft Event 6 Ack (Assignable)	Soft Event 5 Ack (Assignable)	Soft Event 4 Ack (Assignable)	Soft Event 3 Ack (Assignable)	Soft Event 2 Ack (Assignable)	Soft Event 1 Ack (Assignable)	Soft Event 0 Ack (Assignable)
0005	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
0006	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
0007	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
0008	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge
0009	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge
0010	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge
0011	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge
0012	Assignable (Error0 Code)							
0013								
0014								
0015								
0016	Assignable (Error1 Code)							
0017								
0018								
0019								
0020	Assignable (Program Number)							
0021								
0022								
0023								
0024	Assignable (Total Count)							
0025								
0026								
0027								
0028	Command Result							
0029								
0030								
0031								
0032	Command Data 1							
0033								
0034								
0035								
0036	Command Data 2							
0037								
0038								
0039								
0040	Command Data 3							
0041								
0042								
0043								

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0044	Command Data 4							
0045								
0046								
0047								
0048	Command Data 5							
0049								
0050								
0051								
0052	Command Data 6							
0053								
0054								
0055								
0056	Output Data1							
0057								
0058								
0059								
0060	Output Data2							
0061								
0062								
0063								
0064	Output Data3							
0065								
0066								
0067								
0068	Output Data4							
0069								
0070								
0071								
0072	Output Data5							
0073								
0074								
0075								
…								
0484	Output Data108							
0485								
0486								
0487								
0488	Output Data109							
0489								
0490								
0491								
0492	Output Data110							
0493								
0494								
0495								

Service

Service code	Name	Details
14 (0EHex)	GetAttributeSingle	Retrieves the attribute value.

Instance : 101(65Hex)

This is the information for output assembly, and the information received by the device in cyclic communication.

Attribute

Attribute ID	Access	Name	Data type	Details
3 (03Hex)	Get/Set	data	BYTE array	This is the information specified in [Send/Receive-Data Assignment] under the [Global Settings] menu - [Industrial Ethernet Settings]. Device control, command input etc. can be written.
4 (04Hex)	Get	size	UINT	Attribute3 size (byte unit) This is the size specified in [Cyclic Communication Data Size] under the [Global Settings] menu - [Industrial Ethernet Settings].

Example of output assembly data format

The output assembly configuration follows [User-Defined Region] in the [Global Settings] menu - [Industrial Ethernet Settings].
As an example, the configuration in the case of the setting below is shown:

- **Cyclic communication data size**
  496 bytes
- **Command**
  - **Start address**: 0012
  - **Size**: 28
- **Data Input**
  - **Start Address**: 0040
  - **Size**: 456

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0000	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Trigger
0001	Reserved	Reserved	Reserved	Reserved	Reserved	Reset	Output Disable	Trigger Disable
0002	Error1 Clear	Error0 Clear	Go to Setting	Go to Run	Result Ack	Result Handshake Enable	Reserved	Reserved
0003	Reserved	Reserved	Program Load Execute from SD Card	Program Load Execute	Reserved	Reserved	Reserved	Command Request
0004	Soft Event 7 (Assignable)	Soft Event 6 (Assignable)	Soft Event 5 (Assignable)	Soft Event 4 (Assignable)	Soft Event 3 (Assignable)	Soft Event 2 (Assignable)	Soft Event 1 (Assignable)	Soft Event 0 (Assignable)
0005	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
0006	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
0007	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
0008	Program Number							
0009								
0010								
0011								
0012	Command Number							
0013								
0014								
0015								

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0016	Command Parameter 1							
0017								
0018								
0019								
0020	Command Parameter 2							
0021								
0022								
0023								
0024	Command Parameter 3							
0025								
0026								
0027								
0028	Command Parameter 4							
0029								
0030								
0031								
0032	Command Parameter 5							
0033								
0034								
0035								
0036	Command Parameter 6							
0037								
0038								
0039								
0040	Input Data 1							
0041								
0042								
0043								
0044	Input Data 2							
0045								
0046								
0047								
0048	Input Data 3							
0049								
0050								
0051								
0052	Input Data 4							
0053								
0054								
0055								
0056	Input Data 5							
0057								
0058								
0059								
…								
0484	Input Data 112							
0485								
0486								
0487								
0488	Input Data 113							
0489								
0490								
0491								

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0492	Input Data 114							
0493								
0494								
0495								

Service

Service code	Name	Details
14 (0EHex)	GetAttributeSingle	Retrieves the attribute value.
16 (10Hex)	SetAttributeSingle	Sets a value to the attribute. Availability of setting is determined by the accessibility of the attribute.

ClassID : 104 (68Hex) Vision System Object

This object is unique to the device, and provides the attributes and services that are necessary to control the device by means of message communication.
For details of control with attributes, refer to the control sequence in the cyclic communication.

Instance : 1 (01Hex)

Attribute

AttributeID	Access*1	Name	Data type	Details
00 (00HEX)	Get	Vision System Object Status	BYTE	Shows the device status. • Bit0: Error0 Status • Bit1: Error1 Status • Bit2: Run Status

AttributeID	Access*1	Name	Data type	Details
40 (28HEX)	Get	Process Status	DWORD	Shows the measurement status. • Bit0: Trigger Ready • Bit1: Reserved • Bit2: Reserved • Bit3: Reserved • Bit4: Reserved • Bit5: Reserved • Bit6: Reserved • Bit7: Reserved • Bit8: Trigger Ack • Bit9: Reserved • Bit10: Reserved • Bit11: Reserved • Bit12: Reserved • Bit13: Reserved • Bit14: Reserved • Bit15: Reserved • Bit16: Processing Status • Bit17: Output Image Busy • Bit18: Output Image Buffer Status • Bit19: Output Data Busy • Bit20: Output Data Buffer Status • Bit21 to 31: Reserved
90 (5AHEX)	Get	Result Status	BYTE	Shows the data output status. • Bit0: Result Ready • Bit1: Pass • Bit2: Fail
100 (64HEX)	Get/Set	Result Handshake Enable	BOOL	Shows the status of the handshake setting for the data output. • 0: Handshake OFF • 1: Handshake ON
110 (6EHEX)	Get/Set	Result Ack	BOOL	Controls the data output handshake.

*1: In Get access, the GetAttributeSingle service (0EHex) is used. In Set, the SetAttributeSingle service (10Hex) is used.

Service

Service code	Name	Details
14 (0EHEX)	GetAttributeSingle	Retrieves the attribute value.
16 (10HEX)	SetAttributeSingle	Sets a value to the attribute. Availability of setting is determined by the accessibility of the attribute.
64 (40HEX)	Capture	Executes image capture of the specified camera.
65 (41HEX)	Command execution	Issues the command request. Returns the command execution result with the message response.
66 (42HEX)	Retrieve results data	Retrieves the measurement result.
67 (43HEX)	Rewrite Data Input Tool	Rewrites the [Data Input (Industrial Ethernet)] tool settings.

Service details

Image capture service (40Hex)

Input the trigger to capture image.

- Transmission parameter: None
- Return error code

Error Code	Name	Description
16 (10HEX)	Status error	"Ready" corresponding to the specified trigger is OFF (not in Run Mode, Capture not acceptable, etc.).

- Result data: None

Point In the communication processing of message communication, a processing delay of several tens of ms or more occurs. If this delay is a problem, control by means of cyclic communication or terminal input.

Command Execution (41HEX)

You can execute a command.

- Transmission parameter

Name	Data type	Details
Command Number	DWORD	Specifies the command No.
Command Parameter	DWORD[]	Specifies the command parameters. Number data is specified with 1 Command Parameter = 1 argument. String data is specified in DWORD units in a character code for the number of characters including the terminating character.

- Return error code

Error Code	Sub-code	Name	Description
00 (00HEX)	-	Command execution completion	The command execution has completed.
19 (13HEX)	-	Parameter Too Small Error	The parameter was not specified in the send-data.
21 (15HEX)	-	Parameter Too Large Error	A parameter larger than 496 bytes was specified in the send-parameter.
31 (1FHEX)	1	Command Error	The specified command does not exist.
	2	Parameter Count Error	The number of parameters is incorrect.
	3	Parameter Range Error	The parameter range is incorrect.
	4	Parameter Format Error	The format of the parameter does not match the command format.
	5	Command Not Acceptable	Commands cannot be accepted.
	6	Command Not Executable	Commands cannot be executed.
	10000 and higher	Command-Specific Error	An error that is specific to the command.

- Result data

When the execution of a command which has command result is successful, the result data is returned in the following format:

Name	Data type	Details
Command Data	DWORD[]	Returns the command execution result data. The data stored in this area is equivalent to the Command Data area. The maximum size of returned data is 1500 bytes. This is the maximum size of the response buffer for message communication. Number data is returned as one data per one Command Data. String data is returned in DWORD units in a character code for the number of characters including the termination code.

Point In the communication processing of message communication, a processing delay of several tens of ms or more occurs. If this delay is a problem, control by means of the cyclic communication or terminal input.

Retrieve Results Data (42HEX)

Final measurement result is retrieved.

- Transmission parameter

Name	Data type	Details
Size	UINT	Specifies the result size to be acquired in bytes.
Offset	UINT	Specifies the offset of the result data to be acquired in bytes.

- Return error code

Error Code	Name	Description
09 (09HEX)	Abnormal Parameter Value	Offset or size is an incorrect value.
19 (13HEX)	Parameter Too Small Error	The parameter size is too small.
21 (15HEX)	Parameter Too Large Error	The parameter size is too large.

- Result data

Name	Data type	Details
Result	BYTE[]	Returns results data with the specified offset and size. The maximum size that can be set for the data output area within a user-defined area is the size of periodical communication data configurable for Industrial Ethernet. Numeric data is returned in one data per result. String data is returned in bytes in a character code for the number of characters including the termination code.

Write Data (43HEX)

You can rewrite the [Data Input (Industrial Ethernet)] tool settings.

- Transmission parameter

Name	Data type	Details
Size	UINT	Specifies the size of the data to be set.
Offset	UINT	Specifies the offset in bytes of the data to be set.
Parameters	BYTE[]	Specifies the values to be set for the data input tool as array data in bytes.

- Return error code

Error Code	Name	Description
09 (09HEX)	Abnormal Parameter Value	The offset or size value is incorrect.
19 (13HEX)	Parameter Too Small Error	The parameter size is too small.
21 (15HEX)	Parameter Too Large Error	• The parameter size is too large. • When the value obtained by adding Size to Offset exceeds the region size used by the [Data Input (Industrial Ethernet)] tool

• Result data: None

Controlling the Camera with EtherNet/IP message communication

How to use message communication

The VS Camera functions as the message communication server. The procedure for issuing the message communication varies depending on the device. However, it is necessary to specify information such as the following. For details, refer to "EtherNet/IP communication specifications" and manuals of each device.

IP address

Specifies the VS camera IP address.

Class, instance

Specifies the following class and instance equipped with the EtherNet/IP function of the VS camera.

Class (Object name)	Class ID	Instance ID
Identity Object	1 (01Hex)	1 (01Hex)
Message Router Object	2 (02Hex)	1 (01Hex)
Assembly Object	4 (04Hex)	100 (64Hex)
		101 (65Hex)
Connection Manager Object	6 (06Hex)	1 (01Hex)
Vision System Object	104 (68Hex)	1 (01Hex)
Port Object	244 (F4Hex)	1 (01Hex)
TCP/IP Interface Object	245 (F5Hex)	1 (01Hex)
EtherNet Link Object	246 (F6Hex)	1 (01Hex)
LLDP Management Object	265 (109Hex)	1 (01Hex)
LLDP Data Table Object	266 (10AHex)	1 (01Hex)

Reference The class mainly used in the message communication with the VS camera are as follows:

- Vision System Object: It is the object specific to the VS camera. This object is responsible for all controls as the image sensor.
- Assembly Object: The PLC which does not support cyclic communication can achieve control the same as the cyclic communication by directly reading/writing the data of this object.

Attribute

Attribute existing in the specified class or instance is specified. For details of attribute in each class, refer to "EtherNet/IP communication specifications" and specifications of the EtherNet/IP function issued by ODVA.

Reference To obtain specifications issued by ODVA, refer to the following URL:
ODVA web site: www.odva.org

Service

Execution details are specified. The major service used by the VS camera are as follows:

- Access to attribute: GetAttributeSingle/SetAttributeSingle
- Service specific to object: Service prepared for each object.

Control using the message communication

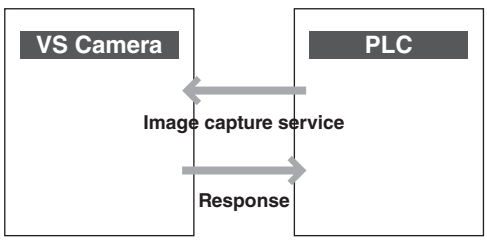
When controlling the VS camera by message communication, gain access to the Vision System Object.
The Vision System Object provides the following services.

Service code	Name	Details
14 (0EHEX)	GetAttributeSingle	Retrieves the attribute value.
16 (10HEX)	SetAttributeSingle	Sets a value to the attribute. Availability of setting is determined by the accessibility of the attribute.
64 (40HEX)	Capture	Executes image capture of the specified camera.
65 (41HEX)	Command execution	Issues the command request. Returns the command execution result with the message response.
66 (42HEX)	Retrieve results data	Retrieves the measurement result.
67 (43HEX)	Rewrite Data Input Tool	Rewrites the [Data Input (Industrial Ethernet)] tool settings.

Controlling the image capture with EtherNet/IP message communication

Control image of image capture service (40Hex)

The specified trigger is input and the image is captured.



Point

To use this service, the following conditions must be satisfied.
- The VS camera must be started with EtherNet/IP enabled.
- The following setting has been configured for [Trigger Settings] in the [Capture] tool
  –[Trigger Mode]: [External]
  –[Trigger Source]: [Industrial Ethernet Protocol] is enabled.
- Trigger Ready must be 1 (Trigger acceptable).

Data example

Transmission data

Class ID	68Hex	Vision System Object
Instance ID	01Hex	Fixed value
Service ID	40Hex	Image capture service
Attribute ID	-	-

Response

Execution result	Execution result
Additional code	None

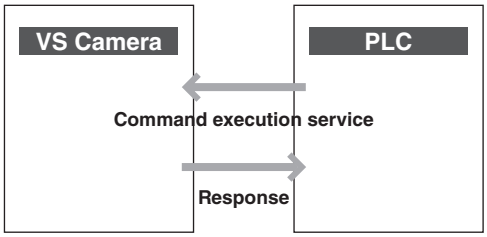
Execution result

- 0 (00Hex): Execution of the service is successful.
- 16 (10Hex): Service Not Accepted (Trigger Ready was 0 (Trigger not acceptable))

Sending commands with EtherNet/IP message communication

Control image of command execution service (41Hex)

Command data is executed.



Point

To use this service, the following conditions must be satisfied.
- The VS camera must be started with EtherNet/IP enabled.
- Command Ready is 1 (command can be accepted)

Reference

The command output data returns the response for the result data size of the command executed.

Data example

When executing PL (Change Program Setting (Specify No.)) of command No. 109 to switch to the program setting of Program No. 10 on the SD card

Transmission data

Class ID		68Hex	Vision System Object
Instance ID		01Hex	Fixed value
Service ID		41Hex	Command execution service
Attribute ID		-	-
Data	0th byte	6DHex	Command No.109
	1st byte	00Hex	
	2nd byte	00Hex	
	3rd byte	00Hex	
	4th byte	02Hex	Switches to settings on the SD card. To specify the SD card, specify 2 (02Hex).
	5th byte	00Hex	
	6th byte	00Hex	
	7th byte	00Hex	
	8th byte	0AHex	Setting number 10 (0AHex)
	9th byte	00Hex	
	10th byte	00Hex	
	11th byte	00Hex	

Response data

Execution result		Execution result
Additional code		Refer to the following.
Data	0th byte	0th byte of execution result
	1st byte	00Hex
	2nd byte	00Hex
	3rd byte	00Hex

Execution result

- 0 (00Hex): Execution of the service is successful.
- 19 (13Hex): Parameter Too Small Error (The parameter is not specified)
- 21 (15Hex): Parameter Too Large Error (The parameter size is greater than 496 bytes)
- 31 (1FHex): Error specific to the vendor has occurred. Detail reason is indicated by additional code.

Additional code

Error code of the binary command is stored.

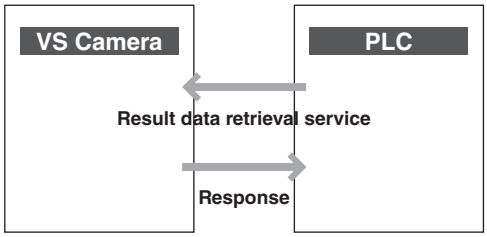
Additional code	Name	Description
1 (01Hex)	Command Error	The requested command does not exist.
2 (02Hex)	Parameter Count Error	The number of parameters is incorrect.
3 (03Hex)	Parameter Range Error	The parameter range is incorrect.
4 (04Hex)	Parameter Format Error	The format of the parameter does not match the command format.

Additional code	Name	Description
5 (05Hex)	Command Not Acceptable	Commands cannot be accepted.
6 (06Hex)	Command Not Executable	Commands cannot be executed.
10000 and higher (2710Hex and higher)	Command-Specific Error	An error that is specific to the command.

Retrieving the measurement data with the EtherNet/IP message communication (result data retrieval)

Control image of result data retrieval service (42Hex)

The offset and the size are specified in bytes with the result data assigned in the[Data Output (Industrial Ethernet)] tool, and the result data is retrieved.



The upper limit size of the result data which can be retrieved is the result data region size assigned to the cyclic communication region. If a size exceeding this value is specified, the data of the returnable size is returned.

Point

To use this service, the following conditions must be satisfied.

- The VS camera must be started with EtherNet/IP enabled.
- The results data must be assigned in the cyclic communication region.
- The output data has been configured using the [Data Output (Industrial Ethernet)] tool
- The measurement with the current settings must be completed (number of measurements is 1 or more).

Data example

When retrieving 20 bytes starting from the 12th byte of the result data

Transmission data

Class ID	68Hex	Vision System Object
Instance ID	01Hex	Fixed value
Service ID	42Hex	Result data retrieval service
Attribute ID	-	-

Data	0th byte	14Hex	Retrieves 20 bytes
	1st byte	00Hex	
	2nd byte	0CHex	Retrieves result data from the 12th byte
	3rd byte	00Hex	

Response data

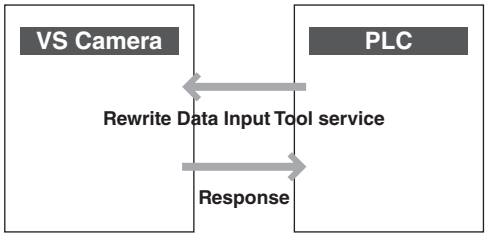
Execution result		Execution result
Additional code		None
Data	0th byte	12th byte of result data
	1st byte	13th byte of result data
	2nd byte	14th byte of result data
	3rd byte	15th byte of result data
	...	
	16th byte	28th byte of result data
	17th byte	29th byte of result data
	18th byte	30th byte of result data
	19th byte	31st byte of result data

Execution result

- 0 (00Hex): Execution of the service is successful.
- 9 (09Hex): Abnormal Parameter Value (The parameter is negative or inappropriately too large)
- 19 (13Hex): Parameter Too Small Error (The parameter is not specified)
- 21 (15Hex): Parameter Too Large Error (The parameter size is greater than 4 bytes)

Rewriting the Data Input Tool Settings with Message Communication via EtherNet/IP (Rewrite Data Input Tool)

Control image of rewrite data input tool service (43Hex)



Point

To use this service, the following conditions must be satisfied.

- The VS camera must be started with EtherNet/IP enabled.
- The input data must be assigned in the cyclic communication region.
- The input data has been configured using the [Data Input (Industrial Ethernet)] tool

Data example

When rewriting 20 bytes of the input data starting from byte 40 by consecutive numbers from 1 to 20

Send-Data

Class ID		68Hex	Vision System Object
Instance ID		01Hex	Fixed value
Service ID		43Hex	Rewrites Data Input Tool
Attribute ID		-	-
Data	0th byte	14Hex	Rewrites 20 bytes
	1st byte	00Hex	
	2nd byte	28Hex	Rewrites data beginning from byte 40
	3rd byte	00Hex	
	4th byte	01Hex	Value that rewrites byte 40
	5th byte	02Hex	Value that rewrites byte 41
	…	…	…
	22th byte	13Hex	Value that rewrites byte 58
	23th byte	14Hex	Value that rewrites byte 59

Response Data

Execution result	The result of the execution
Additional code	None

Execution Result

- 0 (00Hex): Service Execution Successful
- 9 (09Hex): Abnormal Parameter Value (The parameter is negative or inappropriately too large)
- 19 (13Hex): Parameter Too Small Error (Insufficient parameter size)
- 21 (15 Hex): Parameter Too Large Error (When the value obtained by adding Size to Offset exceeds the region size used by the [Data Input (Industrial Ethernet)] tool)

Control/Data Output via PROFINET

This section describes device control and data output via PROFINET.

Overview of Control and Data Output via PROFINET

#M014

PROFINET is an open communication standard provided by PI (PROFIBUS & PROFINET International) to allow communication between supporting devices of any vendors. This device belongs to Conformance Class A. The PROFINET connection provides the following functions:

Data I/O communication (cyclic communication)

Communicating at specified update time intervals allows high-speed control performed every several to several tens of microseconds. It is easier to write PLC programs because you can control the VS camera by referencing and updating the variables and devices in the PLC without considering communication.

Controlling the VS Camera

You can control the VS camera by issuing commands in the cyclic communication.

Outputting Data

The [Data Output (Industrial Ethernet)] tool allows you to set the data to be output to the bit region/byte region, and output the data with cyclic communication.

Inputting Data

Using the [Data Input (Industrial Ethernet)] tool, you can reference the byte region data input from the PLC from the setting parameters of other tools and the vision dashboard.

I/O Control

You can assign control-related functions to the data sent/received via cyclic communication and input/output them in the same way as the power supply I/O connector.

Point

- Be sure to set the update time of the cyclic communication to 4 ms or more.
- Even when the update time of the cyclic communication has been set to 4 ms or more, the VS camera may exhibit processing delays and communication may temporarily time out or disconnect when used with other communications such as device measurement setting, commands or FTP. When this occurs, review the cyclic communication settings and use conditions. Be sure to check for these and other problems in the operating performance before entering production.
- In a network where many devices, including PROFINET devices, are connected, delay or packet loss may occur sometimes when a heavy load is applied to the network constantly or temporarily. Be sure to make thorough verification before entering production.
- PROFINET cannot be used at the same time with other communication protocols.

Record data communication (non-cyclic communication)

This method can be used for communication applications that do not require regularity like that of cyclic communication. This communication method uses dedicated commands to read/write data records (1024 bytes/record) and can access the region exceeding the maximum size allowed to the cyclic communication.

Operation Flow

Control/data output via PROFINET is performed as follows.

Check the specifications

- Check whether the PLC to be connected supports the PROFINET connection.
- Check the input/output data assignments.

→ Preparation for the PROFINET Connection

▼

Change the PROFINET settings

Configure the settings for PROFINET communication between the device and the PLC.
Major setting items: PROFINET device name, and input/output data assignments

→ Changing the PROFINET Settings

▼

Establish the PROFINET link

Supply power to the device and start PROFINET cyclic communication. You can check whether a link has been established with cyclic communication from the [Utilities] menu - [Industrial Ethernet Communication Monitor] - [Communication Status].

▼

Execute necessary processing

Data output

Measurement result data assigned to the data output region can be output to the PLC.

- The measurement result data is written to the data output region assigned by the [Data Output (Industrial Ethernet)] tool and sent to the PLC.
- Result Ready (data transmission complete) turns ON and the PLC is notified that data has been transmitted.
- Completion of data reading by the PLC will be notified to this unit by Result Ack (data read complete) becoming ON.

→ Outputting measurement data via cyclic communication of PROFINET (Data Output)

Data input

Assign data in the data input region from the PLC to the setting parameters of respective tools and cells of the vision dashboard.
Load the input data received from the PLC at the timing when the data input tool is executed and reference them as measurement parameters in each tool.

I/O control

Use I/O control by assigning functions related to terminal control.

→ I/O Control via cyclic communication of PROFINET

Command control

Execute the command specified by the PLC.

- When Command Request (command execution) ON is received, the command specified by Command Number is executed with Command Parameter as argument.
- When command execution is complete, Command Complete (command execution complete) turns ON to notify the PLC that the command has been executed.

→ Controlling the VS Camera via cyclic communication of PROFINET (Command Control)

Preparation for the PROFINET Connection

#M015

PROFINET Connection Supporting Models

For details of the setting procedures for each PLC, refer to the instruction manual provided with the PLC.

Siemens PLCs

PLC model	PROFINET communication unit	Firmware version
SIMATIC S7-300 Series Example: CPU315-2 PN/DP	- (included in the main unit)	V2.6 and later
SIMATIC S7-400 Series Example: CPU414-3 PN/DP	- (included in the main unit)	V5.3 and later
SIMATIC S7-1200 Series Example: CPU1212C	- (included in the main unit)	V2.0 and later
SIMATIC S7-1500 Series Example: CPU1511 PN	- (included in the main unit)	V1.8.2

PROFINET Communication Specifications

The PROFINET communication of this system supports two types of communication: "data I/O communication (cyclic communication)" and "record data communication (non-cyclic communication)."

Data I/O communication (cyclic communication)

This is a function to make periodic communication at specified update time intervals and is suitable for real time control.

- The update time and communication size depend on the connection settings on the PLC (maximum communication size: 1408 bytes).

Record data communication (non-cyclic communication)

This is a communication method to use dedicated commands to access to a "record" which is a piece of byte information divided in the unit of 1024 bytes.

- Two types of commands, Read Record and Write Record, are available. When these commands are executed, a response to the command is returned.
- This method can be used for communication applications that do not require real time processing.
- It is possible to access to the region exceeding the maximum size allowed to the cyclic communication (1408 bytes).
- Ensure that the writing size is specified in units of 4 bytes.

- Each record is assigned with an index. Data is accessed based on the specified index and size. The accessible ranges for each piece of byte information are as follows:

Output data (received by the VS camera) - Read/write

Index	Accessible address	
	Start address	End address
1	0012	1035
2	1036	2059

Input data (sent from the VS camera) - Read only

Index	Accessible address	
	Start address	End address
10	0028	1051
11	1052	2075
12	2076	3099
13	3100	4123

- The Read Record and Write Record commands are issued from the PLC by using the "RDREC" (SFB 52) and "WRREC" (SFB 53) blocks respectively.

Point If the Write Record command is issued while the Parameter module is being written in the cyclic communication, memory area conflict may occur. Design the use of the Write Record command in such a way that memory area conflict with the cyclic communication will not occur.

Example of input data settings (from VS camera to Siemens SIMATIC S7-300 Series)

When the communication data size is 496

Setting status	Address (Byte)	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Fixed assignment region	0000	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Trigger Ready
	0001	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Trigger Ack
	0002	Error1 Status	Error0 Status	Reserved	Run Status	Result Ready	Reserved	Fail	Pass
	0003	Reserved	Reserved	Program Load Complete from SD Card	Program Load Complete	Reserved	Command Ready	Command Error	Command Complete
	0004	Soft Event 7 Ack (Assignable)	Soft Event 6 Ack (Assignable)	Soft Event 5 Ack (Assignable)	Soft Event 4 Ack (Assignable)	Soft Event 3 Ack (Assignable)	Soft Event 2 Ack (Assignable)	Soft Event 1 Ack (Assignable)	Soft Event 0 Ack (Assignable)
	0005	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
	0006	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
	0007	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
	0008	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge

Setting status	Address (Byte)	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Fixed assignment region	0009	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge
	0010	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge
	0011	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge	Tool Judge
	0012	Assignable (Error0 Code)							
	0013								
	0014								
	0015								
	0016	Assignable (Error1 Code)							
	0017								
	0018								
	0019								
	0020	Assignable (Program Number)							
	0021								
	0022								
	0023								
	0024	Assignable (Total Count)							
	0025								
	0026								
	0027								
Command region	0028	Command Result							
	0029								
	0030								
	0031								
	0032	Command Data 1							
	0033								
	0034								
	0035								
	0036	Command Data 2							
	0037								
	0038								
	0039								
	0040	Command Data 3							
	0041								
	0042								
	0043								
	0044	Command Data 4							
	0045								
	0046								
	0047								
	0048	Command Data 5							
	0049								
	0050								
	0051								
	0052	Command Data 6							
	0053								
	0054								
	0055								
Data output region	0056	Output Data1							
	0057								
	0058								
	0059								

Setting status	Address (Byte)	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Data output region	0060	Output Data2							
	0061								
	0062								
	0063								
	0064	Output Data3							
	0065								
	0066								
	0067								
	0068	Output Data4							
	0069								
	0070								
	0071								
	0072	Output Data5							
	0073								
	0074								
	0075								
	…								
	0484	Output Data108							
	0485								
	0486								
	0487								
	0488	Output Data109							
	0489								
	0490								
	0491								
	0492	Output Data110							
	0493								
	0494								
	0495								

Example of output data settings (from Siemens SIMATIC S7-300 Series to VS camera)

When the communication data size is 496

Setting status	Address (Byte)	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Fixed assignment region	0000	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Trigger
	0001	Reserved	Reserved	Reserved	Reserved	Reserved	Reset	Output Disable	Trigger Disable
	0002	Error1 Clear	Error0 Clear	Go to Setting	Go to Run	Result Ack	Result Handshake Enable	Reserved	Reserved
	0003	Reserved	Reserved	Program Load Execute from SD Card	Program Load Execute	Reserved	Reserved	Reserved	Command Request
	0004	Soft Event 7 (Assignable)	Soft Event 6 (Assignable)	Soft Event 5 (Assignable)	Soft Event 4 (Assignable)	Soft Event 3 (Assignable)	Soft Event 2 (Assignable)	Soft Event 1 (Assignable)	Soft Event 0 (Assignable)
	0005	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
	0006	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
	0007	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable	Assignable
	0008	Program Number							
	0009								
	0010								
	0011								
Command region	0012	Command Number							
	0013								
	0014								
	0015								
	0016	Command Parameter 1							
	0017								
	0018								
	0019								
	0020	Command Parameter 2							
	0021								
	0022								
	0023								
	0024	Command Parameter 3							
	0025								
	0026								
	0027								
	0028	Command Parameter 4							
	0029								
	0030								
	0031								
	0032	Command Parameter 5							
	0033								
	0034								
	0035								
	0036	Command Parameter 6							
	0037								
	0038								
	0039								

Setting status	Address (Byte)	7bit	6bit	5bit	4bit	3bit	2bit	1bit	0bit
Data input region	0040	Input Data 1							
	0041								
	0042								
	0043								
	0044	Input Data 2							
	0045								
	0046								
	0047								
	0048	Input Data 3							
	0049								
	0050								
	0051								
	0052	Input Data 4							
	0053								
	0054								
	0055								
	0056	Input Data 5							
	0057								
	0058								
	0059								
	…								
	0484	Input Data 112							
	0485								
	0486								
	0487								
	0488	Input Data 113							
	0489								
	0490								
	0491								
	0492	Input Data 114							
	0493								
	0494								
	0495								

Changing the PROFINET Settings

#M016

To perform PROFINET communication with the PLC, configure the settings such as the destination PLC PROFINET device name, data storage method, and send/receive-data assignment.

Point Assignment of the send-data, such as measurement tool settings and result data, system properties, and Vision Dashboard cell contents, are configured using the [Data Output (Industrial Ethernet)] tool. For the setting method, also refer to the description of the [Data Output (Industrial Ethernet)] tool.

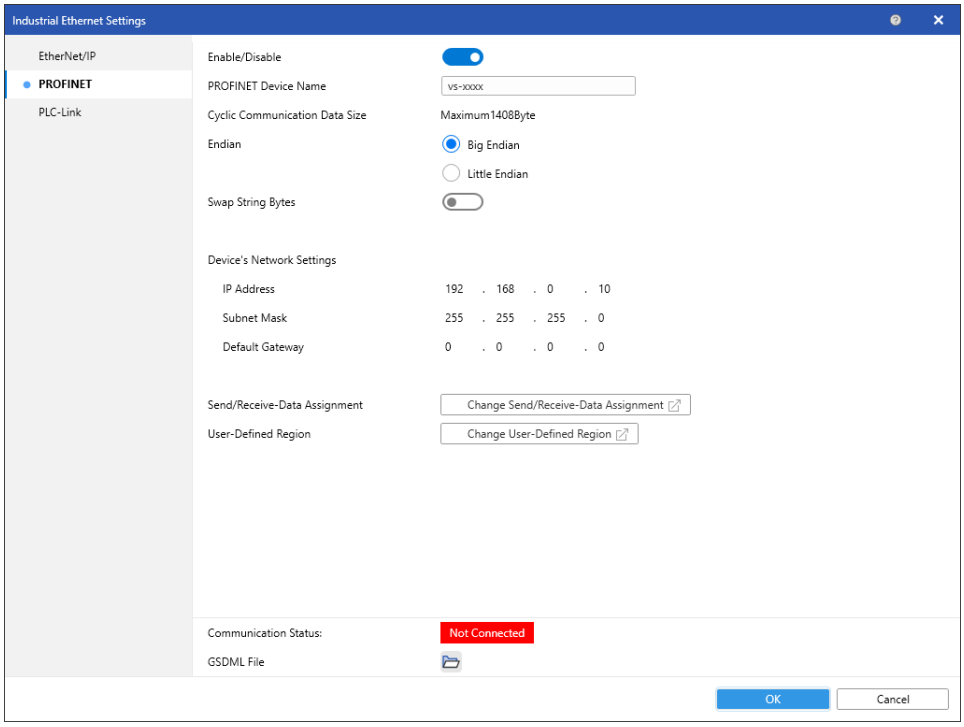
1 Select [Industrial Ethernet Settings] from the [Global Settings] menu.
The [Industrial Ethernet Settings] dialog box appears.

2 Click [PROFINET].

3 Enable [Enable/Disable].

Point If one of the communication protocols is enabled at the timing when you try to enable another protocol, a confirmation message will appear asking whether to disable the currently enabled communication protocol. Click [OK] to disable the currently enabled communication protocol and switch to the new communication protocol.

4 If necessary, change the settings such as the PROFINET device name, data storage method, and send/receive-data assignment.
→ Layout of the Screen (for EtherNet/IP and PROFINET)



5 When settings are complete, click [OK].
This saves the settings and closes the dialog box.

Point If you have changed the protocol enable/disable or the PROFINET device name, you will see a reboot confirmation message after clicking [OK]. A reboot is required for the settings to take effect.

- [Save and Reboot Now]: Save the global settings and the program setting and reboot the device.
- [Reboot Later]: Closes the message. Rebooting the device using [Reboot] in the [System] menu will apply the settings.

Outputting measurement data via cyclic communication of PROFINET (Data Output)

#M017

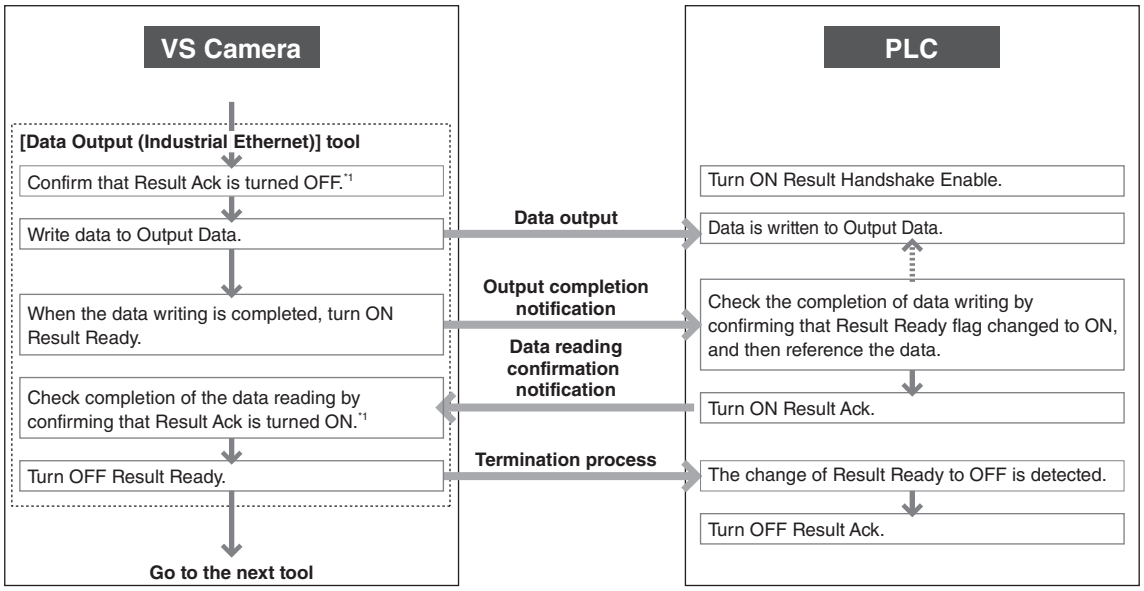
The settings and results data of the measurement tool, system properties, cell contents of the Vision Dashboard, etc., that have been assigned to the send data with the [Data Output (Industrial Ethernet)] tool, are output to the PLC via PROFINET cyclic communication.

Point PROFINET cannot be used at the same time with other communication protocols.

Data Output Flow

You can set the data to be output using the [Data Output (Industrial Ethernet)] tool. Use the following procedures for outputting data from the VS camera by PROFINET.

Reference
- When outputting PROFINET data output in Setup Mode, enable Data (Industrial Ethernet) in Output Check Settings.
- With PROFINET, images and other binary data cannot be output.

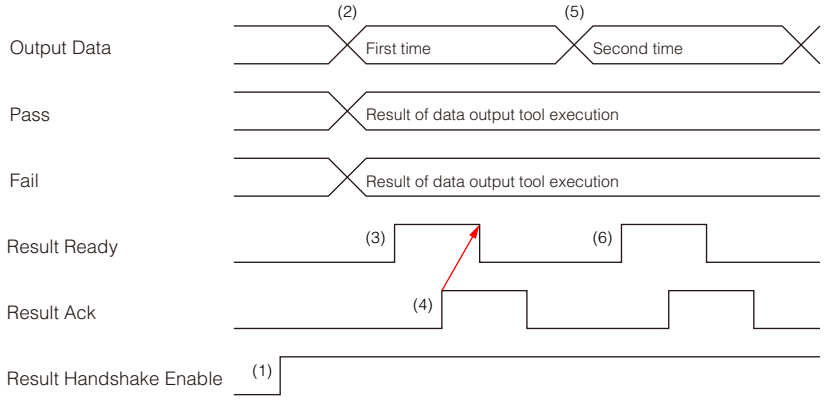


*1: This is the procedure when handshake is set to ON. When handshake is set to OFF, regardless of the Result Ack flag status, the VS camera overwrites the corresponding data memory when the [Data Output (Industrial Ethernet)] tool is executed, and the Result Ready remains ON. If the process requires writing completion confirmation by detecting the change of Result Ready from OFF to ON, turn ON Result Ack to turn OFF Result Ready.

Point
- Be careful that the data range used for data output does not overlap the command response data.
- When the result data of the [Data Output (Industrial Ethernet)] tool is output, Pass, Fail, and Total Count are output to the fixed-assigned area at the execution of the [Data Output (Industrial Ethernet)] tool. They are not output at the end of the task.

Timing Chart

When handshake is ON



(1) The PLC raises Result Handshake Enable.

(2) The first data is stored in the Output Data region.
Stores the total status (Pass/Fail) when executing the data output tool (when storing in the buffer).

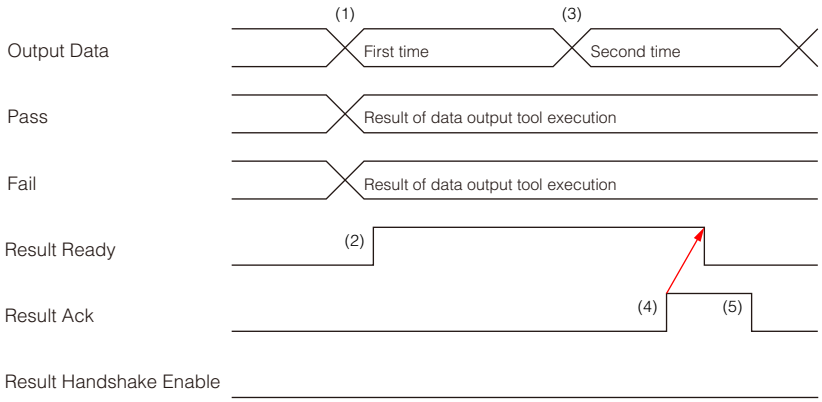
(3) The VS camera raises Result Ready when the data is stored.

(4) When the PLC finishes reading data, it raises Result Ack to signal the completion of data read.
At the rise of Result Ack, the VS camera drops Result Ready.

(5) With the fall of Result Ack, the next update data is output if there is any.

(6) The VS camera raises Result Ready when the next data is set.

When handshake is OFF



(1) The first data is stored in the Output Data region.
Stores the total status (Pass/Fail) when executing the data output tool (when storing in the buffer).

(2) The VS camera raises Result Ready when the data is stored.

(3) When handshake is OFF, the next data is set regardless of the fall of Result Ack.

(4) When the PLC raises Result Ack, The VS camera raises Result Ready.

(5) The PLC drops Result Ack.
With this, the VS camera knows when to set the next data.

I/O Control via cyclic communication of PROFINET

#M018

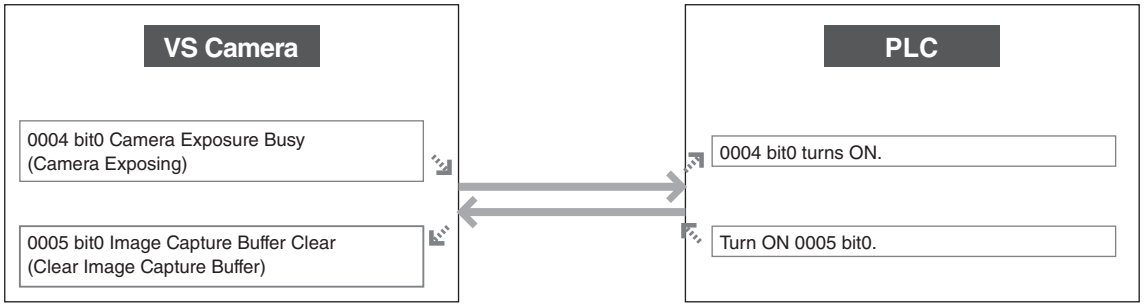
Change the settings to perform via PROFINET the same input/output as the power I/O interface.

Point PROFINET cannot be used at the same time with other communication protocols.

I/O Control Flow

By assigning the functions related to terminal control to bit devices, you can use multiple I/O signals with a single LAN cable.

Reference With PROFINET, images and other binary data cannot be output.



Point Although each I/O signal is interlocked with operation of the terminal block, the PROFINET performs regular communications. If the signal fluctuates at high speed, the PROFINET may not be able to pick up some of these fluctuations. Set the RPI value considering the signal change time used.

Controlling the VS Camera via cyclic communication of PROFINET (Command Control)

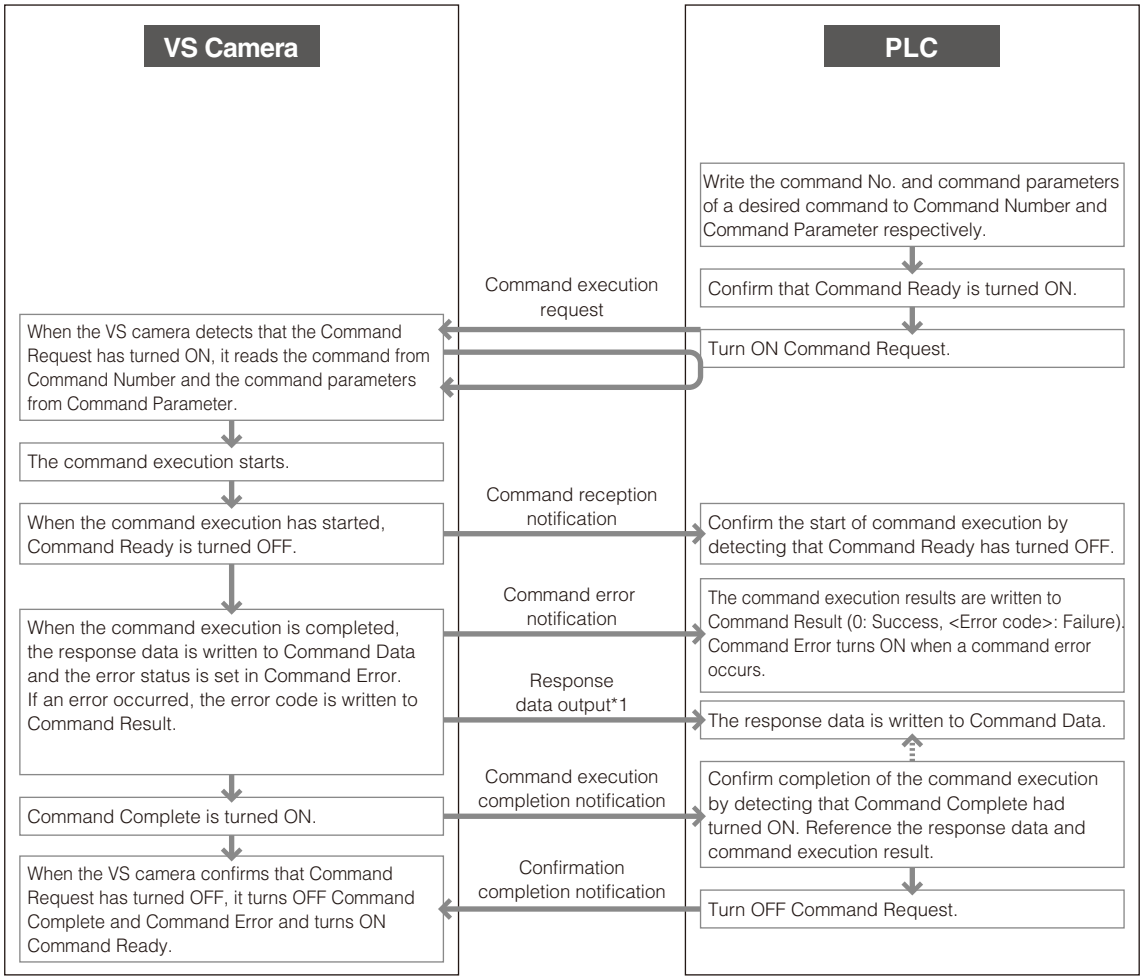
#M019

Commands configured from the PLC can be executed at a desired timing.

Point PROFINET cannot be used at the same time with other communication protocols.

Command Processing Flow with PROFINET

Use the following procedure for using commands to control the VS camera with the PROFINET.

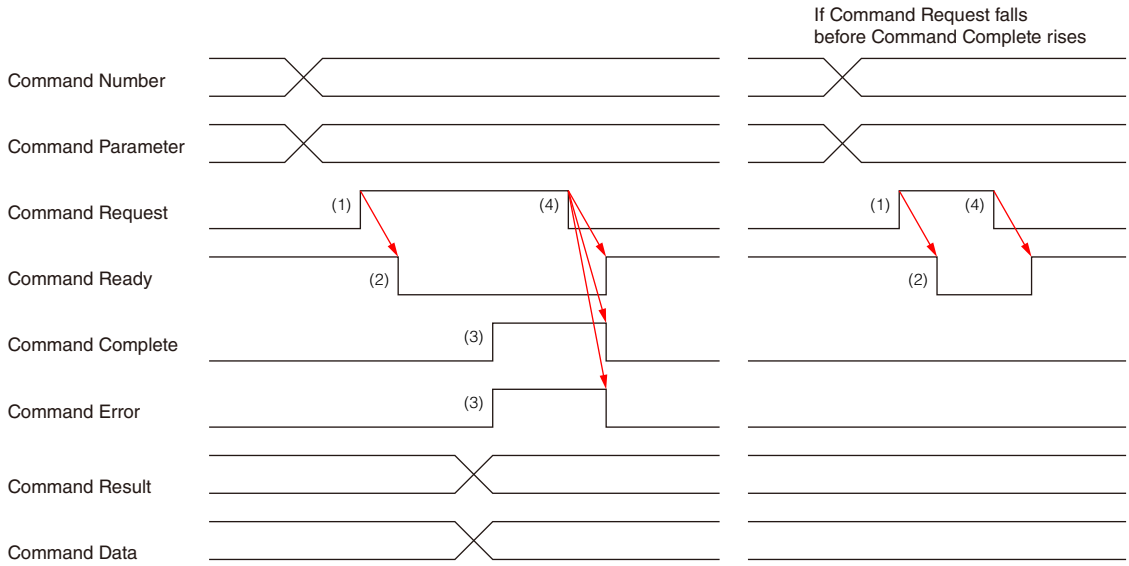


*1: No response data will be output to the Command Data for commands without response data.

Reference When a command error occurs, the command execution result is written to Command Result (0: Success, <Error code>: Failure).

Point In order to confirm that the VS camera has set Command Complete to ON from the PLC side, you need to keep Command Request ON until Command Complete is turned ON. If Command Request is set to OFF before Command Complete is set to ON, Command Complete will not be set to ON even if the command is completed.

Timing Chart



(1) Load Command Number and Command Parameter at the rising edge of Command Request.

(2) Command Ready falls when command acceptance is completed.

(3) At the completion of a command execution, the execution results are stored in Command Result and Command Data and the Command Complete will rise.
Command Error also rises if an error occurs.
If Command Request has fallen at this timing, Command Complete and Command Error will not rise.

(4) Command Ready rises at the fall of Command Request.
Command Complete and Command Error are also lowered at the same time.

Point In order to confirm that the VS camera has set Command Complete to ON from the PLC side, you need to keep Command Request ON until Command Complete is turned ON. If Command Request is set to OFF before Command Complete is set to ON, Command Complete will not be set to ON even if the command is completed.

Control/Data Output via PLC-Link

This section describes device control and data output via PLC-Link.

Overview of Control/Data Output via PLC-Link

#M030

Using the PLC-Link via Ethernet interface enables the following functions.

- **Output Data via PLC-Link**: Measurement data of the device can be output directly to the DM (data memory) in the PLC.
- **Control the Device via PLC-Link**: The device can be controlled by making it read the commands in the DM (data memory) in the PLC.

Reference
- For DM, data register (D) is used in Mitsubishi Electric Corporation PLCs.
- PLC link cannot be used at the same time with other communication protocols.

Usage Examples of PLC-Link

Controlling the VS Camera

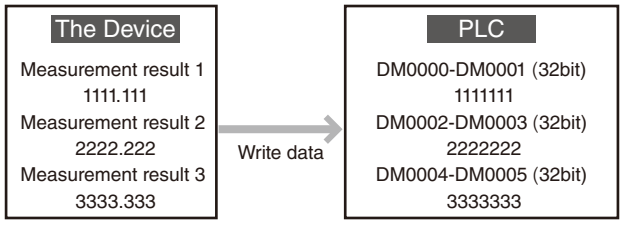
Commands can be instructed and used to control the VS camera.

Reference
- The device reads the command No. that has been entered in advance into the PLC's DM and the command parameters required for the command by polling, and executes the command.
- The command No. corresponding to the command is stored in the DM in 16-bit binary and the command parameters in 32-bit (little endian) binary.

Outputting Data

The [Data Output (Industrial Ethernet)] tool allows you to set the data to be output to the byte region, and output the data.

- **Example of Outputting Measurement Results 1 through 3 to KV Series**



(The notation is for fixed decimal points.)

– For each trigger input, the device's measurement results are written to the DM of the set PLC.
– Two DMs (32 bit) are used per measurement result.

Point
In a network where many devices, including this device, are connected, delays or packet losses may occur sometimes when a heavy load is applied to the network constantly or temporarily. Perform a thorough verification before operation.

Operation Flow

#M031

Control/data output via PLC-Link is performed as follows.

Checking specifications

- Check if the PLC to be connected is a model which supports PLC-Link connection.

→ Preparing PLC-Link Connection

▼

Changing PLC-Link settings

Configure the settings for PLC-Link communication between the device and the PLC.
Main setting items: PLC type, communication settings, address settings

→ Changing PLC-Link Settings

▼

Establishing the link for PLC-Link

Supply power to the device and initiate PLC-Link communication. You can check whether a link has been established for communication from the [Utilities] menu - [Industrial Ethernet Communication Monitor] - [Communication Status].

▼

Executing necessary processing

Data Output

Measurement result data assigned to the data output region can be output to the PLC.

- The measurement result data is written to the data output region assigned by the [Data Output (Industrial Ethernet)] tool and sent to the PLC.
- Data Output Complete Address turns ON and the PLC is notified that data has been transmitted.
- Completion of data reading by the PLC will be notified to the device by Data Output Control Address becoming ON.

→ Outputting Measurement Data via PLC-Link (Data Output)

Command Control

The command specified by the PLC can be executed.

- When the ON state of the Command Execution Address is received, the command specified by the Command No. is executed with Command Parameter as argument.
- When command execution is complete, Command Complete Address turns ON to notify the PLC that the command has been executed.

→ Controlling the VS Camera via PLC-Link (Command Control)

Preparing PLC-Link Connection

#M032

Model compliant with PLC-Link connection

For details of the setting procedures for each PLC, refer to the instruction manual provided with the PLC.

Keyence PLC

Series Name	Target System	Link Unit	PLC Type
KV	KV-700, KV-1000	KV-LE20, KV-LE20A	KV Series
	KV-3000, KV-5000*1, KV-5500*1	KV-LE20V, KV-LE21V, KV-EP21V*2	
	KV-7300, KV-7500*1, KV-8000*1	KV-LE20V, KV-LE21V, KV-EP21V, KV-XLE0.2	
	KV Nano	KV-NC1EP	
KV-X	KV-X310*1, KV-X500*1, KV-X520*1, KV-X530*1, KV-X550*1	KV-XLE02	

*1: The Ethernet interface connection of the device is also supported.

*2: For KV-3000, KV-5000, and KV-5500, only CPU version 2 or later can be used.

Mitsubishi Electric Corporation PLC

Series Name	Target System	Link Unit	PLC Type
MELSEC-Q	Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q02UCPU, Q03UDECPU*1, Q04UDEHCPU*1, Q06UDEHCPU*1, Q10UDEHCPU*1, Q13UDEHCPU*1, Q20UDEHCPU*1, Q03UDVCPU*1, Q04UDVCPU*1, Q06UDVCPU*1, Q13UDVCPU*1, Q26UDVCPU*1	QJ71E71, QJ71E71-100	MELSEC Q/L Series
MELSEC-L	L02CPU*1, L26CPU-BT*1	None*2	
MELSEC iQ-R	R04CPU*1	RJ71EN71	
MELSEC iQ-F	FX5U*/FX5UC*1	None*2	

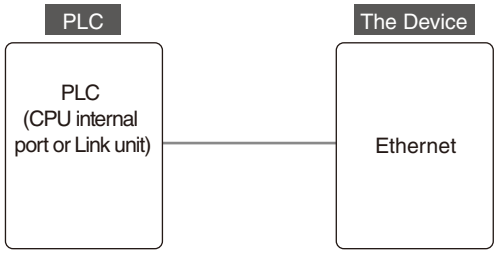
*1: The Ethernet interface connection of the device is also supported.

*2: Connection via a link unit is not supported.

Connecting the Device to a PLC

#M033

Connect the device and a PLC as shown in the diagram below.



Point

- Ensure that the IP address does not overlap with other devices.
- Leave the subnet mask setting at the default setting for direct connection. For other connections, set it according to the network configuration, but the setting must be the same for all connected devices.
- The port number for the communication port settings, “9010”, cannot be used because it is reserved for the device.
- Use an STP cable of Category 5e or higher for the connection. Use a cross cable for direct connection and a straight cable for connection via a hub.

When connecting to Keyence KV series

Set using KV BUILDER or KV STUDIO.

- **IP Address**: Set the IP address specified in [Communication Target IP Address] in the device's PLC-Link Settings.
- **Port No. (VT)**: Set the port No. specified in [Communication Target Port] in the device's PLC-Link Settings.

When connecting to MELSEC (link unit)

For Q series

Set in the network parameters of GX-Developer or GX Works 2.

- **MELSECNET/Ethernet**
  - **Network type**: Select [Ethernet].
  - **Mode**: Select [On line].
- **Operation Settings**
  - **Communication data code setting**: Select [Binary code].
  - **Initial timing setting**: Select [Always wait for OPEN].
  - **IP Address Settings**: Set the IP address specified as the destination address in the device's PLC link settings.
  - **Send frame setting**: Select [Ethernet (V2.0)].
  - **Allow Writing During RUN**: Select the check box.

For iQ-R series

Set in the unit parameters of GX Works 3. From the unit list in [Primary Settings] > [Destination Device Connection Configuration Settings] > [Detailed Settings], add [UDP Connection Device] to the Ethernet configuration and set as follows.

- **Communication Method**: Select either [Fixed Buffer (with procedures)] or [Random Access Buffer].
- **Sequencer (Port Number)/Sensor/Device (Port Number)**: Set the PLC port number for both (setting range: 1025 to 4999, 5010 to 65534 (excluding 9010)).
- **Sensor/Device (IP Address)**: Set the IP address of the device.
- **Life Check**: Select [Do not check life check].
- **Allow Writing During RUN**: Select [Allow].

When connecting to MELSEC (internal Ethernet port)

Point

- The built-in Ethernet port does not support Auto open UDP port (port number default: 5000) like the QJ71E71-100. Specify the communication target port of the device to 1025 to 4999 or 5010 to 65535 (excluding 9010).
- Do not connect multiple VS cameras to one port number. When connecting multiple VS cameras via a hub, set different communication target port numbers for each VS camera, and set multiple local port numbers corresponding to them.

For Q/L series

Set in the PC parameter settings of GX-Developer or GX Works 2.

- **Internal Ethernet Port Settings**
  - **IP Address**: Set the IP address specified as the destination address in the device's PLC link settings.
  - **Communication Data Code Settings**: Select [Binary Code Communication].
  - **Allow Writing During RUN**: Select the check box
- **Open Settings**
  - **Protocol**: Select [UDP].
  - **Open Method**: Select [MC Protocol].
  - **Local node port number**: Specify a hexadecimal value within the range 0401 to 1387, and 1392 to FFFE. Numbers from 1388 to 1391, 2332 (5000 to 5009, 9010 in decimal) are reserved. In the [Communication Target Port] field of the device, enter the value entered here (the hexadecimal value) expressed as a decimal value (for example, if the local node port number is 1387, enter 4999 in this field).

For iQ-R/iQ-F series

Set in the unit parameters of GX Works 3.

- **Local Node Settings**
  - **IP Address**: Set the IP address specified as the destination address in the device's PLC link settings.
  - **Communication Data Code Settings**: Select [Binary].
  - **Allow/Disallow Writing During RUN Settings**: Select "Allow all at once (SLMP)" (only for iQ-R).
- **Destination Device Connection Configuration Settings**: From the unit list in [Primary Settings] > [Destination Device Connection Configuration Settings] > [Detailed Settings], add [SLMP Connection Device] to the Ethernet configuration and set as follows.
  - **Protocol**: Select [UDP].
  - **Sequencer (Port Number)**: Set the PLC port number (setting range: 1025 to 4999, 5010 to 65534 (excluding 9010)).

– **Sensor/Device (IP Address)**: Set the IP address of the device.

Changing PLC-Link Settings

#M034

To establish a PLC-Link, configure the PLC type and address of the destination.

Point

- Assignment of the send-data, such as measurement tool settings and result data, system properties, and Vision Dashboard cell contents, are configured using the [Data Output (Industrial Ethernet)] tool. For the setting method, also refer to the description of the [Data Output (Industrial Ethernet)] tool.
- The range of data memory that can be specified when specifying the data memory for setting items is as follows. When using a PLC other than those listed below, specify the range of data memory that subtracts 2000 from the upper limit of data memory that can be used by the PLC.
  –KV Series: 0 to 63534 (0 to 17999 for KV-700, 0 to 30767 for KV Nano)
  –MELSEC Q/L/iQ-R/iQ-F Series: 0 to 30767
- If writing outside the data memory range occurs, a communication interruption error message will be displayed. Also, the range of data memory that can actually be used depends on the specifications and settings of the PLC even within the same series, so the maximum range may not always be available.

1 Select [Industrial Ethernet Settings] from the [Global Settings] menu.
The [Industrial Ethernet Settings] dialog box appears.

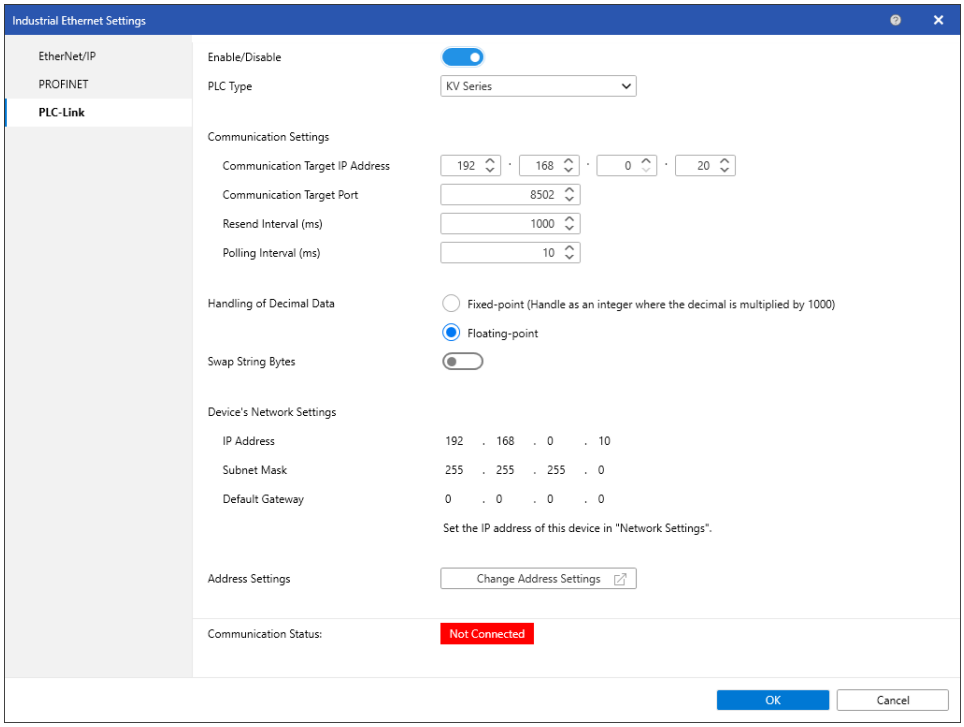
2 Click [PLC-Link].

3 Enable [Enable/Disable].

Point

If any communication protocol is enabled at the time when you try to enable another protocol, a confirmation message will appear asking whether to disable the currently enabled communication protocol. Click [OK] to disable the currently enabled communication protocol and switch to the new communication protocol.

4 If necessary, change the settings such as the PLC type to be connected, communication, network, and address.
→ Layout of the Screen (for PLC-Link)



5 When settings are complete, click [OK].

This saves the settings and closes the dialog box.

Point If you have changed the protocol enable/disable or the PLC type, you will see a reboot confirmation message after clicking [OK]. A reboot is required for the settings to take effect.

- **Save and Reboot Now**: Saves the global settings and the program setting and reboots the device. The main screen will appear when the reboot is complete.
- **Reboot Later**: Closes the message. Rebooting the device using [Reboot] in the [System] menu will apply the settings.

Outputting Measurement Data via PLC-Link (Data Output)

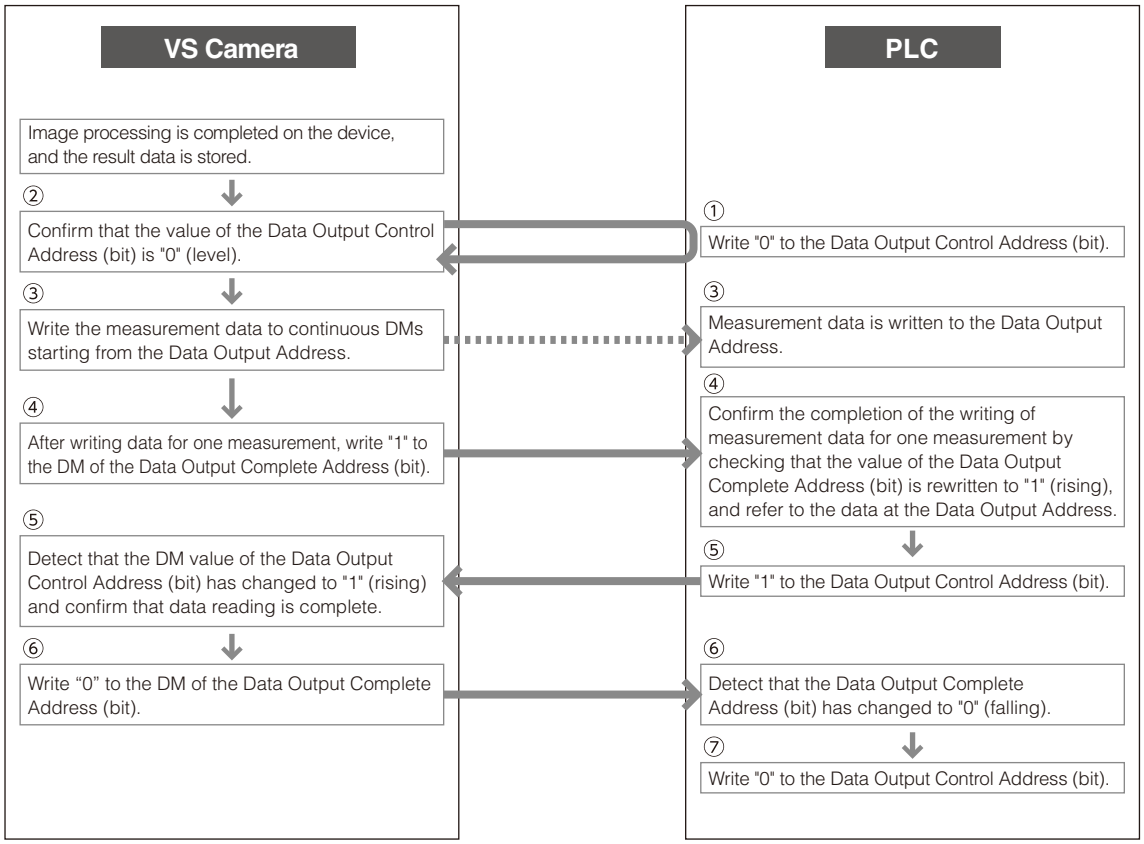
#M035

The settings and results data of the measurement tool, system properties, cell contents of the Vision Dashboard, etc., that have been assigned to the send data with the [Data Output (Industrial Ethernet)] tool, are output to the PLC via PLC-Link.

Point PLC-Link cannot be used at the same time with other communication protocols.

Data Output Flow

You can set the data to be output using the [Data Output (Industrial Ethernet)] tool. Use the following procedures for outputting data from the VS camera by PLC-Link.



Point

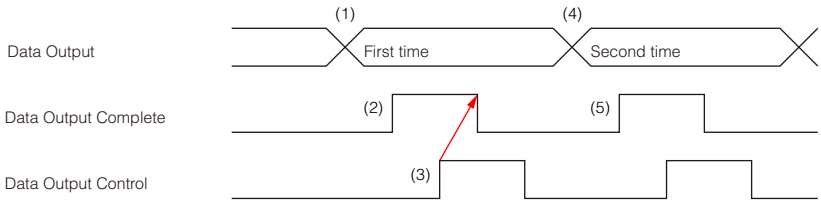
When outputting data via PLC-Link, set it as follows.

- Select the check box for [Industrial Ethernet Settings] - [Change Address Settings] - [Notify Data Output Completion].
  - –If only the latest result data is to be acquired at the PLC side, turning OFF [Notify Data Output Completion] will suppress the checking of the value of the result output control-related addresses (bit) in steps 2, 4, 5, and 6, which can reduce the time required for result output.
  - –When [Notify Data Output Completion] is turned OFF, the device outputs the result data regardless of whether the PLC has finished reading data. In this case, the PLC cannot confirm that the result data has been updated.
- Turn ON [Handshake] in [Options] of the [Data Output (Industrial Ethernet)] tool.
- Be careful that the data range used for data output does not overlap the command response data.

Reference

- When outputting PLC-Link data output in Setup Mode, enable Data (Industrial Ethernet) in the Output Check Settings.
- With PLC-Link, images and other binary data cannot be output.
- If all [Data Output (Industrial Ethernet)] tools on the flow are not executed, no data will be output. In this case, the Data Output Complete Address will not change.

Timing Chart



(1) The first data is stored in the Data Output region.
The total status (Pass/Fail) at the time the data output tool is executed (the time of buffer storage) is stored.

(2) The VS camera raises Data Output Complete when the data is stored.

(3) When the PLC finishes reading data, it raises Data Output Control to signal the completion of data read. At the rise of Data Output Control, the VS camera drops Data Output Complete.

(4) With the fall of Data Output Control, the next update data is output if there is any.

(5) The VS camera raises Data Output Complete when the next data is set.

Controlling the VS Camera via PLC-Link (Command Control)

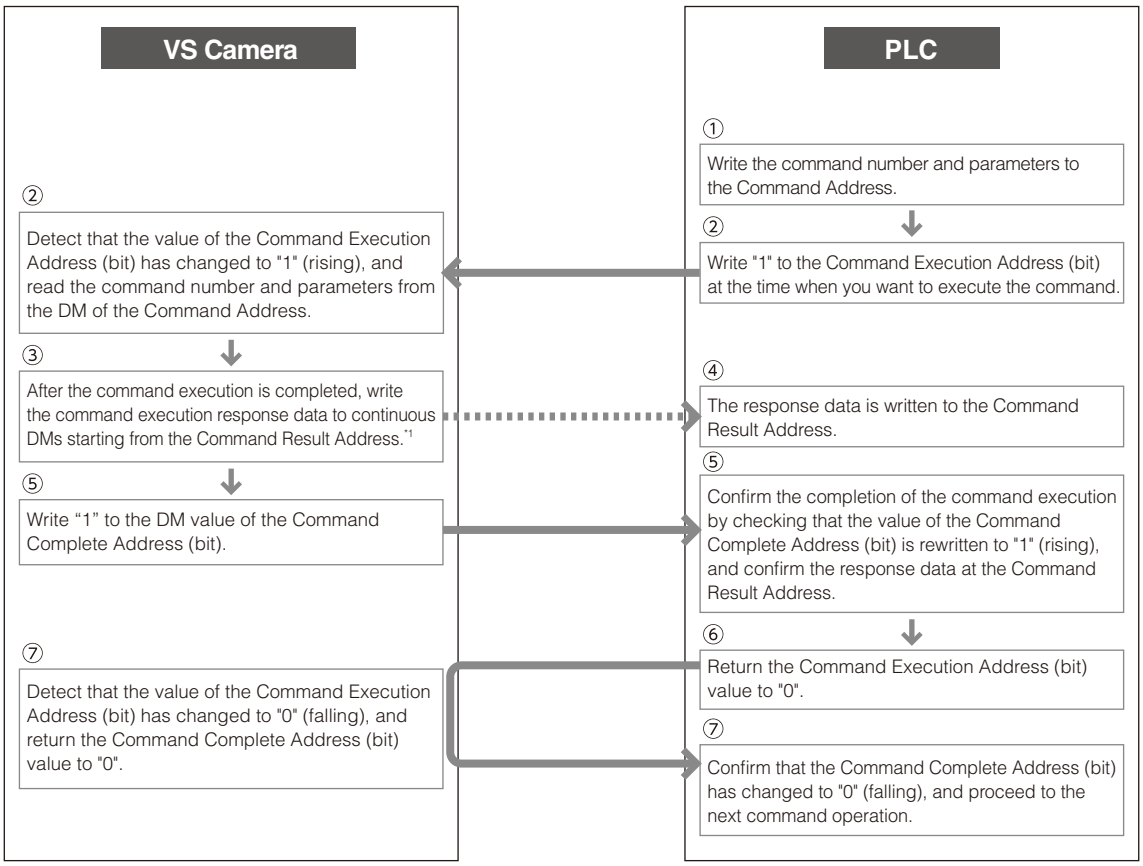
#M036

Commands configured from the PLC can be executed at a desired timing.

Point PLC-Link cannot be used at the same time with other communication protocols.

Command Processing Flow with PLC-Link

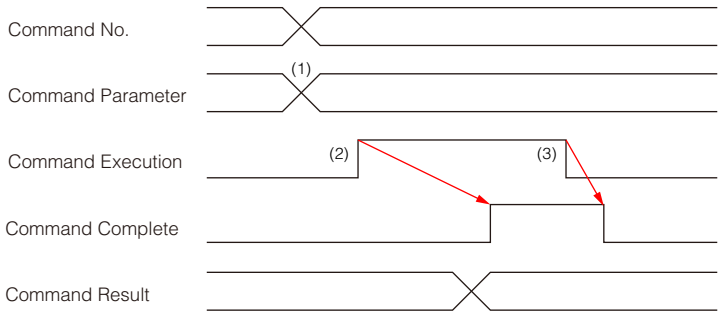
Use the following procedure for using commands to control the VS camera with PLC-Link.



*1: No response data will be output to the Command Result Address for commands without response data.

Reference The command execution result is written to Command Result Address (0: Success, <Error code>: Failure).

Timing Chart



(1) Load Command Number and Command Parameter at the rising edge of Command Execution.

(2) At the completion of a command execution, the execution results are stored in Command Result and the Command Complete will rise.

(3) At the fall of Command Execution, Command Complete is also lowered.

Control/Data Output via Non-Procedural Communication

This section describes device control and data output in non-procedural mode via the Ethernet communication port.

Preparing for Non-procedural Communication

#M020

Non-procedural communication is a protocol in which Control/Data Output via communication is performed without exchanges such as response confirmation between the data sender and receiver. Once the sending device is ready to send, it will send directly to the receiving device. The receiving device receives the sent data as is. It does not have the ability to check whether data are sent/received correctly or to resend data, but you can easily connect devices to each other without complicated settings.
The device connects with a computer via an Ethernet cable, and measured values and judgment results can be output, and the device can be controlled via the Ethernet. Refer to "Control via Commands" for more details on controlling.

Point

- Consult your system administrator or network administrator when connecting to an existing LAN. If any incorrect settings are made, the device as well as other network equipment may not work properly.
- The data outputted from the device may be truncated, depending on the network conditions. (The device does not resend data with packet loss.)
- Some delays may occur during data transmission between the network and the device, depending on the network conditions. If responsiveness is required, such as to a trigger input, communicating via the I/O interface is recommended.
- If a firewall is present on the network, the connection may fail. In this case, you need to disable the firewall or take other measures. For details, consult your network administrator or the manufacturer of the PC.
- Use the network equipment (such as hubs and LAN cables) that is intended for use in a factory environment. Using commercial equipment meant for office applications may cause unstable operation.

Changing the Non-Procedural Communication Settings

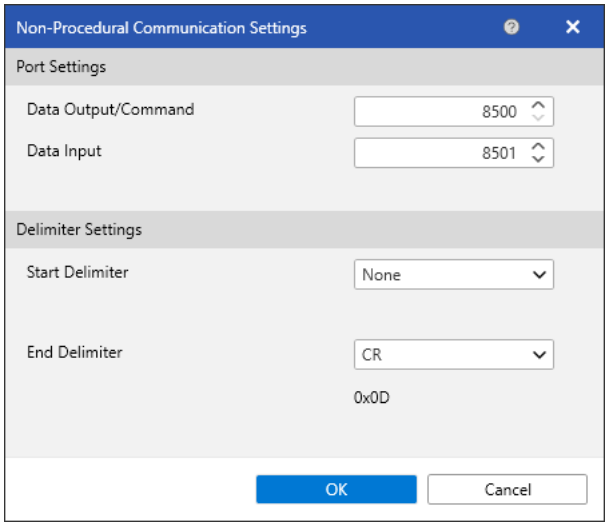
#M021

Configure the port number to be used for non-procedural communication and the start/end delimiter to be added to the data.

Point Assignment of the send-data, such as measurement tool settings and result data, system properties, and Vision Dashboard cell contents, are configured using the [Data Output (Non-Procedural)] tool. For the setting method, also refer to the description of the [Data Output (Non-Procedural)] tool.

1 Select [Non-Procedural Communication Settings] from the [Global Settings] menu.
The [Non-Procedural Communication Settings] dialog box appears.

2 If necessary, change the port number to use and the start/end delimiter to be added to the data.
→ Setting the Ports and Delimiters for Non-Procedural Communication

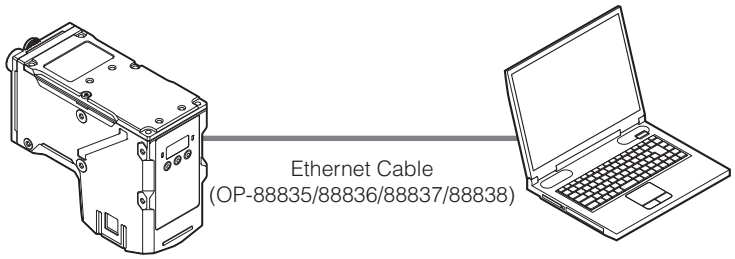


3 When settings are complete, click [OK].
This saves the settings and closes the dialog box.

One-to-one connection of the device with a PC

#M022

This section describes how to prepare and communicate when the device is controlled in a one-to-one connection with a PC, and not via the LAN. To connect, an optional Ethernet Cable (OP-88835/88836/88837/88838) should be used.



Connecting the device to a PC

1 Change the TCP/IP settings on the device.
This device uses the TCP/IP settings in [Network Settings] in the [Connect to Device] dialog box as its TCP/IP settings.

2 Change the TCP/IP settings on the PC.
Set the same subnet mask as this device and set an IP address that does not overlap with this device.

3 Turn off the device and the PC, and connect the Ethernet connector on the PC to the Ethernet port of the device using an Ethernet cable.

4 Turn on the device and the PC.

5 Open [Command Prompt] on the PC and use the "ping" command to check the connection.
If the device and the PC are properly configured and connected, a message "Reply from (the IP address of the device) : " will appear.
If you see the message "Request has timed out.", the settings and connection between the device and the PC were not properly performed. Check that the steps from 1 to 3 have been properly performed.

An example of communicating with the device using Telnet software and non-procedural mode

You can use Telnet software to communicate with the device. In this example, the operation process using Tera Term (freeware) is described.

Reference See the following URL for details on Tera Term (as of August 2023).
ja.osdn.net/projects/ttssh2/releases/

1 Prepare Telnet software on your PC.
Install Telnet software such as Tera Term (freeware).

2 Start Telnet software on your PC and configure settings for the host.
- Host: Enter the IP address (default: 192.168.0.10) of the device.
- Port: Enter the communication port (default: 8500) specified for the device.

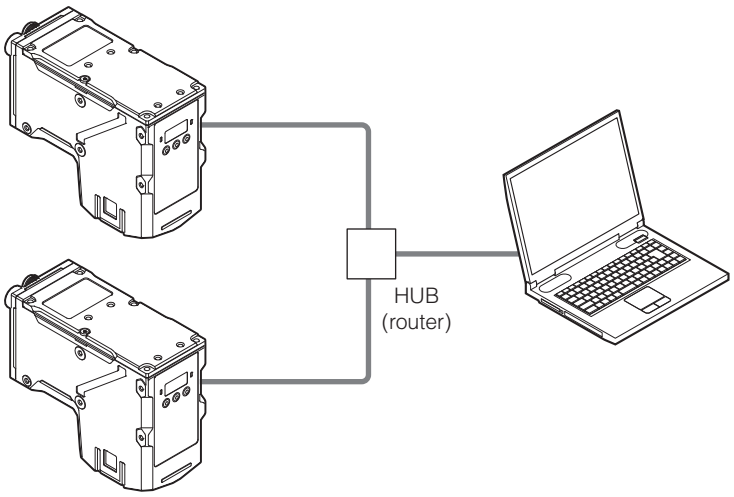
3 Connect to the host.

4 If Tera Term is used, click [OK] after configuring the host settings.
Refer to "Command" for more details on the communication command system.

One-to-n connection of the devices with a PC

#M023

This section describes how to set up communications when more than one device is controlled by one PC via LAN.



Differences from one-to-one connection

Preparation and control methods for one-to-n connection are basically the same as those for one-to-one connection. However, note that the following points differ.

- To connect multiple VS cameras, a hub or router that supports 1000BASE-T or 100BASE-TX is required. (Keyence recommends 1000BASE-T.)
- To connect a VS camera to a hub (or router), an optional Ethernet Cable (OP-88835/88836/88837/88838) should be used.
- The IP addresses of the VS cameras on the network and that of the PC must be different to avoid overlap.
  An example of using two VS cameras (In this example the subnet mask of the device and PC is 255.255.255.0)
  - IP address of the first VS camera: 192.168.0.10 (default)
  - IP address of the second VS camera: 192.168.0.11 (changed because the default value overlaps)
  - IP address of the PC: 192.168.0.12 (set to a different address that does not overlap with the VS cameras and other devices on the network)
- If a router is used, the Ethernet settings of the VS cameras must be changed according to the settings of the router. For more details, see the instruction manual of the router or consult your system or network administrator.

Notes on one-to-n connections

- Multiple VS cameras on the network cannot exchange data with each other nor control each other.
- The maximum number that can be connected at once to a computer depends on the specifications of the connection destination software and hardware. For more details, contact the manufacturer of the connection destination software and hardware.

- Consult your system administrator or network administrator when connecting to an existing LAN. If any incorrect settings are made, the device, as well as other network equipment may not work properly.
- The communication speed and/or connection stability may vary depending on the combination of connected devices and the network status. Make sure to check the operational functionality of the network before starting actual operation.

Outputting data via non-procedural communication (data output)

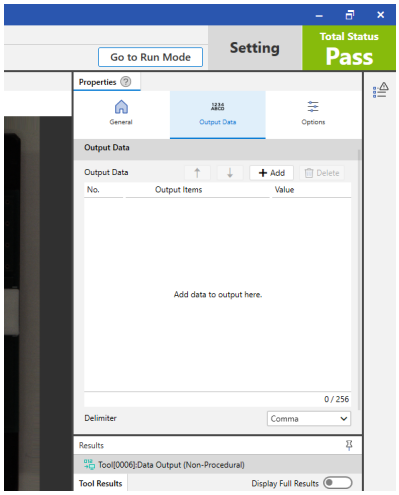
#M024

Set the data to be output via non-procedural communication using the [Data Output (Non-Procedural)] tool.

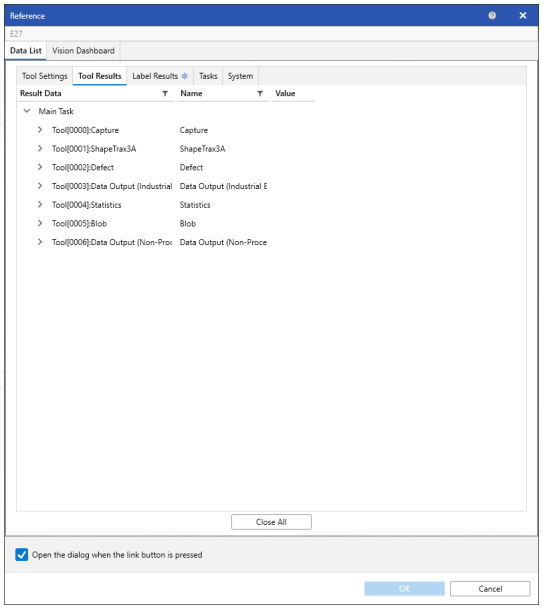
Reference

- The data output via non-procedural communication is performed only when the device is in Run Mode. Data is not output in Setup Mode.
- With non-procedural communication, images and other binary data cannot be output.
- When none of the [Data Output (Non-Procedural)] tools in the workflow is executed, no data will be output.

1 In the [Task] view, add the [Data Output (Non-Procedural)] tool to the task.
→ "Adding a Tool"
The [Properties] view switches to the setting items for the [Data Output (Non-Procedural)] tool.

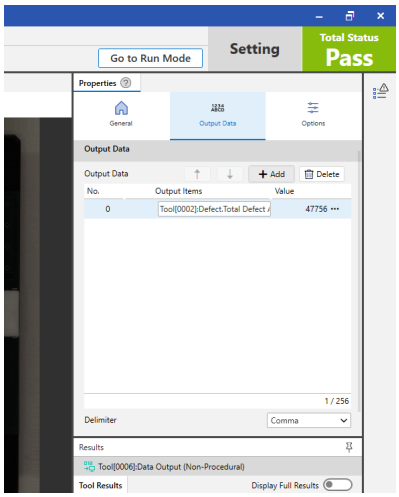


2 In the [Output Data] tab of the [Properties] view, click [Add].
The [Reference] dialog box appears.



3 Select the data to be output and click [OK].

The selected data is added to the list of output data.



4 Select the delimiter character to be inserted between the data in [Delimiter].

5 If there is more data to output, repeat steps 2 to 3 to add the output data.

Reference Up to 256 data can be added.

For format settings of the output data, refer to [Input/Output] - [Data Output (Non-Procedural)] - [Output Data] - "Configuring Output Data".

FTP Client/Server Function

This section describes how to use the FTP client and FTP server functions of this device.

Using the FTP Client/Server Functions

#M025

This device supports both FTP client and FTP server functions.

FTP Client function

This function allows the device to serve as an FTP client and output data/images to an external FTP server. You can output files by specifying an FTP server as the output destination. Files can also be output to an FTP server that supports SFTP (SFTP: SSH File Transfer Protocol).

FTP Server function

By setting the device to function as an FTP server, the device's internal storage and/or SD card can be directly accessed from an external FTP client so that files can be sent and received, and deleted, and folders can be created/deleted.

Outputting Data/Images via FTP Communication (FTP Client Function)

#M026

Data and images can be output to an external FTP server as the output destination.
You can configure the settings related to the output destination FTP server in [Target FTP Settings] under the [Global Settings] menu and the settings related to the data to be output in the [Data Output (FTP/Storage)] and [Image Output (FTP/Storage)] tools.

Point

- The output target data are as follows.
  –Tool results data
  –Label results data
  –Task data
  –Vision Dashboard cell date
  –System properties
  –Image data
  The output of other data and files is not supported. To output data other than image data, an FTP server that supports the APPE command is required.
- Other than PCs as the FTP servers, a commercially-available network-enabled hard disk called NAS (Network Attached Storage) can also be used as an FTP server to receive data, as long as it has the FTP server capability. Additionally, to output data other than image data, the NAS needs to support the APPE command. Regarding the availability of FTP server functionality and APPE command support, check with the NAS manufacturer.
- The output of all the results and image data without any losses cannot be guaranteed. Output speed may decrease and errors may occur due to a temporary or persistent high load or some sort of failure in the network or destination device.
- If a firewall is present on the FTP server or the network route to the FTP server, the connection may fail. In this case, you need to disable the firewall or take other measures. For details, consult your network administrator or the manufacturer of the PC.
- Data output using the FTP client function can be used simultaneously with any other communication methods, including those that use the Ethernet port. However, if data is output using several different methods, the communication speed of the device may be slower in comparison with the output speed when using a single method.

Changing the Relevant FTP Client Settings

Configure the network settings of the destination FTP server and the connection method from this device.

Point

VS cameras can have settings for two FTP servers (FTP1/FTP2). Data output can be customized for different purposes, such as FTP1 for data and FTP2 for images.

Before changing the settings

Configure settings on the FTP server and check the following setting parameters.

- IP address of the FTP server: The address must be unique on the network including the device.

- User name to log in to the FTP server
- Password to log in to the FTP server
- Home directory of the logged in user

Changing the settings

1 Select [Global Settings] - [Target FTP Settings] from the menu bar.
The [Target FTP Settings] dialog box will appear.

2 Select the [FTP1] or [FTP2] tab to switch to the target FTP settings you wish to configure.

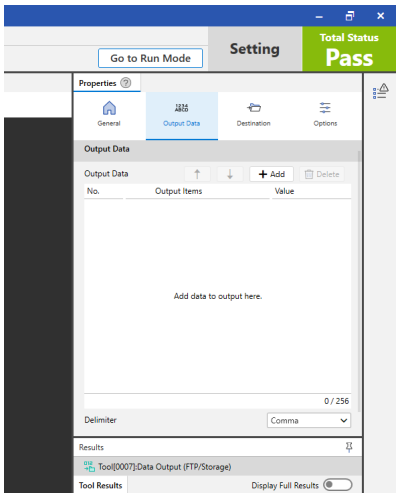
3 Configure the settings of the destination FTP server network.
→ Configuring Destination FTP Server and Connection Settings

4 After completing the setting, click [OK].
The [Target FTP Settings] dialog box closes and the settings are saved.

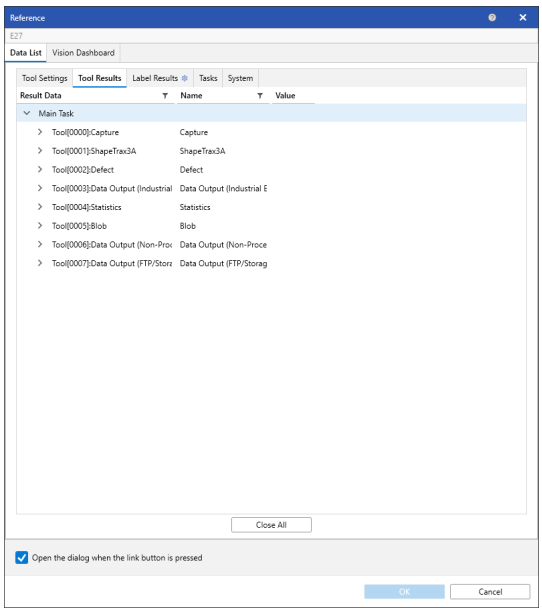
Configuring the Output Data

Depending on the data to be output, you can add the [Data Output (FTP/Storage)] tool and/or the [Image Output (FTP/Storage)] tool and set the data to be output.

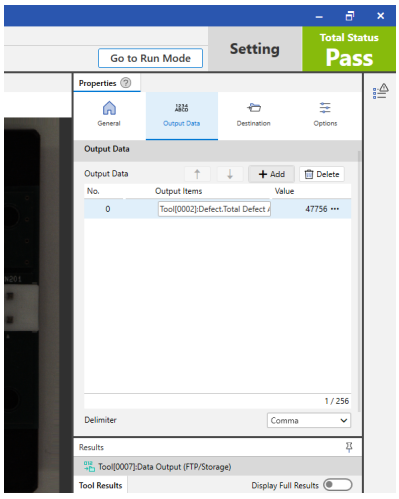
1 In the [Task] view, add the [Data Output (FTP/Storage)] and/or [Image Output (FTP/Storage)] tool to the task.
→ "Adding a Tool"
The [Properties] view switches to the setting items for the added tool.
Example: [Data Output (FTP/Storage)] tool



2 In the [Output Data] tab of the [Properties] view, click [Add].
The [Reference] dialog box appears.



3 Select the data to be output and click [OK].
The selected data is added to the list of output data.



4 Select the delimiter character to be inserted between the data in [Delimiter].

5 If there is more data to output, repeat steps 2 to 3 to add the output data.

Reference Up to 256 data can be added.

For format settings of the output data, refer to [Input/Output] - [Data Output (FTP/Storage)] - [Output Data] - "Configuring Output Data".

Using the Device as FTP Server (FTP Server Function)

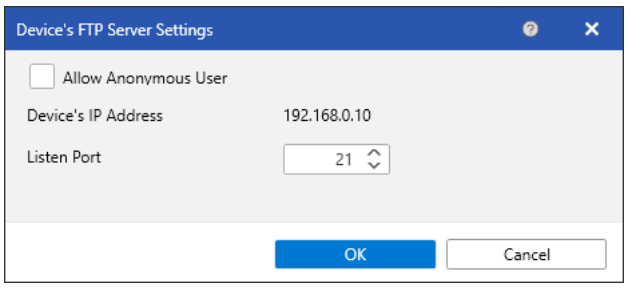
#M027

Point

- To access the device from an external FTP client, use the user account and password set with [Account Settings] under the [Global Settings] menu.
- The following functional restrictions apply depending on the permission level of the user logged in as an FTP client.
  - –Edit, Full Control: No restrictions on file access.
  - –View Only: Only file retrieval is permitted. You cannot manipulate files and folders on the FTP server nor transfer files to the FTP server.
- Up to two users are allowed to access the FTP server simultaneously.
- When accessing the VS camera from an FTP client, the default folder will be “/EM/” (internal storage). To access microSD, enter “/SD/” directly.
- If a file or folder name is not named by alphanumeric characters, accessing it may fail.
- [Device's FTP Server Settings] can be used at the same time as [Target FTP Settings] (FTP client function).
- This function does not affect measurements.

1 Select [Global Settings] - [Device's FTP Server Settings] from the menu bar.
The [Device's FTP Server Settings] dialog box will appear.

2 Configure the settings for the FTP server function.
→ Configure FTP Server Settings



3 After completing the setting, click [OK].
The [Device's FTP Server Settings] dialog box will close.

Point

If you have changed [Listen Port], a reboot confirmation message will appear after you click [OK]. A reboot is required for the settings to take effect.

- [Save and Reboot Now]: Save the global settings and the program setting and reboot the device. The main screen will appear when the reboot is complete.
- [Reboot Later]: Closes the message. Rebooting the device using [Reboot] in the [System] menu will apply the settings.

OPC UA Server Function

This section describes how to use the OPC UA server function of the device.

OPC UA

#M037

OPC UA is one of the industrial network protocols and is a platform-independent, service-oriented architecture that integrates all functionalities of each OPC Classic specification into an extensible framework. It is said that it has high interoperability between devices and can connect various hierarchical levels, from field devices to servers on the cloud. It is secure, reliable, and increasingly being adopted in industrial equipment.

Precautions for Security

#M038

Do not use in a vulnerable state

- When restricting access to OPC UA settings, enable the security function and configure the appropriate user level settings.
- Enable OPC UA security functions such as encryption and signature. By default, the security policy [None] is also enabled to facilitate initial connections. When operating with the security function enabled, use it with [None] disabled.
- Establish a policy for managing user names and passwords and apply it.
- Properly manage the update, revocation, and deletion of certificates. When trusting a certificate, check the certificate information thoroughly and check whether the correct certificate is registered.
- Apply software updates for vulnerabilities if any.

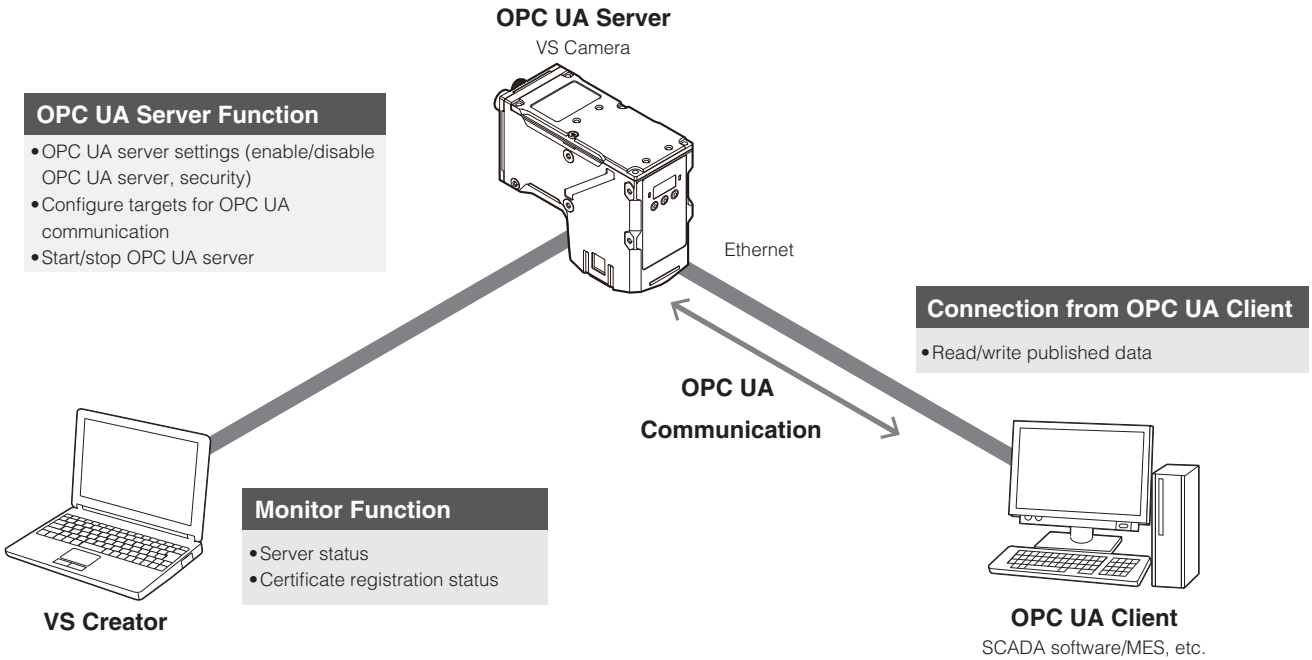
Design and maintain network configurations to ensure security

- Manage to prevent eavesdropping and DoS attacks.
- If there is a risk of unauthorized access from external devices via the network, implement measures on the user side.

Overview of OPC UA Server Function

#M039

The OPC UA server function allows the VS camera to function as an OPC UA server and can be managed by the VS Creator. Data and methods (commands) published by the OPC UA server can be read, written, and controlled from an OPC UA client.



OPC UA Server Function

Use the VS camera as an OPC UA server. Enable the OPC UA server, configure the authentication settings, and set the targets that are allowed to be read/written from the OPC UA client.
→ OPC UA Server Settings

Monitor Function

From the [OPC UA Monitor], view a list of the static nodes such as operation status and the number of measurements and dynamic nodes such as setting parameters and result data.
→ OPC UA Monitor

Connection from OPC UA Client

From OPC UA clients such as SCADA software and MES, specify the URL (endpoint URL) to connect to the OPC UA server. You can monitor the status of Run/Setup Mode and error output, and you can also output measured values and calculation results, change measurement parameters, and control through methods (commands).
→ Connection from OPC UA Client

Flow from Setup to Connection

#M040

Configure the following settings for the OPC UA server and OPC UA client.

Reference Operate the OPC UA server side with the VS Creator. To operate the OPC UA client, reference the manual for each OPC UA client.

OPC UA Server

(1) Set the OPC UA server and VS camera settings
- OPC UA server settings: Enable/disable the OPC UA server and configure security settings.
- VS camera settings: Set the IP address and port number of the VS camera.

→ OPC UA Server Settings

▼

(2) Manage certificates
- Generate or import a certificate if no server certificate is registered in the OPC UA server.
- The OPC UA server function starts after enabling the OPC UA server and rebooting the VS camera.

OPC UA Client

◀ (3) Set connections
Specify the endpoint URL to connect to the OPC UA server from the OPC UA client software. Select a security policy when requesting a connection.

▶ (4) Set the server certificate
Register the server certificate provided by the OPC UA server with the OPC UA client software.

▼

◀ (5) Set a client certificate
Create a client certificate and provide it when requesting a connection.

(6) Register the client certificate
The client certificate provided by the OPC UA client is automatically registered in the OPC UA server. If the client certificate is self-signed, it will be temporarily added to the untrusted list.

▼

(7) Set the OPC UA input/output data settings
Configure the input/output data settings for OPC UA communication.

→ "OPC UA I/O Data Settings"

OPC UA Server Function Specifications

#M041

Supporting versions of the VS Camera and VS Creator

VS Camera Supporting Versions	VS Creator Supporting Versions
Version 1.6 and later	Version 1.6 and later

OPC UA Server Function Specifications

Category	Item	Description
General	Maximum number of sessions (clients)	5
	Maximum number of subscriptions per session	5
	Maximum number of monitor items per subscription	100
	Maximum number of monitor items*1	2000
	Sampling cycle	50 ms to 10 s*2
	Maximum number of network published variables (nodes)	Dynamic nodes: Maximum of 200*3
	Security policies	→ "Security Policies"
	Initial value of fixed IP address	192.168.0.10
	Initial value of port number	4840
	Range of port numbers	1 to 65535
	Time zone	No settings
User authentication	User name, password	Available
	Public key	Not available
	Number of users that can be registered	Depend on account settings specifications
	Initial value for anonymous login permission	Allow
Certificate management	Maximum number of trusted clients to be saved	10
	Maximum number of rejected clients to be saved	10
	Maximum number of certificate authorities to be saved	10
	Maximum number of certificate authority certificate revocation lists to be saved	4
	Presence/absence of automatic trust	• Self-signed: Do not automatically trust • Other than self-signed: Automatically trust
	Initial value for accepting expired certificates	Rejected
	Initial value for applying certificate revocation list	Do not apply
	Self-generation	Available
	Passphrase for self-generated private key	Do not generate
	Passphrase when importing private key	Enter with GUI
	Storage for certificates	VS camera internal storage
	Permission to read private key	Not permitted and cannot be changed

Category	Item	Description
Information model	-	Not supported

*1:This is the maximum number of elements to be set as targets for cyclic communication with the OPC UA client. The monitor item counts the number of actual variables regardless of the size of the variable, and even if a variable of a structure or array data type is registered, the number of monitor items is counted as 1.

*2:Set with the OPC UA client. In the OPC UA server of the VS camera, it operates with an integer multiple of 50 ms based on the sampling cycle set by the client. For details on setting operations on the OPC UA client side, see the manual of each OPC UA client.

*3:The maximum number of array elements is 1000 in total. For example, if each node has an array of 100 elements, the maximum number of nodes is 10.

Overview of OPC UA Server Function

Typical functions that can be controlled by the OPC UA server function are as follows.
For other details, see "Reading and Writing/Controlling Nodes".

Function	Description
Trigger Input	Executes a trigger input.
Change Program Setting	Executes the switching of program settings.
Save Program Setting	Saves the program setting.
Reset	Executes a reset.
Clear Error	Clears Error0 and Error1.
Switch to Run Mode	Switches to Run Mode.
Switch to Setup Mode	Switches to Setup Mode.

Operation Verified Client List

For details on the setting method, see the instruction manual of each client.

OPC UA Client		Version
SIEMENS	TIA Portal	V19
BECKHOFF	TwinCAT3	v3.1.4024.10
Ignition	Standard Edition	Version 8.1.43
HighByte	Intelligence-Hub	3.4.5
UaExpert	UaExpert	v1.7.1.540
Kepware	KEPServerEX	6-6.16.217.0

OPC UA Client Operation Restrictions

The following client-dependent operation restrictions apply. Make sure to check the operational functionality before starting actual operation.

Item	Description
HighByte	With regard to method execution, only the LoadProgram method can be executed.

Item	Description
BECKHOFF	Use ASCII characters for the dynamic node display name and ensure it does not duplicate other node names. Correct the display name before compiling as non-ASCII characters could be added to the display name in [OPC UA I/O Data Settings].
Kepware	Method execution is unavailable.

OPC UA Server Settings

#M042

Enable/disable the OPC UA server function and configure security settings.

Enabling OPC UA Server Function and Various Settings

Enable the OPC UA server function of the VS camera and configure various settings.

1 Select [OPC UA Settings] from [Global Settings] on the menu bar.
The [OPC UA Settings] dialog box appears.

2 Turn ON [Enable/Disable OPC UA Server] (default: OFF).

3 Enter the port number to be used for OPC UA communication (1 to 65535, default: 4840).

Point Port numbers used for other settings, such as non-procedural communication and FTP server, cannot be used.

Reference The IP address and port number of the VS camera will set the endpoint URL (opc.tcp://[IP Address]:[Port No.]) to be specified when connecting from the OPC UA client.

4 Set the application authentication.
→ Application Authentication

5 When performing user authentication, turn [Allow Anonymous Login] OFF (default: ON).
→ User Authentication

6 Set the time difference between the time in the [Date and Time Settings] and the reference time (UTC).
→ Time Difference Settings

Reference [Time Difference Settings] in the OPC UA settings is enabled only when the menu bar - [Global Settings] - [Date and Time Settings] - [Use Time Synchronization] is disabled.

IP Address Setting of the VS Camera

Set the IP address of the VS camera from the device list. For details, see "Configuring Device's Network Settings".

Point If the IP address is changed after the server certificate is generated, the IP address in the server certificate and the IP address of the VS Camera will not match, and it may not be possible to connect from the OPC UA client. To make it connect, restore the IP address or recreate the server certificate.

OPC UA Server Security Function

#M043

The OPC UA server function can perform the two-factor authentication of application authentication and user authentication for the connection from the OPC UA client.

Application Authentication

Application authentication is a method in which the OPC UA server and the OPC UA client exchange digital certificates to authenticate each other's identity. Application authentication in VS Creator supports X.509 standard certificates.

Security Policies

A security policy is an agreement that combines the settings required to maintain security, such as the presence/absence of signatures and encryption for messages exchanged in communication, and their algorithms. Select the same security policy between server and client to enable OPC UA communication. The available security policies and their default settings are as follows.

Security policies	Default Setting
None	ON
Basic128Rsa15 - Sign	OFF
Basic128Rsa15 - SignAndEncrypt	OFF
Basic256 - Sign	OFF
Basic256 - SignAndEncrypt	OFF
Basic256Sha256 - Sign	ON
Basic256Sha256 - SignAndEncrypt	ON
Aes128Sha256RsaOaep - Sign	ON
Aes128Sha256RsaOaep - SignAndEncrypt	ON
Aes256Sha256RsaPss - Sign	ON
Aes256Sha256RsaPss - SignAndEncrypt	ON

Point

- The security policy "Sign" is a function to prevent tampering, and the security policy "Encrypt" is a function to prevent eavesdropping.
- [None] is a setting that allows communication without signature or encryption. Turn [None] OFF if you are concerned about communication security.
- For more details on security policies, see the "OPC Unified Architecture Specification" established by the OPC Foundation.

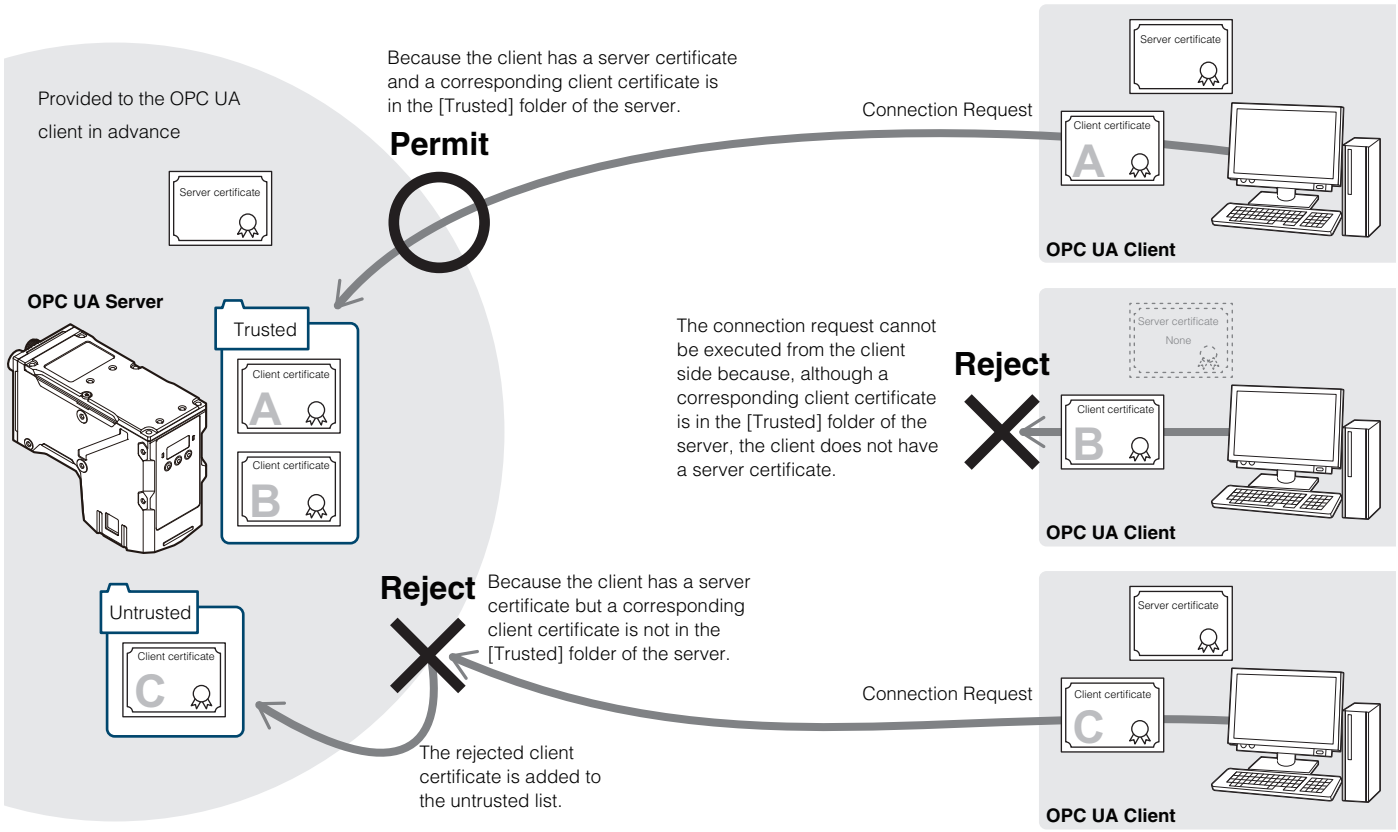
Examples of Application Authentication

The authentication procedure differs depending on whether the client certificate sent at the time of connection request from the client is self-signed or other than self-signed (such as CA-signed).

In the Case Where the Client Certificate is Self-Signed

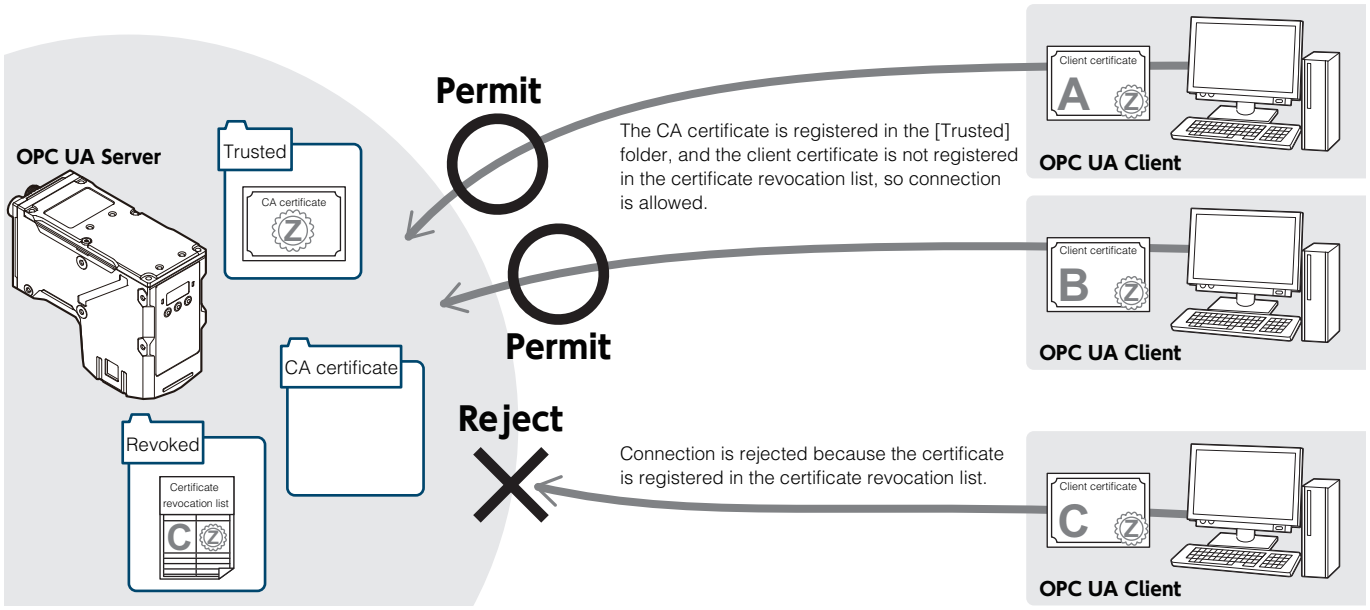
A self-signed client certificate is temporarily added to the untrusted list. If the client certificate file (*.der) is registered in the VS Camera in advance or the client certificate added to the untrusted list

is manually moved to the trusted list, application authentication is completed and OPC UA communication becomes available.



In the Case Where the Client Certificate is Other Than Self-Signed

Client certificates other than self-signed certificates do not need to be individually registered, because they are automatically registered in the trusted list at the time of connection request from the client. If a CA (Certificate Authority) certificate is registered in the trusted list in advance, OPC UA communication becomes available immediately upon client connection request.



Certificate Types

The OPC UA server function supports the following three types of certificates.

Certificate	Description
Server certificate	This is a certificate to certify the OPC UA server. A self-signed server certificate*1 or a CA-signed server certificate*2 can be used. This must be provided to the OPC UA client in advance.
Client certificate	This is a certificate to certify the OPC UA client. A self-signed client certificate or a CA-signed client certificate*3 can be used. The timing for registering with the OPC UA server varies depending on the type of signature and so on.
CA certificate*3/ Certificate revocation list*3	CA-signed client certificates can be collectively authenticated by registering with the OPC UA server in advance. • CA certificate: This is a certificate to authenticate a certificate chain (client certificate > intermediate certificate > root certificate). • Certificate revocation list: This is a list of certificates that have been revoked due to certificate compromise, company name change, or other reasons.

*1:The server certificate generated by VS Creator is a self-signed server certificate.

*2:This is a server certificate issued by a CA. It is imported into VS cameras and used. The CA-signed server certificate, the CA certificate, and the certificate revocation list must be provided to the OPC UA client and registered in advance. For the registration method, see the manual of the OPC UA client application to be used.

*3:This is a certificate/list issued by a CA. Depending on the authentication pattern, register a combination of the CA-signed client certificate, the CA certificate, and the certificate revocation list.

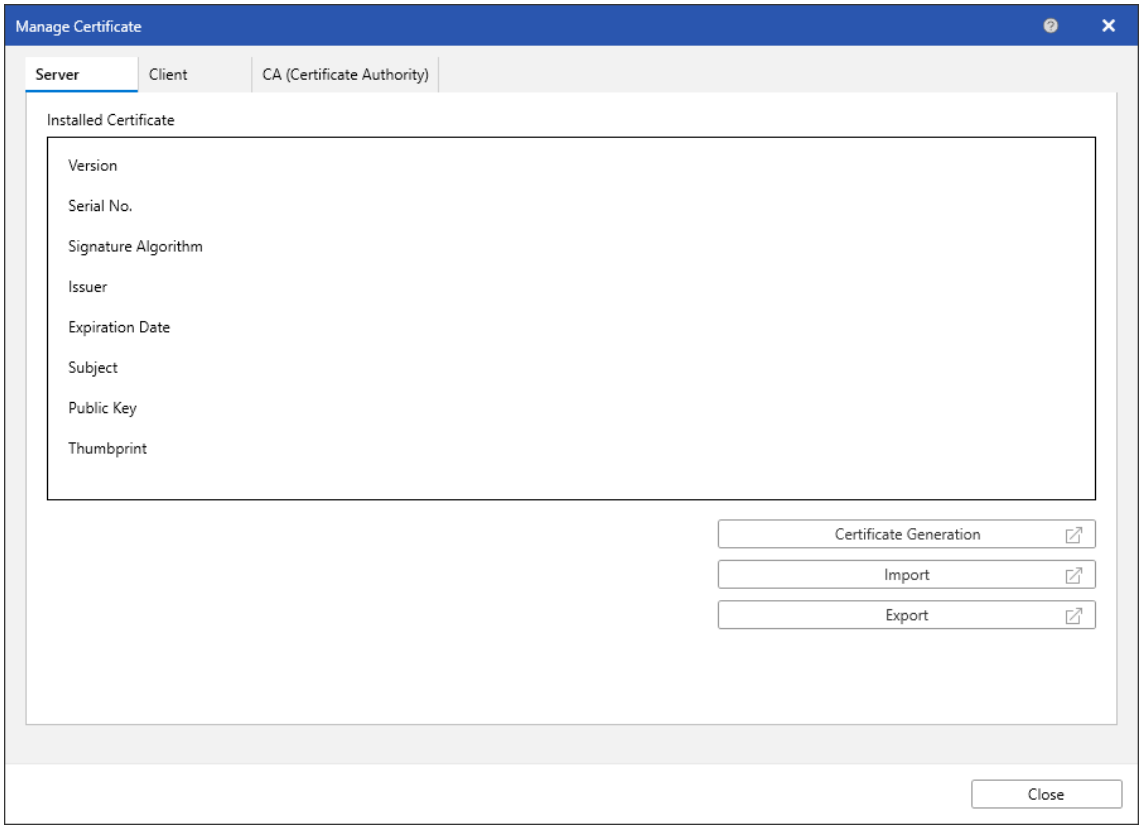
Certificate Management

The OPC UA server function can perform the following processes for each certificate.

Certificate	Description
Server certificate	• Generate server certificates • Display server certificate information registered in the VS camera • Export from the VS camera • Import to the VS camera
Client certificate	• Automatically register client certificates • Manually register client certificates • Display client certificate information added to the list • Delete client certificates
CA certificate and certificate revocation list	Used only when the client certificate is CA-signed. • Register CA certificates • Display CA certificate information registered in the VS camera • Delete CA certificates • Register certificate revocation lists • Display certificate revocation list information • Delete certificate revocation lists

Managing Server Certificates

Server certificates are managed from the menu bar - [Global Settings] - [OPC UA Settings] - [Manage Certificate] - [Server] tab.



Generating Server Certificates

Click [Certificate Generation], enter each item, and click [OK] to generate a server certificate. The generated server certificate is stored in the VS camera's internal storage according to the settings in [OPC UA Settings]. For details on the setting items of the server certificate, see "Configuring the Settings for Communication Method and Certificates".

Point

- Provide the generated server certificate to the OPC UA client in advance. For details about how to register the server certificate with the OPC UA client, see the manual of each OPC UA client software.
- When generating an OPC UA server certificate, the initial value of the server name is "VS_VisionSystem". Also, the encryption key length is fixed at 2048 bits.

Reference The algorithm for encrypting the certificate itself supports only RSA (SHA1withRSA/SHA224withRSA/SHA256withRSA/SHA384withRSA/SHA512withRSA). The key length supports 2048 bits/3072 bits/4096 bits.

Displaying Server Certificate Information Registered in the VS Camera

When a server certificate is registered, the following detailed information can be checked in [Installed Certificate].

Item	Description
Version	The version information of the certificate.
Serial No.	The identification number of the certificate.
Signature Algorithm	The algorithm of the signature affixed to the certificate.

Item	Description
Issuer	The name of the issuing Certificate Authority. Examples) C=JP, ST=Osaka, O=KEYENCE CORPORATION, CN=VS_VisionSystem
Expiration Date	The validity period of the certificate. YYYY/MM/DD hh:mm:ss to YYYY/MM/DD hh:mm:ss
Subject	The expiration date of the certificate. For self-signed certificates, this is the same as [Issuer].
Public Key	The applicant's public key and its type.
Thumbprint	A check code to prevent tampering with the certificate.

Exporting from the VS Camera

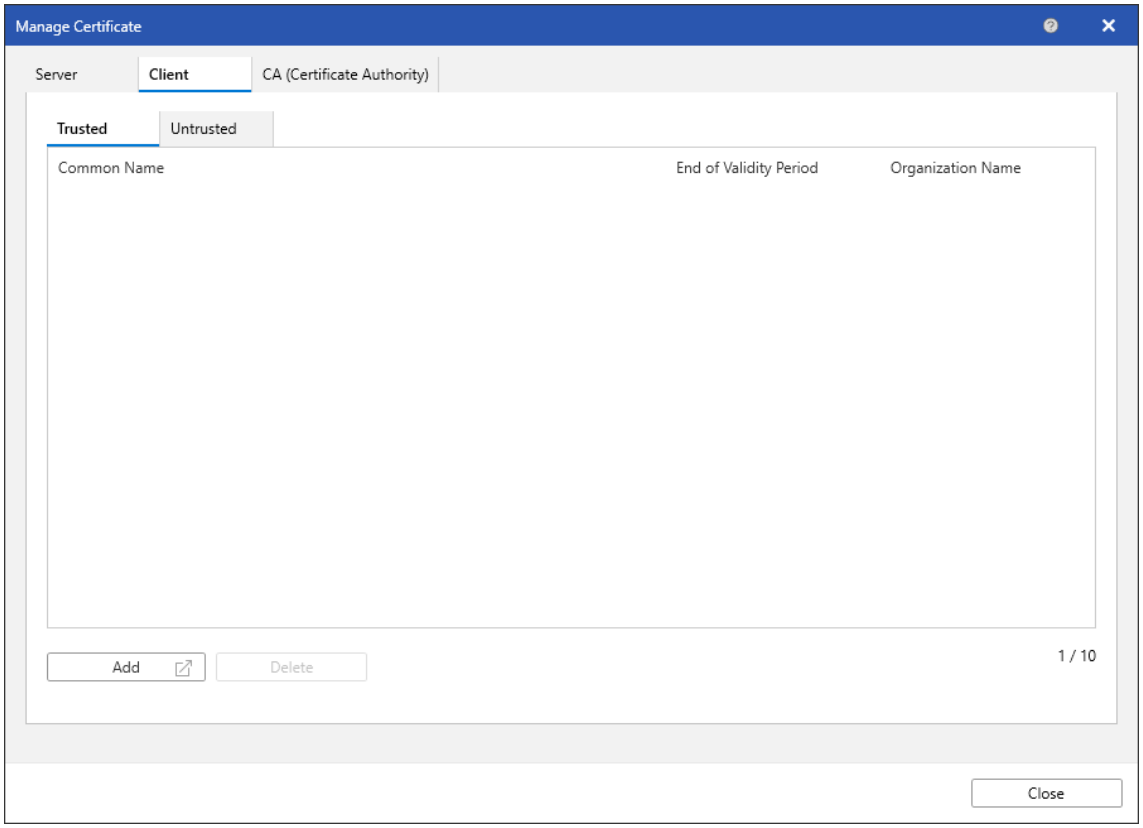
Export the server certificate stored in the VS camera, such as when providing the server certificate to the OPC UA client in advance. Click [Export] and select a save destination to export the server certificate file (.der).

Importing to the VS Camera

Import an existing server certificate to register it in the VS camera. Click [Import] and select a server certificate file (*.der) to import.

Managing Client Certificates

Client certificates are managed from the menu bar - [Global Settings] - [OPC UA Settings] - [Manage Certificate] - [Client] tab.



Reference
- For details about how to generate client certificates, see the manual of each OPC UA client.
- By default, connection will not be permitted if the client certificate has expired. If you want to permit connection even if the certificate has expired, turn ON the menu bar - [Global Settings] - [OPC UA Settings] - [Accept Expired Certificate].

Automatically Registering Client Certificates

Client certificates provided by the client at the time of connection are sorted according to whether they are self-signed or other than self-signed (such as CA-signed). Self-signed client certificates are temporarily added to the [Untrusted] list, and client certificates that are other than self-signed are added to the [Trusted] list and also automatically registered in the VS camera.

Reference
- Select a client certificate added to the [Untrusted] tab and click [Trust] to move it to the list on the [Trusted] tab and register it in the VS camera.
- Up to 10 certificates can be registered in the [Untrusted] tab.

Manually Registering Client Certificates

The client certificate generated by the OPC UA client side can be manually registered in the VS camera in advance. Click [Add] on the [Trusted] tab and select a client certificate file (*.der) to add the certificate to the list.

Point
- When manually adding a client certificate, thoroughly check whether or not the certificate to be registered can be trusted. Adding a wrong client certificate may result in information compromise or unintended operations.
- Up to 10 certificates can be registered in the [Trusted] tab.

Displaying Client Certificate Information Added to the List

Client certificates already added to the [Trusted] tab or [Untrusted] tab are displayed in a list. Double-click a certificate row to view detailed information such as the version and serial number.

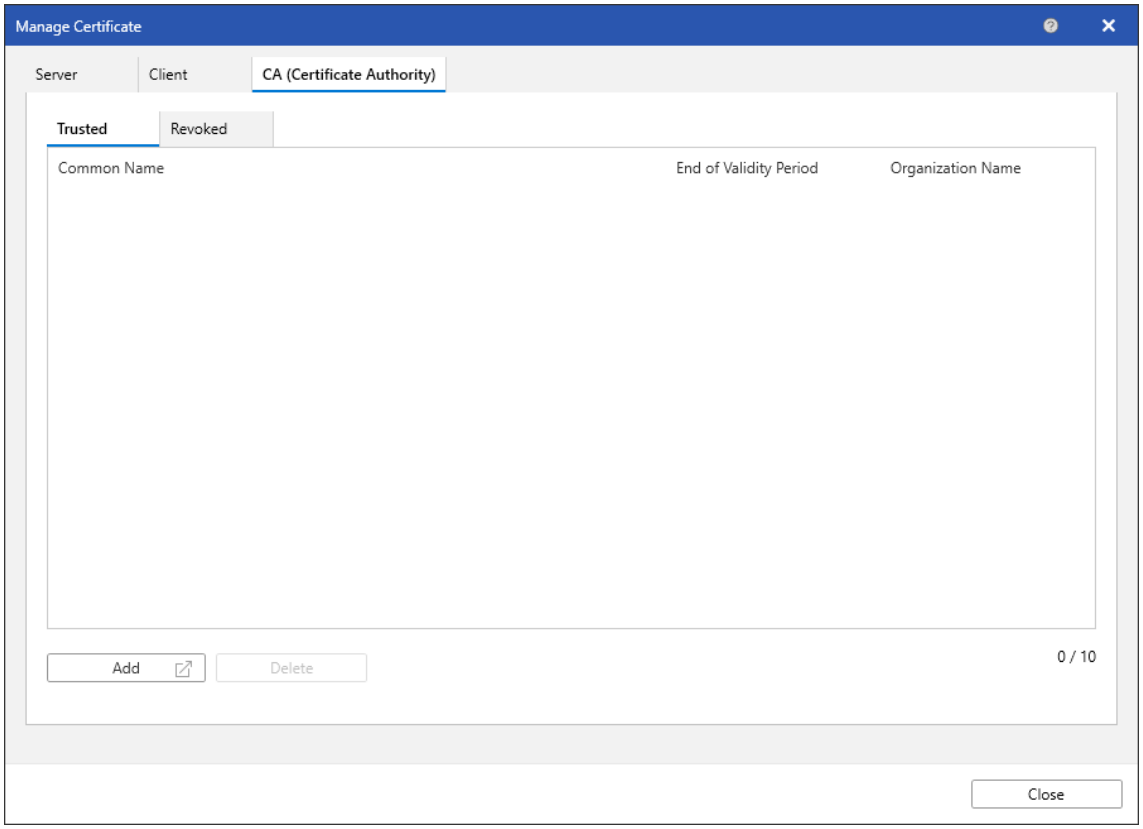
Reference
The contents of the detailed information are the same as the detailed information of a server certificate.

Deleting Client Certificates

Select a client certificate on the [Trusted] tab or [Untrusted] tab and click [Delete] to delete the certificate.

Managing CA Certificates and Certificate Revocation Lists

CA certificates/certificate revocation lists are managed from the menu bar - [Global Settings] - [OPC UA Settings] - [Manage Certificate] - [CA (Certificate Authority)] tab.



Point By default, clients included in the certificate revocation list can also be connected to the OPC UA server. If you want to reject them, turn ON the menu bar - [Global Settings] - [OPC UA Settings] - [Apply Certificate Revocation List].

Registering CA Certificates

CA (Certificate Authority) certificates generated by the CA can be manually registered in the VS camera. Click [Add] on the [Trusted] tab and select a CA certificate file (*.der) to register.

Displaying CA Certificate Information Registered in the VS Camera

You can check the CA certificates that have been registered on the [Trusted] tab. Double-click a certificate row to display detailed information such as the version and serial number.

Deleting CA Certificates

Select a CA certificate on the [Trusted] tab and click [Delete] to delete the certificate.

Registering Certificate Revocation Lists

Register a list (*.crl) of CA-signed client certificates that have been revoked due to certificate compromise, company name change, or other reasons. Click [Add] on the [Revoked] tab and select a file to add it to the list.

Reference Up to 1000 revoked certificates can be registered.

Displaying Certificate Revocation List Information

You can check the certificate revocation list that has been registered on the [Revoked] tab. Double-click a certificate revocation list row to display detailed information such as the issuer and CRL number.

Deleting Certificate Revocation Lists

Select a certificate revocation list on the [Revoked] tab and click [Delete] to delete the list.

User Authentication

Perform a two-factor authentication for users who have completed application authentication by making them enter their user names and passwords.

Point When using user authentication, turn OFF the menu bar - [Global Settings] - [OPC UA Settings] - [Allow Anonymous Login] and register users in [Account Settings] in the Global Settings.

Connection from OPC UA Client

#M044

Connect from the OPC UA client to the OPC UA server of the VS camera to read and write/control published nodes.

Preparing Certificates

If security is set, server certificates and client certificates must be prepared before connecting.

Registering Server Certificates

It is necessary to receive the server certificate from the OPC UA server in advance and register it as a trusted connection destination.
→ Exporting from the VS Camera

Providing Client Certificates

To connect to the OPC UA server, it is necessary to have the OPC UA server side recognize that the connecting OPC UA client is a legitimate user. Therefore, create a client certificate for the connecting OPC UA client, provide it to the OPC UA server side, and have it registered as a trusted connection destination.
→ Application Authentication

Reference The OPC UA server function also supports CA-signed client certificates. In such a case, a CA certificate and certificate revocation list are required in addition to the CA-signed client certificate.

Access to Endpoint URL

Specify the OPC UA server endpoint URL (opc.tcp://[IP Address]:[Port No.]) as the connection destination of the OPC UA client.

Point If user authentication is enabled, enter the user name and password registered in [Account Settings].

Reference Confirm the endpoint URL in the menu bar - [Global Settings] - [OPC UA Settings] - [Connection Settings].

Reading and Writing/Controlling Nodes

In OPC UA communication, a "node" refers to elements that can be accessed by a client, such as measured values and set values published on the server. Aside from being able to check the status and measurement results of the VS camera from the client it is also possible to, write values to some nodes, and control them with methods (commands).

Reference
- The write permission of a node can be set in the menu bar - [Settings] - [OPC UA I/O Data Settings].
- For the operations on the client side, see the manual of each OPC UA client.

Checking/Reading and Writing Nodes

The status and measurement results of the VS camera can be checked. User-defined data can be written to from the client.
The node structure following Root-Objects-VisionSystem is as shown in the table below.

Point
- When entering a number into a cell, enter a number into the relevant cell in advance.
- When entering a string into a cell, enter a string into the relevant cell in advance.
- If the above conditions are not met, writing is not possible.

Affiliated Object	Item	Type	Description
MachineStatus (Machine Status)	RunStatus (Operation Status)	Boolean	True: Run Mode False: Setup Mode
	Error0Status (Error0 Status)	Boolean	True: State where Error0 occurred False: No Error0
	Error0Code (Error0 Code)	UInt16	Shows the currently occurring error code (system error: 10000s).
	Error1Status (Error1 Status)	Boolean	True: State where Error1 occurred False: No Error1
	Error1Code (Error1 Code)	UInt16	Shows the currently occurring error code (system error: 10000s).
	ProgramStorage (Program Setting Storage)	Byte	Shows the storage of the current program setting. 1: Internal storage 2: SD card
	ProgramNumber (Program No.)	UInt16	Shows the current program number (0 to 9999).
	ProgramName (Program Name)	String	Shows the current program name.
AcquisitionResults (Measurement Results)	AcquisitionDateTime (Measurement Date & Time)	DateTime	Shows the measurement date & time. Shows the image capture start time of the system property in UTC format.
	TotalPass (Total Pass Judgment)	Boolean	True: Pass False: Fail/Not judged
	TotalFail (Total Fail Judgment)	Boolean	True: Fail False: Pass/Not judged
	TotalCount (Measurement Count)	UInt32	Shows the execution count of the main task.
	TotalPassCount (Measurement Pass Count)	UInt32	Shows the pass count occurring in the main task.
	TotalFailCount (Measurement Fail Count)	UInt32	Shows the fail count occurring in the main task.
UserDefinedData (User-defined)	-	-	User-defined input/output data.

Data Type Notation

The data type of a node is represented differently between the OPC UA client side and its server side.

Client (Type notation of Information model)	Server (Type notation of the VS series)
Boolean	Boolean
Byte	8-bit Unsigned Integer
UInt16	16-bit Unsigned Integer
UInt32	32-bit Unsigned Integer
Int16	16-bit Integer
Int32	32-bit Integer
Int64	64-bit Integer
Float	32-bit Floating-point Number
String	String
DateTime	Date & Time

Controlling Nodes

You can execute methods (commands) such as triggers and resets from the OPC UA client.

Point When issuing a Trigger from the client, the following settings must be configured in [Properties] - [Trigger] of the Capture tool.
- **[Trigger Mode]**: [External]
- **[Trigger Source] - [OPC UA]**: ON

Item	Description
Trigger (Issue Trigger)	Issues a trigger to the Capture tool that is waiting for a trigger.
Reset (Reset)	• Clears all of the following. – System property (various buffers including images) – Total status – Execution results of tools and tasks – Fieldbus output region – Archived data – Statistical data – State of trigger prohibition by TD commands – State of output prohibition by OD commands • Initializes all output terminals. • Cancels the wait for trigger of the tool. • Creates a new file name for the file to save data to. • Returns to the top of the main task.
Error0Clear (Clear Error0)	Clears Error0Status and Error0Code.
Error1Clear (Clear Error1)	Clears Error1Status and Error1Code.
GoToRunMode (Switch to Run Mode)	Switches from Setup Mode to Run Mode.

Item	Description
GoToSettingMode (Switch to Setup Mode)	Switches from Run Mode to Setup Mode. • When in waiting state at a tool, immediately stops the tool execution and switches to Setup Mode. • Otherwise, switches to Setup Mode after the task is executed.
LoadProgram (Change Program No.)	Switches to the program setting of the specified program setting number in the specified storage. • When in waiting state at a tool, immediately stops the tool execution and switches the settings. • When in waiting state at the [Capture] tool after receiving the command, switches the settings. • If the above does not apply, switches the settings after completing the execution of the task.
SaveProgram (Save Settings)	Saves the current program setting. • If the folder for the active program setting does not exist at the time of saving, creates a folder and saves the program setting. • An error occurs if the settings cannot be saved due to the device's state.

Reference

• Return value of each item:
  –1. 0: No error (Successful) / 1: Error (Failed) <MethodStatus>: Byte
  –2. Error code <ErrorCode>: UInt16
• Arguments of LoadProgram (Change Program No.):
  –A. Storage (1: Internal storage, 2: SD card) <DriveId>: Byte
  –B. Program Setting No. (0 to 9999) <ProgramNumber>: UInt16

Node Operation Permissions

Node operation restrictions according to account permission levels are as follows.

Operation	Full Control (Admin)	Edit (Operator)	View Only (Monitor)	Anonymous (Anonymous)
Read the values of published nodes	✓	✓	✓	✓
Write the values of published nodes	✓	✓	–	–
Issue triggers using method	✓*1	✓*1	–	–
Reset using method	✓	✓	–	–
Clear Error0 using method	✓	✓	–	–
Clear Error1 using method	✓	✓	–	–
Switch to Run Mode using method	✓	✓*1	–	–
Switch to Setup Mode using method	✓	✓*1	–	–
Change program number using method	✓	✓*1	–	–
Save program setting using method	✓	✓*1	–	–

*1:Available if permitted in [Edit Permission Group].

Point

The permission changes will be reflected after rebooting if account settings are changed after logging in to the OPC UA server.

Control via Commands

This section describes how to control the device and output data using commands.

Overview of Control via Commands

#M028

You can control the device and output data using the tools in the [Control] category, as well as by issuing commands from industrial Ethernet and non-procedural communication.

Notes on Command Input and Output

Command execution time

The command execution time fluctuates depending upon the image processing loads and the kinds of operations to the device at those times. For applications such as those where the next inspection is set to wait for command completion before starting, be mindful of the fluctuations in wait time.

Operation mode

Each command has its defined conditions on operation mode (Run Mode, Setup Mode) and communication methods in which the command can be executed.
→ Command List (Available Operation vs. Situation)

Command execution during mode transition

- If a command is issued during a mode transition, the command is held on standby and executed when the mode transition finishes. The command can or cannot be executed depending on the operation mode at the start of the command execution. If it cannot be executed, an error is returned.
- Command execution when program settings are switched: A command is aborted with an error if it is issued when program settings are switched, but a command is executed if it is issued after program settings are switched.

Reset/Switching of program settings

Industrial protocol (EtherNet/IP, PROFINET, PLC-Link)

Command executability is determined based on the condition at the time of command execution.

Non-procedural communication

Even if reset is made, program settings are switched, or an RB command is issued between the start of command input and the start of execution, no errors will occur because the command is generally processed in the order in which it was requested.

In the event of an error in command acceptance

Industrial protocol (EtherNet/IP, PROFINET, PLC-Link)

Only an error code is received.

Non-procedural communication

"ER, **, nn" is received as an error response.
The error content is as follows:

- **: Received command that caused the error
- nn: Error code

Error codes (for industrial protocols and non-procedural communication)

- 01: Unrecognized command (When the specified command does not exist)
- 02: Too many/few arguments (When there are too many/few arguments for the specified command format)
- 03: Argument is out of range (When the value specified as the argument exceeds the upper/lower limit value)
- 04: Wrong argument type (When the type of the specified argument is different for the format of the specified command)
- 05: Command not acceptable (Program setting being loaded, command acceptance maximum limit is exceeded, command being accepted from another route, etc.)
- 06: Command not executable (Setup Mode/Run Mode, etc.)
- 07: Timeout (when the next input or the end delimiter is not sent within a certain period of time from the input with Ethernet non-procedural communication; the timeout period is 3 seconds.)
- Command number (3 digits) + Error cause (2 digits): Command-specific error

Restrictions on parameters

Industrial protocol (EtherNet/IP, PROFINET)

Operation when parameters are less than those required for command input

If the command region size in the output data region of the EtherNet/IP or PROFINET is insufficient for the parameters required by a command, a parameter error occurs.

Non-procedural communication

Restriction on characters

Control codes other than "," (comma), ";" (semicolon), "CR" (carriage return), and "LF" (line feed) cannot be used.
If it is necessary to input "," (comma), which is a delimiter character for commands, for the string argument of a command, input "', " (quotation + comma).

Maximum number of characters that can be entered

The maximum number of characters that can be entered into the command is 500 bytes (including line breaks).

Format of numbers output from read-type commands (Non-procedural communication)

Basic policy of format

Output values are normally unsigned. Only the output values which may take negative values are signed (even when the value is positive).

- Integer digits: The integer digits are set to the minimum number to output the maximum output value.
- Decimal places: Generally, no decimal places are used. If the decimal value in an output value is significant, six decimal places are set.

Restrictions on the number of digits for specifying numerical values

The following restrictions are imposed on the command input format:

- For parts where an integer can be input
  - Signed
  - 10 integer digits
- For parts where a decimal can be input
  - Signed
  - 10 integer digits
  - 6 decimal places

Handling of strings (Non-procedural communication)

To specify a string as an argument, enclose it in "". For example, to pass the string, TEST as an argument, use "TEST".
A response also returns a string enclosed in "".

Command

#M029

These commands are used for basic input/output operation and are provided by default. Available commands vary depending on the communication method and operation mode.

Command List (Available Operation vs. Situation)

No.	Command name	Description	Operability									
			Non-procedural communication		EtherNet/IP, PROFINET, PLC-Link		[Control] tool		Event button*1		OPC UA (Methods)	
			Setup	Run	Setup	Run	Setup	Run	Setup	Run	Setup	Run
100	TRG	Issue Trigger	✓	✓	✓	✓	-	-	✓	✓	✓	✓
101	TD	Disable Trigger Input	✓	✓	✓	✓	✓	✓	✓	✓	-	-
102	TSR	Read Trigger Input Enable/Disable Status	✓	✓	✓	✓	-	-	✓	✓	-	-
103	RS	Reset	–	✓	–	✓	–	✓	–	✓	–	✓
104	RB	Reboot	✓	✓	✓	✓	-	-	✓	✓	-	-
105	RUN	Switch to Run Mode	✓	✓	✓	✓	-	-	✓	✓	✓	✓
106	SET	Switch to Setup Mode	✓	✓	✓	✓	-	-	✓	✓	✓	✓
107	MOR	Read Run/Setup Mode	✓	✓	✓	✓	-	-	✓	✓	-	-
108	OD	Disable Output	–	✓	–	✓	–	✓	–	✓	-	-
109	PL	Change Program Setting (Specify No.)	–	✓	–	✓	–	✓	–	✓	–	✓
110	PR	Read Program Setting	–	✓	–	✓	-	-	–	✓	-	-
111	PS	Save Program Setting	–	✓	–	✓	–	✓	–	✓	–	✓
112	MS	Change Model Image (Specify No.)	–	✓	–	✓	–	✓	–	✓	-	-
113	MR	Read Model Image	–	✓	–	✓	-	-	–	✓	-	-
114	RPU	Update Position Adjustment Reference Value	–	✓	–	✓	–	✓	–	✓	-	-
115	PDU	Update Pattern Information	–	✓	–	✓	–	✓	–	✓	-	-
116	EC	Echo	✓	✓	–	–	-	-	–	–	-	-
117	ERC	Clear Error	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
118	TW	Write Date & Time	✓	✓	✓	✓	-	-	✓	✓	-	-
119	TR	Read Date & Time	✓	✓	✓	✓	-	-	✓	✓	-	-
120	ICC	Clear Image Capture Buffer	–	✓	–	✓	-	-	–	✓	-	-
121	HMR	Read Hardware Model	✓	✓	✓	✓	-	-	✓	✓	-	-
122	FVR	Read Firmware Version	✓	✓	✓	✓	-	-	✓	✓	-	-
123	SEI	Issue Soft Event	–	✓	–	✓	–	✓	–	✓	-	-
124	CWN	Write Cell Number	–	✓	–	✓	-	-	–	✓	-	-
125	CWS	Write Cell Text	–	✓	–	✓	-	-	–	✓	-	-

No.	Command name	Description	Operability									
			Non-procedural communication		EtherNet/IP, PROFINET, PLC-Link		[Control] tool		Event button*1		OPC UA (Methods)	
			Setup	Run	Setup	Run	Setup	Run	Setup	Run	Setup	Run
126	TT	Execute Tool Test	–	✓	–	✓	-	-	–	✓	-	-
127	JSU	Update Registered String	–	✓	–	✓	–	✓	–	✓	-	-
128	CRU	Update Collation Pattern	–	✓	–	✓	–	✓	–	✓	-	-
129	MG	Register Model Image (Specify No.)	–	✓	–	✓	–	✓	–	✓	-	-
130	CWB	Write Logical Value to Cell	–	✓	–	✓	-	-	–	✓	-	-
131	RBMW	Set Robot Tool Mode	–	✓	–	✓	-	-	–	✓	-	-
132	RBCD	Execute Robot Calibration Detection	✓	✓	✓	✓	-	-	✓	✓	-	-
133	RBCP	Read Robot Calibration Coordinates	✓	✓	✓	✓	-	-	✓	✓	-	-
134	RBCE	Execute Robot Calibration	✓	✓	✓	✓	-	-	✓	✓	-	-
135	RBMR	Read Robot Tool Mode	✓	✓	✓	✓	-	-	✓	✓	-	-
136	RBCSR	Read Robot Calibration Status	✓	✓	✓	✓	-	-	✓	✓	-	-
137	RBCPW	Update Robot Capture Position	✓	✓	✓	✓	-	-	✓	✓	-	-
138	RBRPW	Update Robot Coordinates	✓	–	✓	–	-	-	✓	–	-	-
139	TBC	Clear Tool Buffer	–	✓	–	✓	✓	✓	–	✓	-	-
140	CCV	Copy Cell Value	–	✓	–	✓	–	✓	–	✓	-	-
141	DRC	Reconnect Device	✓	✓	✓	✓	-	-	✓	✓	-	-
142	RSOD	Initialize Output Data	–	✓	–	✓	✓	✓	–	✓	-	-
143	CEV	Export Cell Values	–	✓	–	✓	–	✓	–	✓	-	-
144	CIV	Import Cell Values	–	✓	–	✓	–	✓	–	✓	-	-

✓: Usable
–: Unusable
-: Not supported
*1: This applies to buttons placed on the Vision Dashboard and those placed on the custom screen/web browser.

Reference The EC command (echo) cannot be used for simulators.

100 : TRG : Issue Trigger

This command issues a specified trigger to the [Capture] tool waiting for the trigger.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	100	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

TRG<Delimiter>

Receive

TRG<Delimiter>

Reference This command does not affect the measurement processing time.

Error Code

- **10001**: When Trigger Ready was down at the time of command processing

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

101 : TD : Disable Trigger Input

This command controls the disabling/enabling of trigger input.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	101		n	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

TD,n<Delimiter>

Receive

TD<Delimiter>

Parameter (Common)

- **n** : Enable/Disable settings
  - **0** : Enable
  - **1** : Disable

Point

- When "TD,0" is sent, the status is reset to normal.
- Even if "TD,0" is sent while the trigger input is enabled, or if "TD,0" is sent while the trigger input is disabled, it is not considered an error.
- The trigger disabled status cannot be stored in the settings.
- Trigger input is reset to be enabled when the device is turned off and on.

Reference This command does not affect the measurement processing time.

Relationship with Terminal's Trigger Disable

The TD command has the same function as Trigger Disable of external terminals. When a command and an external terminal are issued at the same time, the trigger status will be determined by the OR of their respective [Disable/Enable Setting] parameters.
If trigger is disabled by either the external terminal or the command (ON for external terminal, argument 1 for TD command), trigger will remain disabled even if trigger is enabled by the other (OFF for external terminal, argument 0 for TD command).
To enter the trigger enabled state, both the external terminal and the command must be set to the trigger enable state (OFF for terminal, argument 0 for TD command).

- Example: Issuing a command with "TD,1" while Trigger Disable on the external terminal is OFF (trigger enabled) results in the trigger disabled state.
- Example: Issuing a command with "TD,0" while Trigger Disable on the external terminal is ON (trigger disabled) does not cancel the trigger disabled state.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

102 : TSR : Read Trigger Input Enable/Disable Status

This command reads out whether trigger can be input or not. The trigger input state is determined by taking the OR value of the command, terminal and Fieldbus states.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	102	

* : Starting word device (command address)

Receive

Word Device	Command Result		Command Data1	
	*	*+1	*+2	*+3
Return value	Execution result		n	

* : Starting word device (command result address)

For non-procedural commands

Send

TSR<Delimiter>

Receive

TSR,n<Delimiter>

Parameter (Common)

- **n** : Disabled/Enabled Setting
  - **0** : Enabled
  - **1** : Disabled

Reference This command does not affect the measurement processing time.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

103 : RS : Reset

This command performs all of the following:

- Initialize all system properties and clear all buffers including the image buffer.
- Clear the total status.
- Clear all tool and task execution results.
- Initialize all output terminals.
- Clear all Fieldbus output regions.

- Cancel the tool's trigger waiting state.
- Create a new file name for the file used to store data.
- Return to the top of the main task.
- Clear all archive data.
- Clear all statistical data.
- Clear the trigger disabled state set by the TD command.
- Clear the output disabled state set by the OD command.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	103	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

RS<Delimiter>

Receive

RS<Delimiter>

Reference
- If the tool is in a waiting state, immediately stop the tool execution and perform a reset.
- Otherwise, perform a reset after the task is executed.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

104 : RB : Reboot

This command reboots the device.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	104	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send
RB<Delimiter>

Receive
RB<Delimiter>

Reference
- If the tool is in a waiting state, immediately stop the tool execution and perform a reboot.
- Otherwise, perform a reboot after the task is executed.
- When data is being output, the process is synchronized according to the OD command timing, and then the device is rebooted.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

105 : RUN : Switch to Run Mode

This command switches the device from Setup Mode to Run Mode.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	105	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

RUN<Delimiter>

Receive

RUN<Delimiter>

Point If the device is already in Run Mode, the command finishes normally without making any changes.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

106 : SET : Switch to Setup Mode

This command switches the device from Run Mode to Setup Mode.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	106	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

SET<Delimiter>

Receive

SET<Delimiter>

Point If the device is already in Setup Mode, the command finishes normally without making any changes.

Reference
- If the tool is in a waiting state, immediately stop the tool execution and switch to Setup Mode.
- Otherwise, switch to Setup Mode after the task is executed.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

107 : MOR : Read Run/Setup Mode

This command obtains the current operation mode (Run Mode/Setup Mode).

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	107	

* : Starting word device (command address)

Receive

Word Device	Command Result		Command Data1	
	*	*+1	*+2	*+3
Return value	Execution result		n	

* : Starting word device (command result address)

For non-procedural commands

Send

MOR<Delimiter>

Receive

MOR,n<Delimiter>

Parameter

- **n** : Mode
  - **0** : Setup Mode
  - **1** : Run Mode

Reference This command does not affect the measurement processing time.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

108 : OD : Disable Output

This command controls data output to the external device.

Target Tools

- [Data Output (Industrial Ethernet)] tool
- [Data Output (Non-Procedural)] tool
- [Data Output (FTP/Storage)] tool
- [Data Output (Terminal)] tool
- [Image Output (FTP/Storage)] tool

For number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	108		n	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

OD,n<Delimiter>

Receive

OD<Delimiter>

Parameter

- **n** : Disable/Enable Setting
  - **0** : Enable
  - **1** : Disable

Point
- Output of results/images to the output buffer by the output tool will be disabled. The output buffer will not be cleared.
- Even if "OD,0" (enable) is sent while the output is enabled or "OD,1" (disable) is sent while the output is disabled, it is not considered to be an error.
- The status of Output Disable by the OD command is cleared at reset and when the program setting is switched.

Reference This command does not affect the measurement processing time.

Relationship with Terminal's Output Disable

The OD command has the same function as Output Disable of terminals. When a command and an external terminal are issued at the same time, the status of disabled output is judged by the OR of their respective [Exclude/Enable Setting] parameters.
If output is disabled by either the external terminal or the command (ON for external terminal, argument 1 for OD command), the output will remain disabled even if the other is enabled (OFF for external terminal, argument 0 for OD command).
To enter the output enabled state, both the external terminal and the command must be set to the output enable state (OFF for external terminal, argument 0 for OD command).

– Example: When Output Disable of the external terminal is set to OFF (output enabled) state and "OD,1" is issued, the output will be disabled.
– Example: Even if "OD,0" is issued while Output Disable of the external terminal is set to ON (output disabled) state, the output disabled state will not be canceled.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

109 : PL : Change Program Setting (Specify No.)

This command switches the currently set program setting to that of the program setting No. in the specified storage.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2	
	*	*+1	*+2	*+3	*+4	*+5
	109		d		nnnn	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send
PL,d,nnnn<Delimiter>

Receive
PL<Delimiter>

Parameters (Common)

- **d** : Storage
  - **1** : Internal storage
  - **2** : SD card
- **nnnn** : Program setting No. (0 to 9999)

Point If the program setting with [Program Setting Protection] enabled is specified, the loading will fail for devices other than the target device.

Reference
- When this command is received while the process is in a waiting state at a tool, tool execution is immediately forced to stop and the program setting is changed.
- When the process starts waiting status at the [Capture] tool after this command is received, the program setting is changed.
- In cases other than those above, the program setting is changed after the task processing finishes.

Error Code

- **10901**: When the storage specified by argument d does not exist
- **10902**: When the program setting of the number specified by argument nnnn does not exist
- **10903**: When the program setting file of the number specified by argument nnnn is corrupted
- **10904**: When the operation-supported version of the program setting specified by argument nnnn is higher than the device's firmware version
- **10905**: When a program setting for which [Program Setting Protection] is enabled is specified for a device other than the target device
- **10906**: When a program setting fails to load due to insufficient image memory
- **10907**: When a program setting fails to load due to insufficient resource memory

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

110 : PR : Read Program Setting

This command returns the storage type and program setting number of the current program setting.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	110	

* : Starting word device (command address)

Receive

Word Device	Command Result		Command Data1		Command Data2	
	*	*+1	*+2	*+3	*+4	*+5
Return value	Execution result		d		nnnn	

* : Starting word device (command result address)

For non-procedural commands

Send

PR<Delimiter>

Receive

PR,d,nnnn<Delimiter>

Parameters (Common)

- **d** : Storage
  - **1** : Internal storage
  - **2** : SD card
- **nnnn** : Program setting No. (0 to 9999)

Reference This command does not affect the measurement processing time.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

111 : PS : Save Program Setting

This command saves the current program setting.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	111	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

PS<Delimiter>

Receive

PS<Delimiter>

Point If the folder of the currently loaded program setting does not exist at the time of saving, a new folder is created to save the program setting.

Reference This command does not affect the measurement processing time.

Error Code

- **11101**: When the storage for the currently loaded program setting does not exist
- **11102**: When the save fails due to insufficient capacity
- **11103**: When the currently loaded program setting is read-only
- **11104**: When the storage for the currently loaded program setting can not be accessed
- **11105**: When the device is unable to save data

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

112 : MS : Change Model Image (Specify No.)

This command updates the image reference information by switching the model image used by the specified tool to the model image with the specified number.

Target Tools

- [Pattern Search] tool
- [ShapeTrax3A] tool
- [Subtraction Filter] tool
- [Image Region (Model Image)] tool
- [Shared Pattern (ShapeTrax3A)] tool

For number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2	
	*	*+1	*+2	*+3	*+4	*+5
	112		nnnn		uuu	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

MS,nnnn,uuu<Delimiter>

Receive

MS<Delimiter>

Parameters

- **nnnn**: Tool No. (0 to 1999, 9999)
  If 9999 is specified for the tool No., the command will be executed for all tools with model images.
- **uuu**: Model image No. (0 to 999)

Point

- The model image is loaded from the image file contained in the program setting.
- Model images are loaded after each command issuance.
- The current values at the time of command issuance are used for the region and color extraction information needed to update the image information.
- Registration of image reference information may fail for reasons such as the reference destination value being out of the range or insufficient work memory. Even in such case, the model image will still be switched. No errors will occur because the switching of the model image itself was successful.
- If the specified model image does not exist, an error will occur.

Reference This command is executed in intervals between measurements. The operation is equivalent to a setting change, which causes a pause request to the measurement.

Error Code

- **11201**: When the tool specified by argument nnnn does not exist
- **11202**: When the tool specified by argument nnnn is not a target tool
- **11203**: When 9999 is specified for argument nnnn and no target tools exist in the task
- **11204**: When the model image with the number specified by argument uuu does not exist; This error also occurs if the model image is not accessible.

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

113 : MR : Read Model Image

This command reads the model image No. of the model image used in the specified tool.

Target Tools

- [Pattern Search] tool
- [ShapeTrax3A] tool
- [Subtraction Filter] tool
- [Image Region (Model Image)] tool
- [Shared Pattern (ShapeTrax3A)] tool

For number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	113		nnnn	

* : Starting word device (command address)

Receive

Word Device	Command Result		Command Data1	
	*	*+1	*+2	*+3
Return value	Execution result		uuu	

* : Starting word device (command result address)

For non-procedural commands

Send

MR,nnnn<Delimiter>

Receive

MR,uuu<Delimiter>

Parameters (Common)

- **nnnn**: Tool No. (0 to 1999)
- **uuu**: Model image No. (0 to 999, 65535)
  If the file name of the set model image does not start with a number, 65535 will be returned.

Reference This command does not affect the measurement processing time.

Error Code

- **11301**: When the tool specified by argument nnnn does not exist
- **11302**: When the tool specified by argument nnnn is not a target tool

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

114 : RPU : Update Position Adjustment Reference Value

This command updates the position adjustment reference value of the specified [Image Position Adjustment] tool to the latest position information of the referenced tool.

Target Tools

- [Image Position Adjustment] tool
- [Subtraction Filter] tool
- [Image Region (Model Image)] tool

For number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	114		nnnn	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

RPU,nnnn<Delimiter>

Receive

RPU<Delimiter>

Parameter

- **nnnn**: Tool No. (0 to 1999, 9999)
  If 9999 is specified, it is executed for all target tools.

Point

- The detection point captures the current result at the time of command issuance of the set tool. Re-measurement is not performed at the time of issuance.
- Position adjustment reference values updated by this command are not automatically saved. It needs to be saved with the PS command.
- If 9999 is specified for the tool number, an error does not occur even if the task has a tool that is not a target tool. However, if no target tool is available to update the reference position, a 11403 error occurs.
- The command does not return an error even if there are no items to import, for example, if all reference positions are set to reference.

Reference This command is executed between measurement times.

Error Code

- **11401**: When the tool specified by argument nnnn does not exist
- **11402**: When the tool specified by argument nnnn is not an image position adjustment tool
- **11403**: When 9999 is specified for argument nnnn and no target tools exist in the task

- **11404**: When the results could not be retrieved from the tool set for the detection point of the tool specified by argument nnnn (non-number, no result, broken reference, etc.)

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

115 : PDU : Update Pattern Information

This command updates the pattern information registered in the specified tool with the model image that has been set.

Target Tools

- [Pattern Search] tool
- [ShapeTrax3A] tool
- [Subtraction Filter] tool
- [Image Region (Model Image)] tool
- [Shared Pattern (ShapeTrax3A)] tool

For number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	115		nnnn	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

PDU,nnnn<Delimiter>

Receive

PDU<Delimiter>

Parameter

- **nnnn**: Tool No. (0 to 1999, 9999)
  If 9999 is specified for the tool No., the command will be executed for all tools in the task.

Point
- If 9999 is specified in argument nnnn, an error will not occur even if the task contains a tool that has no model information. However, an error will occur if there are no tools that allow updating of the model information.
- Registration of model information may fail for reasons such as the reference destination value being out of the range or insufficient processing memory.

Reference This command is executed between measurement times.

Error Code

- **11501**: When the tool specified by argument nnnn does not exist
- **11502**: When the tool specified by argument nnnn is not a target tool
- **11503**: When 9999 is specified for argument nnnn and no target tools exist in the task
- **11504**: When the tool specified by argument nnnn has a configuring error
- **11505**: When the pattern registration has failed. This error also occurs when the pattern data could not be registered due to insufficient processing memory or due to other causes.

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

116 : EC : Echo

This command returns the same numerical value as the one that was sent from the external device.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	116		nnnn	

* : Starting word device (command address)

Receive

Word Device	Command Result		Command Data1	
	*	*+1	*+2	*+3
Return value	Execution result		nnnn	

* : Starting word device (command result address)

For non-procedural commands

Send

EC,nnnn<Delimiter>

Receive

EC,nnnn<Delimiter>

Parameter

- **nnnn** : Numerical value (1 to 9999)

Reference This command does not affect the measurement processing time.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

117 : ERC : Clear Error

This command clears the error status and error code for the specified type (Error0 or Error1).

For number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	117		n	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

ERC,n<Delimiter>

Receive

ERC<Delimiter>

Parameters

- **n** : Type of error (0 or 1)
  - **0**: Clear Error0 Status and Error0 Code
  - **1**: Clear Error1 Status and Error1 Code

Point The command finishes normally without any action if the specified error type is not active.

Reference This command does not affect the measurement processing time.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

118 : TW : Write Date & Time

This command sets the specified date and time.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2		Command Parameter3		Command Parameter4		Command Parameter5		Command Parameter6	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7	*+8	*+9	*+10	*+11	*+12	*+13
	118		YYYY		MO		DD		HH		MI		SS	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

TW,YYYY,MO,DD,HH,MI,SS<Delimiter>

Receive

TW<Delimiter>

Parameters (Common)

- **YYYY**: Year (2000 to 2037)
- **MO**: Month (1 to 12)
- **DD**: Day (1 to 31)
- **HH**: Hour (0 to 23, 24-hour format)
- **MI**: Minute (0 to 59)
- **SS**: Second (0 to 59)

Reference This command does not affect the measurement processing time.

Error Code

- **11801** : Failed to set the date and time
- **11802** : Attempted to change to a date earlier than the tria periodl expiration date after the AI activation trial period has expired.

Reference For more details about errors other than that listed above, see "In the event of an error in command acceptance".

119 : TR : Read Date & Time

This command reads the current date and time on the VS camera.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	119	

* : Starting word device (command address)

Receive

Word Device	Command Result		Command Data1		Command Data2		Command Data3		Command Data4		Command Data5		Command Data6	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7	*+8	*+9	*+10	*+11	*+12	*+13
Return value	Execution result		YYYY		MO		DD		HH		MI		SS	

* : Starting word device (command result address)

For non-procedural commands

Send

TR<Delimiter>

Receive

TR,YYYY,MO,DD,HH,MI,SS<Delimiter>

Parameters (Common)

- **YYYY**: Year (2000 to 2037)
- **MO**: Month (1 to 12)
- **DD**: Day (1 to 31)
- **HH**: Hour (0 to 23, 24-hour format)
- **MI**: Minute (0 to 59)
- **SS**: Second (0 to 59)

Reference This command does not affect the measurement processing time.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

120 : ICC : Clear Image Capture Buffer

This command clears the image capture buffer.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	120	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send
ICC<Delimiter>

Receive
ICC<Delimiter>

Reference If the tool is in a waiting state, immediately stop the tool execution and clear the image buffer capacity. In cases other than those above, the image buffer capacity is cleared after the task processing finishes.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

121 : HMR : Read Hardware Model

This command reads the system information (model) of the device.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	121	

* : Starting word device (command address)

Receive

Word Device	Command Result		Command Data1	
	*	*+1	*+2	*+3

Return value	Execution result		model

* : Starting word device (command result address)

For non-procedural commands

Send

HMR<Delimiter>

Receive

HMR,model<Delimiter>

Parameter

- **model**: Device model string (ASCII code)

Reference This command does not affect the measurement processing time.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

122 : FVR : Firmware Version Read

This command reads the system information (ROM version) of the device as a string with the major version's first digit, major version's second digit, and minor version separated by periods ".".

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	122	

* : Starting word device (command address)

Receive

Word Device	Command Result		Command Data1	
	*	*+1	*+2	*+3
Return value	Execution result		Version	

* : Starting word device (command result address)

For non-procedural commands

Send

FVR<Delimiter>

Receive

FVR,Version<Delimiter>

Parameter

- **Version**: Version string ("[First digit of the major version].[Second digit of the major version].[Four digits of the minor version]"; in ASCII code)

Reference This command does not affect the measurement processing time.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

123 : SEI : Issue Soft Event

This command issues a Soft Event of the specified number.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	123		n	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

SEI,n<Delimiter>

Receive

SEI<Delimiter>

Parameter

- **n**: Soft Event No. (0 to 199)

Reference This command does not affect the measurement processing time.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

124 : CWN : Write Cell Number

This command writes the specified value to the cell in the Vision Dashboard specified by row and column numbers.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2		Command Parameter3	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7
	124		cc		rr		nnnn	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

CWN,cc,rr,nnnn<Delimiter>

Receive

CWN<Delimiter>

Parameters (Common)

- **cc**: Vision Dashboard column number (1 to 100)
- **rr**: Vision Dashboard row number (1 to 1000)
- **nnnn**: Setting value

Point The set value nnnn is specified as a floating point.

Reference The timeliness of capturing and measurement depends on the tool that refers to the cell in which a value is written.

Error Code

- **12401**: When the cell specified by argument cc and argument rr is not a constant cell
  This also includes the case in which the cell specified by argument cc and argument rr is an empty cell.
- **12402**: When a value other than a number is set in a cell specified by argument cc and argument rr

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

125 : CWS : Write Cell Text

This command writes the specified string to the cell in the Vision Dashboard specified by row and column numbers.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2		Command Parameter3		Command Parameter4		Command Parameter5	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7	*+8	*+9	*+10	*+11
	125		cc		rr		C_2C_1	C_4C_3	C_6C_5	C_8C_7	....	....

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

Parameters (number-specified commands)

- **cc** : Vision Dashboard column number (1 to 100)
- **rr** : Vision Dashboard row number (1 to 1000)
- **$C_1C_2C_3C_4...C_n$** : Character string (1 character is 1 byte, 2 characters are set for each address; the maximum number of characters depends on the command address size;the termination character is specified by the numeric value "0" or "NULL".))

For non-procedural commands

Send

CWS,cc,rr,"ssss"<Delimiter>

Receive

CWS<Delimiter>

Parameters (non-procedural commands)

- **cc** : Vision Dashboard column number (1 to 100)
- **rr** : Vision Dashboard row number (1 to 1000)
- **ssss**: Character string

Reference The timeliness of capturing and measurement depends on the tool that refers to the cell in which a string is written.

Error Code

- **12501**: When the cell specified by argument cc and argument rr is not a constant cell
  This also includes the case in which the cell specified by argument cc and argument rr is an empty cell.
- **12502**: When a value other than a string is set in a cell specified by argument cc and argument rr
- **12503**: When writing fails due to insufficient resource memory

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

126 : TT : Execute Tool Test

This command measures again with the specified tool using the image from the previous execution cycle.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	126		nnnn	

* : Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

* : Starting word device (command result address)

For non-procedural commands

Send

TT,nnnn<Delimiter>

Receive

TT<Delimiter>

Parameter

- **nnnn** : Tool No. (0 to 1999)

Point If the input image for the specified tool has been generated by the tool test execution of the [Shared Image Enhance] tool, the image will be used for re-measurement.

Reference This command is executed by stopping the current measurement temporarily between tools.

Clearing the Tool Test Execution

The execute tool test is cleared at the following times:

– When the device is reset
– When the program setting is switched
– When the current task execution is complete
– When editing a tool is finished
– When the position adjustment reference value is updated with the RPU command, etc. using a model image

Executability of Each Tool

Category	Tool	Executability
Capture	Capture	-
	Calibration	-
	Scaling	-
Inspection	Area	✓
	Intensity	✓
	Color Detection	✓
	Pattern Search	✓
	ShapeTrax3A	✓
	Edge Position	✓
	Edge Width	✓
	Edge Pitch	✓
	Edge Pairs	✓
	Profile Position	✓
	Profile Width	✓
	Profile Defect	✓
	Defect	✓
	Blob	✓
	Grayscale Blob	✓
	OCR2	✓
	1D Code Reader	✓
	2D Code Reader	✓
AI Inspection	AI Classification	✓
	AI Detection	✓
	AI OCR	✓
	AI Segmentation	✓

Category	Tool	Executability
Measurements & Dimensions	Points Distance	✓
	Point/Line Distance	✓
	Lines Distance	✓
	Point/Circle Distance	✓
	Line/Circle Distance	✓
	Circles Distance	✓
	Line Detection	✓
	Line Passing Two Points	✓
	Bisection of Two Lines	✓
	Angle Formed by Two Lines	✓
	Circle Detection	✓
	Line/V-Line Intersection	✓
	Two Lines Intersection	✓
	Center of Quadrangle	✓
	Midpoint of Points	✓
Region	Shared Region	✓
	Image Region (Current Image)	✓
	Image Region (Model Image)	✓
	Shared Pattern (ShapeTrax3A)	✓
Image Conversion	Shared Image Enhance	✓
	Subtraction Filter	✓
	Image Position Adjustment	✓
Vision-Guided Robotics	Calibration (Robot)	–
	Pick/Place	✓
	Grip Shift Correction	✓
	Robot Coordinate Transformation	✓
Communication	Data Input (Industrial Ethernet)	✓
	Data Input (Non-Procedural)	–
	Data Output (Industrial Ethernet)	–
	Data Output (Non-Procedural)	–
	Data Output (FTP/Storage)	–
	Data Output (Terminal)	–
	Image Output (FTP/Storage)	–
	Image Output with Graphics (FTP/Storage)	–
Display	Graphics Display	✓
Data Analysis	Statistics	–
	Yield Rate	–
	Data History	✓

Category	Tool	Executability
Control	Change Program Setting (PL)	–
	Save Settings (PS)	–
	Issue Soft Event (SEI)	–
	Clear Error (ERC)	–
	Clear Tool Buffer (TBC)	–
	Reset (RS)	–
	Initialize Output Data (RSOD)	–
	Disable Output (OD)	–
	Disable Trigger Input (TD)	–
	Register Model Image (MG)	–
	Change Model Image (MS)	–
	Update Pattern Information (PDU)	–
	Update Position Adjustment Reference Value (RPU)	–
	Update Registered String (JSU)	–
	Update Collation Pattern (CRU)	–
	Copy Cell Value (CCV)	–
	Export Cell Values (CEV)	–
	Import Cell Values (CIV)	–

Error Code

- **12601**: When the tool specified by argument nnnn does not exist
- **12602**: When a tool test is not executable for the tool specified by argument nnnn
- **12603**: When the tool specified by argument nnnn has a configuring error

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

127 : JSU: Update Registered String

This command updates the contents of the registered string for the specified tool with the latest detected string for that tool.

Target tool

- [OCR2] tool
- [AI OCR] tool

Format of number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	127		nnnn	

*: Front word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

*: Front word device (command result address)

Format of non-procedural commands

Send

JSU,nnnn<Delimiter>

Receive

JSU<Delimiter>

Parameters (common)

- **nnnn**: Tool No. (0 to 1999, 9999)

Point If 9999 is specified for tool No., it is executed for all target tools.

Reference Suspend the measurement at the end of the tool to execute this.

Error Code

- **12701**: When the tool specified by argument nnnn does not exist
- **12702**: When the tool specified by argument nnnn is other than OCR2 or AI OCR
- **12703**: When 9999 is specified for argument nnnn and no OCR2 or AI OCR tool exists in the task
- **12704**: When the registered string of the tool specified by argument nnnn refers to a tool or cell

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

128: CRU: Update Collation Pattern

This command updates the collation pattern for the specified tool with the latest read data.

Target tool

- [1D Code Reader] tool
- [2D Code Reader] tool

Format of number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	128		nnnn	

*: Front word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

*: Front word device (command result address)

Format of non-procedural commands

Send
CRU,nnnn<Delimiter>

Receive
CRU<Delimiter>

Parameters (common)

- **nnnn**: Tool No. (0 to 1999, 9999)

Point
- If 9999 is specified for tool No., it is executed for all target tools.
- If the specified tool has not been measured, set "---".

Reference Suspend the measurement at the end of the tool to execute this.

Error Code

- **12801**: When the tool specified by argument nnnn does not exist
- **12802**: When the tool specified by argument nnnn is not the target tool
- **12803**: When 9999 is specified for argument nnnn and no target tools exist in the task
- **12804**: When the collation pattern of the tool specified by argument nnnn refers to the tool or cell

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

129: MG: Register Model Image (Specify No.)

This command saves the latest input image of the specified tool as a model image with the specified number.

Target tool

- [Pattern Search] tool
- [ShapeTrax3A] tool
- [Subtraction Filter] tool
- [Image Region (Model Image)] tool
- [Shared Pattern (ShapeTrax3A)] tool

Format of number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter1	
	*	*+1	*+2	*+3	*+4	*+5
	129		nnnn		uuu	

*: Front word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

*: Front word device (command result address)

Format of non-procedural commands

Send

MG,nnnn,uuu<Delimiter>

Receive

MG<Delimiter>

Parameters (common)

- **nnnn**: Tool No. (0 to 1999)
- **uuu**: Model image No. (0 to 999)

Point

- Set the registered image as the model image of the specified tool.
- If the specified tool is pattern search or ShapeTrax3A, pattern registration will also be performed.
- If the model image of the specified tool is also referenced as a model image by other tools, pattern registration for the referenced tools is also executed.
- If there are multiple files with the same number, the first file found will be overwritten.
- Image reference information registration may fail if the referenced value is out of range, or due to insufficient processing memory or other reasons.

Reference Execute this between measurement sessions or during the downtime period when the tool is waiting for an event.

Error Code

- **12901**: When the tool specified by argument nnnn does not exist
- **12902**: When the tool specified by argument nnnn is not the target tool
- **12903**: When the input image of the tool specified by argument nnnn is not available.
- **12904**: When the storage for the currently loaded program setting does not exist
- **12905**: When the file could not be saved due to insufficient space
- **12906**: When the storage for the currently loaded program setting cannot be accessed

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

130: CWB: Write Logical Value to Cell

Write the specified value to the cell of the specified column and row of the vision dashboard.

Format of number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2		Command Parameter3	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7
	130		cc		rr		n	

*: Front word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

*: Front word device (command result address)

Format of non-procedural commands

Send

CWB,cc,rr,n<Delimiter>

Receive

CWB<Delimiter>

Parameters (common)

- **cc**: Vision Dashboard column number (1 to 100)
- **rr**: Vision Dashboard row number (1 to 1000)
- **n**: Logical value
  - **0**: FALSE
  - **1**: TRUE

Reference If a cell referenced by the Capture tool or measurement tool is specified, processing time of the measurement will be affected.

Error Code

- **13001**: When the cell specified by argument cc and argument rr is other than a constant cell Also include the case where the cell specified by argument cc and argument rr is a blank cell
- **13002**: When a value other than a logical value is set in the cell specified by argument cc and argument rr

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

131: RBMW: Set Robot Tool Mode

This command transitions the specified tool to the specified calibration mode.

Format of number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2	
	*	*+1	*+2	*+3	*+4	*+5
	131		nnnn		m	

*: Front word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

*: Front word device (command result address)

Format of non-procedural commands

Send

RBMW,nnnn,m<Delimiter>

Receive

RBMW<Delimiter>

Parameters (common)

- **nnnn**: Tool No. (0 to 1999)
- **m**: Calibration mode (0 to 3)
  - **0**: None
  - **1**: Auto calibration
  - **2**: Tool center calculation
  - **3**: High-precision calculation

Point If the mode has already been set by a tool other than the specified tool, the mode of the tool that has already been set is set to 0 (none).

Reference Suspend the measurement at the end of the tool to execute this.

Error Code

- **13101**: When the tool specified by argument nnnn does not exist
- **13102**: When the tool specified by argument nnnn is not the target tool
- **13103**: When 2 or 3 is specified in argument m for robot calibration tool with tool center calculation set to OFF

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

132: RBCD: Execute Robot Calibration Detection

This command executes the detection of the specified detected point number of the tool whose mode is set to calibration tool.

Format of number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	132		nnnn	

*: Front word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

*: Front word device (command result address)

Format of non-procedural commands

Send

RBCD,nnnn<Delimiter>

Receive

RBCD,m<Delimiter>

Parameters (common)

- **nnnn**: Detected point No. (1 to 9999)
- **M**: Detection result (0 to 1)
  - **0**: Detection successful
  - **1**: Detection failed

Reference
- If the tool is in a waiting state, immediately stop the tool execution and execute this.
- Otherwise, execute this after the task is executed.

Error Code

- **13201**: When there is no tool with the mode set for the robot calibration tool
- **13202**: When the detected point No. specified by argument nnnn does not exist
- **13203**: When no detection tool is set for the robot calibration tool

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

133: RBCP: Read Robot Calibration Coordinates

This command reads the robot coordinates of the specified detected point number of the tool whose mode is set to calibration tool.

Format of number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	133		nnnn	

*: Front word device (command address)

Receive

Word Device	Command Result		Command Data1		Command Data2		Command Data3		Command Data4		Command Data5		Command Data6		Command Data7	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7	*+8	*+9	*+10	*+11	*+12	*+13	*+14	*+15
Return value	Execution result		m		x		y		z		rx		ry		rz	

*: Front word device (command result address)

Format of non-procedural commands

Send

RBCP,nnnn<Delimiter>

Receive

RBCP,m,x,y,z,rx,ry,rz<Delimiter>

Parameters (common)

- **nnnn**: Detected point No. (0 to 9999)
  - **0**: Start point
  - **1 to 9999**: Detection point
- **m**: Data status (0 to 2)
  - **0**: Detected point No.is out of range
  - **1**: Normal
  - **2**: Detection point is disabled
- **x**: X coordinates (-9999.999 to 9999.999)
- **y**: Y coordinates (-9999.999 to 9999.999)
- **z**: Z coordinates (-9999.999 to 9999.999)
- **rx**: Rx coordinates (-180.000 to 180.000)
- **ry**: Ry coordinates (-180.000 to 180.000)
- **rz**: Rz coordinates (-180.000 to 180.000)

Point Read the robot coordinates even if the specified detection point has not yet been detected.

Reference Suspend the measurement at the end of the tool to execute this.

Error Code

- **13301**: When there is no tool with the mode set for the robot calibration tool
- **13302**: When 0 is set for the segment shift of the robot calibration tool
- **13303**: If the start point of the robot calibration tool is not set
- **13304**: When the robot coordinates are not registered

- **13305**: When the movement pattern is 3×3 or 5×5, the calculated robot coordinates do not fall within ±9999.999

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

134: RBCE: Execute Robot Calibration

This command executes the calibration of the tool whose mode is set to calibration tool and return result.

Format of number-specified commands

Send

Word Device	Command Number		Command Parameter1	
	*	*+1	*+2	*+3
	134		n	

*: Front word device (command address)

Receive

Word Device	Command Result		Command Data1	
	*	*+1	*+2	*+3
Return value	Execution result		m	

*: Front word device (command result address)

Format of non-procedural commands

Send

RBCE,n<Delimiter>

Receive

RBCE,m<Delimiter>

Parameters (common)

- **n**: Saved operation of the robot calibration setting file (0 to 2)
  - **0**: Save
  - **1**: Save only when calibration is successful
  - **2**: Do not save
- **m**: Calibration execution result (0 to 1)
  - **0**: Calibration successful
  - **1**: Calibration failed

Point
- If 0 is specified for argument n, the robot calibration configuration file is overwritten and saved regardless of whether calibration is successful or failed.
- If 1 is specified for argument n, the robot calibration configuration file is overwritten and saved only when calibration is successful.

Reference Suspend the measurement at the end of the tool to execute this.

Error Code

- **13401**: When there is no tool with the mode set for the robot calibration tool
- **13402**: When there is no robot calibration setting file
- **13403**: When it failed to save the robot calibration setting file

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

135: RBMR: Read Robot Tool Mode

This command reads the current vision-guided robotics tool mode and the tool number of the tool being set.

Format of number-specified commands

Send

Word Device	Command Number	
	*	*+1
	135	

*: Front word device (command address)

Receive

Word Device	Command Result		Command Data1		Command Data2	
	*	*+1	*+2	*+3	*+4	*+5
Return value	Execution result		m		nnnn	

*: Front word device (command result address)

Format of non-procedural commands

Send

RBMR<Delimiter>

Receive

RBMR,m,nnnn<Delimiter>

Parameters (common)

- **m**: Calibration mode (0 to 4)
  - **0**: None
  - **1**: Auto calibration
  - **2**: Tool center calculation
  - **3**: High-precision calculation
  - **4**: Coordinate acquisition

nnnn: Tool No. (0 to 1999, 65535)
m: Return 65535 if the mode of the vision-guided robotics tool is 0.

Reference This command does not affect the measurement processing time.

Error Code

- **13501**: When there is no vision-guided robotics system tool

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

136: RBCSR: Read Robot Calibration Status

This command reads calibration execution result.

Format of number-specified commands

Send

Word Device	Command Number	
	*	*+1
	136	

*: Front word device (command address)

Receive

Word Device	Command Result		Command Data1	
	*	*+1	*+2	*+3
Return value	Execution result		m	

*: Front word device (command result address)

Format of non-procedural commands

Send

RBCSR<Delimiter>

Receive

RBCSR,m<Delimiter>

Parameters (common)

- **m**: Calibration execution result (0 to 1)
  - **0**: Calibration successful
  - **1**: Calibration failed

Point If the calibration is not completed, it is treated as a calibration failure (return value m is 1).

Reference This command does not affect the measurement processing time.

Error Code

- **13601**: When there is no robot calibration tool
- **13602**: When there is no tool with the robot calibration mode set to 1 to 3

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

137: RBCPW: Update Robot Capture Position

This command updates the robot posture parameters of the specified tool to the specified value.

Reference Even at a capture position with a different posture (Rx/Ry/Rz) than at the time of calibration, the capture position can be updated.

Format of number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2		Command Parameter3		Command Parameter4		Command Parameter5		Command Parameter6		Command Parameter7	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7	*+8	*+9	*+10	*+11	*+12	*+13	*+14	*+15
	137		nnnn		x		y		z		rx		ry		rz	

*: Front word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

*: Front word device (command result address)

Format of non-procedural commands

Send

RBCPW,nnnn,x,y,z,rx,ry,rz<Delimiter>

Receive

RBCPW<Delimiter>

Parameters (common)

- **nnnn**: Tool No. (0 to 1999)
- **x**: X coordinates (-9999.999 to 9999.999)
- **y**: Y coordinates (-9999.999 to 9999.999)
- **z**: Z coordinates (-9999.999 to 9999.999)
- **rx**: Rx coordinates (-180.000 to 180.000)
- **ry**: Ry coordinates (-180.000 to 180.000)
- **rz**: Rz coordinates (-180.000 to 180.000)

Reference Suspend the measurement at the end of the tool to execute this.

Error Code

- **13701**: When the tool specified by argument nnnn does not exist
- **13702**: When the tool specified by argument nnnn is not the target tool
- **13703**: When the robot posture of the tool specified by the argument nnnn refers to a tool or cell
- **13704**: When the correction type of the robot coordinate transformation tool specified by the argument nnnn is no correction or the calculation method is "Specify Directly"
- **13705**: When "Update Capture Position at Each Measurement" is set to OFF for the pick/place tool specified by argument nnnn

- **13706**: When "Update Capture Position at Each Measurement" is set to OFF for the grip shift correction tool specified by argument nnnn

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

138: RBRPW: Update Robot Coordinates

This command updates robot coordinates for tools whose vision-guided robotics tool mode is set to coordinate setting mode.

Format of number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2		Command Parameter3		Command Parameter4		Command Parameter5		Command Parameter6	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7	*+8	*+9	*+10	*+11	*+12	*+13
	138		x		y		z		rx		ry		rz	

*: Front word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution result	

*: Front word device (command result address)

Format of non-procedural commands

Send

RBRPW,x,y,z,rx,ry,rz<Delimiter>

Receive

RBRPW<Delimiter>

Parameters (common)

- **x**: X coordinates (-9999.999 to 9999.999)
- **y**: Y coordinates (-9999.999 to 9999.999)
- **z**: Z coordinates (-9999.999 to 9999.999)
- **rx**: Rx coordinates (-180.000 to 180.000)
- **ry**: Ry coordinates (-180.000 to 180.000)
- **rz**: Rz coordinates (-180.000 to 180.000)

Reference
- Suspend the measurement at the end of the tool to execute this.
- Coordinates can be specified using exponents.

Error Code

- **13801**: When there is no vision-guided robotics tool whose tool mode is set to coordinate setting

- **13802**: When the robot coordinates of the tool whose vision-guided robotics too mode is set to coordinate setting refer to the tool or cell

Reference For errors other than those listed above, see "In the event of an error in command acceptance".

139: TBC: Clear Tool Buffer

Specify the type and number of tools to clear tool buffer.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2	
	*	*+1	*+2	*+3	*+4	*+5
	139		m		nnnn	

*: Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution Result	

*: Starting word device (command result address)

For non-procedural commands

Send

TBC,m,nnnn<Delimiter>

Receive

TBC<Delimiter>

Parameters (Common)

- **m**: Tool type (0 to 5, 9999)
  - **0**: Image output tool
  - **1**: Data output tool
  - **2**: Statistics tool
  - **3**: Yield rate tool
  - **4**: Data history tool
  - **5**: Data input (non-procedural) tool

Point
- If 9999 is specified for tool type, it is executed for all tool types.
- If 0, 1, or 5 is specified for tool type and 9999 is specified for tool number, it is executed for all tools specified by tool type.

- **nnnn**: Tool number (0 to 1999, 9999)
  - **0**: Image output tool

– **1**: Data output tool
– **5**: Data input (non-procedural) tool
– **9999**: All tools

Point
- If 9999 is specified for tool number, it is executed for all tools specified by tool type.
- If 0, 1, 5, or 9999 is specified for tool type and the tool number is within the specifiable range, it is executed for all tools specified by tool type.

Reference Suspend the measurement at the end of the tool to execute this.

Error Code

- **13901**: When the tool specified by argument nnnn does not exist
- **13902**: When the tool specified by argument nnnn is other than the tool type specified by argument m
- **13903**: When 9999 is specified for argument nnnn and no tool type specified by argument m exist in the task or 0, 1, 5, or 9999 is specified by argument m

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

140: CCV: Copy Cell Value

Specify the range of copy source and copy destination to copy cell values.

Point If a CCV command is issued with a version of VS Creator earlier than Ver.1.3, the Vision Dashboard may not be updated correctly.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2		Command Parameter3		Command Parameter4		Command Parameter5		Command Parameter6	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7	*+8	*+9	*+10	*+11	*+12	*+13
	140		sc		sr		ec		er		pc		pr	

*: Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution Result	

*: Starting word device (command result address)

For non-procedural commands

Send

CCV,sc,sr,ec,er,pc,pr<Delimiter>

Receive

CCV<Delimiter>

Parameters (Common)

- **sc**: Column number of the start cell of the copy source (1 to 100)
- **sr**: Row number of the start cell of the copy source (1 to 1000)
- **ec**: Column number of the end cell of the copy source (1 to 100)
- **er**: Row number of the end cell of the copy source (1 to 1000)
- **pc**: Column number of the copy destination cell (1 to 100)
- **pr**: Row number of the copy destination cell (1 to 1000)

Point
- When a formula cell is copied, the resulting value calculated by the formula is copied.
- When a cell that is set to reference is copied, the value of the reference is copied.
- Cell formatting, text color, etc. will not be pasted.

Reference Suspend the measurement at the end of the tool to execute this.

Error Code

- **14001**: When attempting to paste into a cell other than a constant cell (including blank cells)
- **14002**: When the cell types of the copy source and copy destination do not match or when attempting to paste into a constant cell a blank cell or a cell with an error as a reference/ calculation result
- **14003**: When the paste destination does not fit within the range of the vision dashboard
- **14004**: When the number of copy source cells exceeds 500
- **14005**: When pasting fails due to insufficient resource memory

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

141: DRC: Reconnect Device

This command reconnects the device.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	141	

*: Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution Result	

*: Starting word device (command result address)

For non-procedural commands

Send
DRC<Delimiter>

Receive
DRC<Delimiter>

Reference Execute this between measurement sessions or by forcefully stopping the state where the tool is waiting for an event.

Error Code

- **14101**: When there is a lighting controller that could not be reconnected

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

142: RSOD: Initialize Output Data

Initialize the output data.

For number-specified commands

Send

Word Device	Command Number	
	*	*+1
	142	

*: Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution Result	

*: Starting word device (command result address)

For non-procedural commands

Send
RSOD<Delimiter>

Receive
RSOD<Delimiter>

Reference Execute this between measurement sessions or by forcefully stopping the state where the tool is waiting for an event.

Error Code

There are no command-specific errors.

Reference If an error that is common to all commands occurs, see "In the event of an error in command acceptance".

143: CEV: Export Cell Values

Specify the export destination file number and copy source cell range to export cell values.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2		Command Parameter3		Command Parameter4		Command Parameter5	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7	*+8	*+9	*+10	*+11
	143		nn		sc		sr		ec		er	

*: Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution Result	

*: Starting word device (command result address)

For non-procedural commands

Send

CEV,nn,sc,sr,ec,er<Delimiter>

Receive

CEV<Delimiter>

Parameters (Common)

- **nn**: File number (0 to 99)
- **sc**: Column number of the start cell (1 to 100)
- **sr**: Row number of the start cell (1 to 1000)
- **ec**: Column number of the end cell (1 to 100)
- **er**: Row number of the end cell (1 to 1000)

Point
- When a cell values shared file with the number specified by argument nn already exists, it will be overwritten.
- When a cell values shared file with the number specified by argument nn does not exist, a new file will be created.
- The file name excluding the file number will be "VisionDashboardCellValues".
- Formats and objects will not be exported.

Reference Execute this between the measurement sessions or by forcefully stopping the state where the tool is waiting for an event.

Error Code

- **14301**: When a save destination storage does not exist
- **14302**: When a file could not be saved due to insufficient capacity
- **14303**: When the cell data file is read-only
- **14304**: When the save destination storage cannot be accessed
- **14305**: When a cell in error state is included among the cells specified by argument sc, argument sr, argument ec, and argument er
- **14306**: When the number of cells specified by argument sc, argument sr, argument ec, and argument er exceeds 500

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

144: CIV: Import Cell Values

This command specifies the file number and the import destination column and row number and imports cell values.

For number-specified commands

Send

Word Device	Command Number		Command Parameter1		Command Parameter2		Command Parameter3	
	*	*+1	*+2	*+3	*+4	*+5	*+6	*+7
	144		nn		pc		pr	

*: Starting word device (command address)

Receive

Word Device	Command Result	
	*	*+1
Return value	Execution Result	

*: Starting word device (command result address)

For non-procedural commands

Send

CIV,nn,pc,pr <Delimiter>

Receive

CIV<Delimiter>

Parameters (Common)

- **nn**: File number (0 to 99)

- **pc**: Column number of the import destination cell (1 to 100)
- **pr**: Row number of the import destination cell (1 to 1000)

Reference Suspend the measurement at the end of the tool to execute this.

Error Code

- **14401**: When a cell values shared file with the number specified by argument nn does not exist
- **14402**: When a cell values shared file with the number specified by argument nn is corrupted
- **14403**: When attempting to import into a cell other than a constant cell (including blank cells)
- **14404**: When the cell types of the import data and import destination do not match (including when attempting to import a blank cell)
- **14405**: When not fitting within the range of the vision dashboard
- **14406**: When importing fails due to insufficient resource memory

Reference For more details about errors other than those listed above, see "In the event of an error in command acceptance".

Port Used for Communication

VS Series communication uses the following ports.

Port Number	Service	Remarks
21 (TCP)	FTP	
22 (TCP)	SFTP	Only when SFTP is enabled
80 (TCP)	HTTP	Only when using a web browser
443 (TCP)	HTTPS	Only when using a web browser
161 (UDP)	PROFINET	Only when PROFINET is enabled
319 (UDP)	PTP	Only when using the PTP protocol for the date and time settings
320 (UDP)	PTP	Only when using the PTP protocol for the date and time settings
2222 (UDP)	EtherNet/IP	Only when EtherNet/IP is enabled
3956 (UDP)	VS series discovery	
8500 (TCP)	Non-procedural communication	Can be changed in Global Settings
8501 (TCP)	Data Input (Non-Procedural) tool	Can be changed in Global Settings
8502 (TCP)	VS software communication	
34964 (UDP)	PROFINET	Only when PROFINET is enabled
44818 (TCP/UDP)	EtherNet/IP	Only when EtherNet/IP is enabled
49152 (UDP)	PROFINET	Only when PROFINET is enabled

Chapter 14 Display Expansion Monitor/Unit

The display expansion monitor/unit are hardware for adjusting the program setting of the VS camera and checking the measurement results. VS Creator functions can be used in environments where the bringing in of one's own computer is restricted.

Point For details of restrictions when using the VS Creator with display expansion monitors/units, see "Restrictions on the Display Expansion Monitor/Unit".

Overview of Functions

#N001

The display expansion monitor/unit allow the user to check the program setting and measurement results of the connected VS camera and adjust the setting parameters. They enable the equivalent functionality as the VS Creator that is used on a computer. For more details, see the other chapters in this manual.

Point There are restrictions when using the VS Creator with display expansion monitors/units. For details, see "Restrictions on the Display Expansion Monitor/Unit".

The display expansion monitor/unit is connected to the VS camera via Ethernet. If required, external devices such as a USB mouse, USB keyboard and/or USB storage device can be connected.
There are two types of display expansion monitors/units: a monitor type and a unit type.

Monitor type (12-inch Display Panel CG-MP120T)

This device is an integrated unit and monitor.

Unit type (Display Unit CG-MU100)

This device is alone display expansion unit. To use it, connect it to a commercially available monitor.

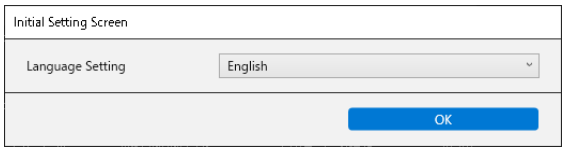
- LCD monitor: Connect it to the HDMI port on the display expansion unit.
- Touch panel display: Connect it to the HDMI and USB ports on the display expansion unit.

Flow of Setting

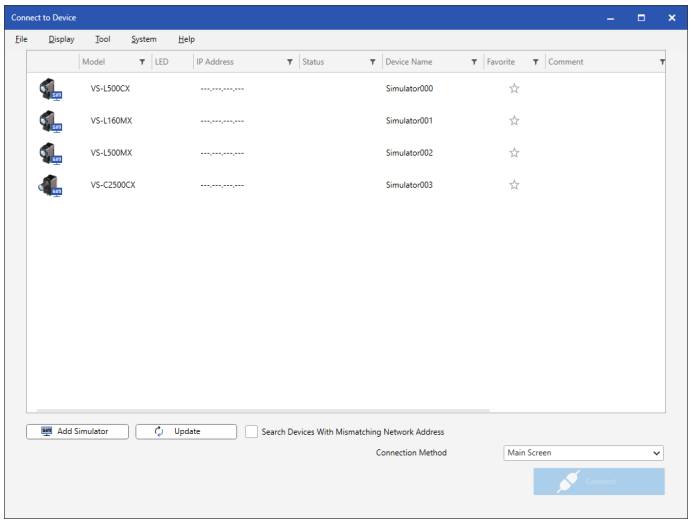
#N002

This section describes the process of setting up display expansion monitors/units.

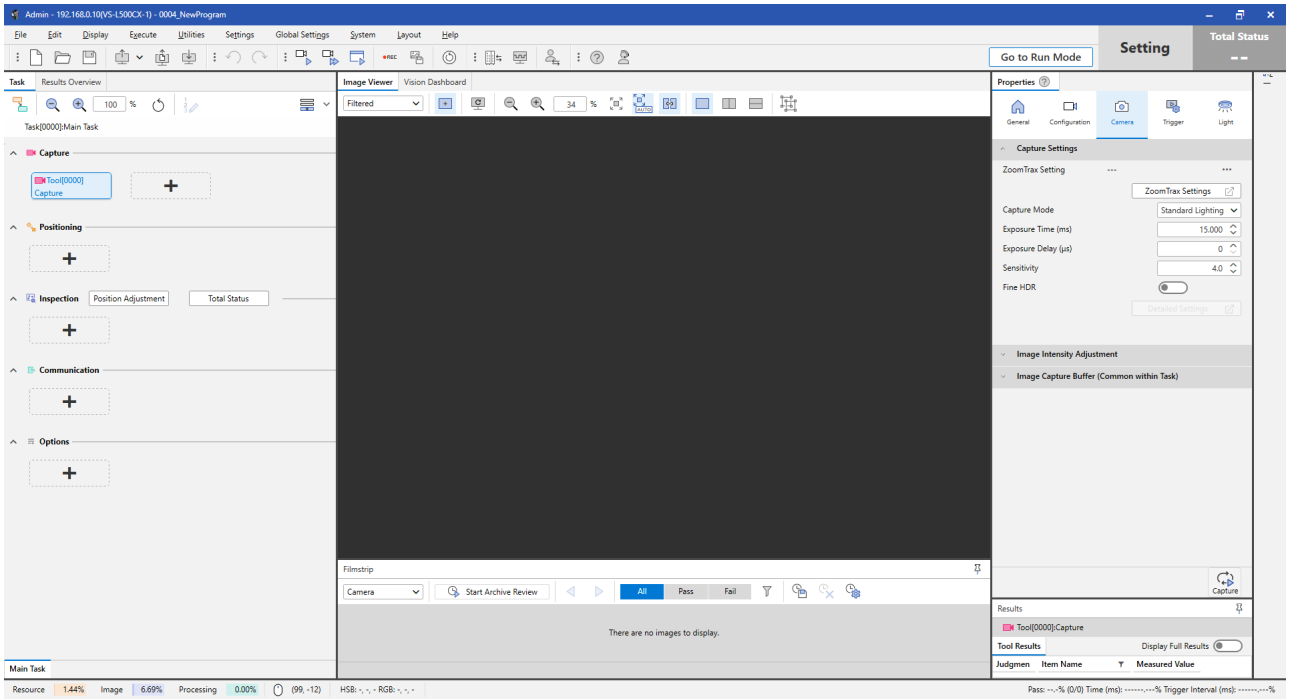
(1) Turn on the power for the display expansion monitor/unit.
The startup screen appears.



(2) You only need to set the display language on the [Initial Setting Screen] dialog box at the first start-up.
After setting, a reboot confirmation screen opens. Click the [OK] button to reboot the display expansion monitor/unit. After the reboot, the [Connect to Device] screen appears in the set language.



(3) On the [Connect to Device] screen, select a VS camera and click the [Connect] button.
The main screen appears.



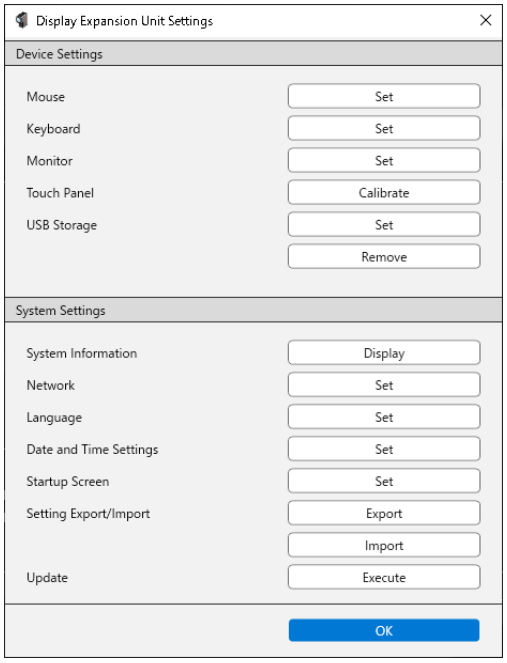
Point

- Update the VS Creator if necessary. For more details, see “Display Expansion Unit Settings” - “System Settings” - “Update”.
- If an error occurs, get the error log. For more details, see “Display Expansion Unit Settings” - “System Settings” - “System Information” - “Log Information”.

Reference When always connected to the same VS camera, the main screen can be displayed immediately after start-up. For more details, see “Display Expansion Unit Settings” - "System Settings” - “Startup Screen”.

(4) Configure the camera, light, communication, accounts, and other settings.
For more details, see the other chapters in this manual.

(5) Select the menu bar - [System] - [Display Expansion Unit Settings].
The [Display Expansion Unit Settings] dialog box appears. Configure settings related to the display expansion monitor/unit.



(6) Create and edit program settings on the main screen.
For more details about creating and editing program settings, see the other chapters in this manual.

Point For details about how operations differ to that on the computer and operating restrictions, see "Restrictions on the Display Expansion Monitor/Unit".

[Initial Setting Screen] dialog box

This dialog box appears when the display expansion monitor/unit is started for the first time. Set the language that would be displayed on all subsequent screens.

Reference The language can be changed later in the [Display Expansion Unit Settings] dialog box.

Language Setting

Select the language to be displayed on the screen from the drop-down menu and click the [OK] button.

English/Spanish/Brazilian Portuguese/German/French/Italian/Czech/Hungarian/Polish/Japanese/Simplified Chinese/Traditional Chinese/Korean/Thai/Vietnamese/Indonesian

After a confirmation message appears, the display expansion monitor/unit reboots. The setting is applied after the unit reboots.

Display Expansion Unit Settings

#N003

Immediately after installing the display expansion monitor/unit or when the operating environment changes, configure settings related to the display expansion monitor/unit.
Select the menu bar - [System] - [Display Expansion Unit Settings] on the [Connect to Device] screen or the main screen to display the [Display Expansion Unit Settings] dialog box.

[Display Expansion Unit Settings] dialog box

The settings for display expansion monitors/units include "Device Settings" and "System Settings". See the explanation of each item for more details.

Device Settings

Configure settings related to the devices to connect to the display expansion monitor/unit.

Setting Items	Description
Mouse	Set the button function and the cursor speed.
Keyboard	Set the language and keyboard layout.
Monitor	Set the brightness and resolution.
USB Storage	Manage files, format, and check the USB storage.

System Settings

Configure system settings for the display expansion monitor/unit.

Setting Items	Description
System Information	Get the VS Creator logs and check the hardware information.
Network	Set the IP address for the display expansion monitor/unit.
Language	Set the language displayed on the screen.
Date and Time Settings	Set the date and time. You can also synchronize with a time server.
Startup Screen	Set the screen to be displayed when the display expansion monitor/unit starts.
Setting Export/Import	Export or import the settings file of the display expansion monitor/unit.
Update	Update the system.

Device Settings

#N004

Configure settings for an external device (Mouse/Keyboard/Monitor/USB Storage) to be connected to the display expansion monitor/unit.

Mouse

Click the [Set] button to open the [Mouse Settings] dialog box. Set the button function and the cursor speed.

Primary Button

Select whether to click the left or right button when making a selection from the drop-down menu (default: Left). This setting is applied immediately.

Cursor Speed

Set the speed at which the mouse cursor moves by dragging the knob on the slider bar. This setting is applied immediately.

Keyboard

Click the [Set] button to open the [Keyboard Settings] dialog box. Set the language and keyboard layout.

Point After changing the keyboard layout, clicking the [OK] button displays a message prompting a reboot. Click the [OK] button to reboot the display expansion monitor/unit.

Language Setting

Select the keyboard language from the drop-down menu.
English/Spanish/Brazilian Portuguese/German/French/Italian/Czech/Hungarian/Polish/Japanese/Simplified Chinese/Traditional Chinese/Korean/Thai/Vietnamese/Indonesian

Keyboard Layout

Select the keyboard layout from the drop-down menu when [Japanese] is selected for [Language Setting]. This setting is applied after the unit is rebooted.

Monitor

Click the [Set] button to open the [Monitor Settings] dialog box. Set the monitor brightness and resolution.

Brightness

Drag the knob on the slider bar to adjust the brightness of the monitor when the monitor type is connected as the display expansion monitor/unit.

Resolution

Select the monitor resolution from the drop-down menu (default: 1024 x 768).

Point When Set Automatically is turned on, the resolution will be set automatically and cannot be selected in the drop-down menu.

- For unit type: Resolutions that can be set on the connected monitor (1024 x 768 (XGA) to 1920 x 1080 (Full HD))
- For monitor type: 1024 x 768 only

Touch Panel (CG-MU100)

Click the [Calibration] button to display the [Touch Panel Settings] dialog box. The calibration of the touch panel can be executed.

Calibrate

Click the [Calibrate] button to execute calibration. A reboot is required after executing calibration.

USB Storage

You can manage files, format, and remove the USB storage devices.

Set

Click the button to display the [USB Storage Settings] dialog box. You can Manage Files, Format, and Check the USB storage devices.

Manage Files

Click the button to display the [Manage Files] dialog box. You can use the dialog box to view and manipulate files and folders in the USB storage device.

Format

Click the button to display the [Format] dialog box. Set the capacity, file system, and so on, and click the [Start] button to format the USB storage device.

Check

Click the button to check the file system of the USB storage device for corrupt files. A message is displayed indicating whether an error was detected.

Remove

Clicking the button displays the message “The USB storage is ready to be removed.”. The USB storage device can now be safely removed.

System Settings

#N005

Configure system settings for the display expansion monitor/unit.

- System Information: Get the VS Creator logs and check the hardware information.
- Network: Set the IP address for the display expansion monitor/unit.
- Language: Set the language displayed on the screen.
- Date and Time Settings: Set the date and time. You can also synchronize with a time server.
- Startup Screen: Set the screen to be displayed when the display expansion monitor/unit starts.
- Setting Export/Import: Export or import the settings file of the display expansion monitor/unit.
- Update: Update the system.

System Information

Click the [Display] button to display the [System Information] dialog box. Get the VS Creator logs and check the hardware information.

Log Information

Click the [Get Log] button to display the [Select Folder] dialog box. Select a folder on the USB storage device and click the [OK] button to save the VS Creator logs to the selected folder.

System Information

This area displays the model and serial number of the display expansion monitor/unit.

Initialization

Click the [Execute] button to display a confirmation message. Click the [OK] button to initialize all settings of the display expansion monitor/unit. When the initialization is completed, the display expansion monitor/unit will reboot.

Network

Click the [Set] button to display the [Network Settings] dialog box. Set the IP address for the display expansion monitor/unit.

Point

- If there is an error in the set address, an [!] icon and an error message are displayed on that item. The [OK] button cannot be clicked until the error is resolved.
- After setting is complete, clicking the [OK] button displays a message prompting a reboot. Click the [OK] button to reboot the display expansion monitor/unit.

MAC Address

The MAC address for the ETHERNET ports (ETHERNET-1/ETHERNET-2) are displayed.

IP Settings

Select whether the IP address is set manually or automatically.

Obtain an IP address automatically

The IP address obtained via DHCP is set.

Use the following IP address:

Set the [IP Address], [Subnet Mask], and [Default Gateway] manually.

Language

Click the [Set] button to open the [Language Setting] dialog box. Set the display language.

> **Point** After setting is complete, clicking the [OK] button displays a message prompting a reboot. Click the [OK] button to reboot the display expansion monitor/unit.

Select the language to be displayed on the screen from the drop-down menu.
English/Spanish/Brazilian Portuguese/German/French/Italian/Czech/Hungarian/Polish/
Japanese/Simplified Chinese/Traditional Chinese/Korean/Thai/Vietnamese/Indonesian
The setting is applied after the unit reboots.

Date and Time Settings

Click the [Set] button to display the [Date and Time Settings] dialog box. Set the date and time. You can also synchronize with a time server.

> **Point** After setting [Time Zone] and [Internet Time Settings], clicking the [OK] button displays a message prompting a reboot. Click the [OK] button to reboot the display expansion monitor/unit.

Date/Time

Set the date, time, and time zone.

> **Point** The date, time, and time zone are applied when you click the [OK] button, not immediately after they are set.

Date

Enter the date directly (MM/DD/YYYY) or click the (calendar) icon and select from the calendar displayed.

Time

Enter the time directly (hh:mm:ss) or increase or decrease each value using the buttons.

Time Zone

From the drop-down menu, select the time zone of the installation region.

Internet Time Settings

Set whether to synchronize the time for the display expansion monitor/unit with the internet time server (NTP server).

Synchronize with Internet Time Server

To synchronize the time, enable this setting item.

Server

If [Synchronize with Internet Time Server] is enabled, directly enter the name or IP address of the server to synchronize the time with.

Check Connection (Ping)

Click the button to ping the set server. The connection confirmation result appears.

Update Now

Click the button to synchronize the time.

Startup Screen

Click the [Set] button to display the [Startup Screen Settings] dialog box. Set the screen to be displayed when the display expansion monitor/unit starts.

Startup Screen

Select the screen to be displayed when the display expansion monitor/unit starts from the drop-down menu.

- **"Connect to Device" Screen** (default): Displays the [Connect to Device] screen.
- **Main Screen**: Connects to the VS camera set in [Target IP Address] and displays the main screen directly without going via the [Connect to Device] screen.
- **Custom Screen Viewer**: Displays the custom screen viewer without going through the [Connect to Device] screen. For details, see "Custom Screen".

Target IP Address

This option appears if you selected [Main Screen] on [Startup Screen]. Directly enter the IP address of the VS camera to connect to at startup.

Setting Export/Import

Export or import the settings file of the display expansion monitor/unit. The settings that can be exported and imported are as follows:

- Device Settings
  - Mouse
  - Keyboard
  - Monitor
- System Settings
  - Network

– Language
– Date and Time Settings (Internet Time Settings only)
– Startup Screen

Export

Click the [Export] button to display the [Export Settings] dialog box. Set the export destination folder and the file name.

Export Destination

Set the folder to export to (default: Directly under USB storage). Click the button and select the folder in the [Select Folder] dialog box that appears.

Point
- The path displayed in the text box cannot be changed.
- You can delete, create, and rename folders on the [Select Folder] dialog box.

File Name

Set the settings file name (default: DisplayUnitSettings).

File Type

“Display Expansion Unit Settings File (*.xml)” will be displayed.

Import

Click the [Import] button to display the [Import Settings] dialog box. Set the file to be imported.

File to Import

Set the file to import (default: Directly under USB storage). Click the button and select the file in the [Select File] dialog box that appears.

Point
- The path displayed in the text box cannot be changed.
- You can delete and rename a file, and create a folder on the [Select File] dialog box.

Load Network Settings

To import Network settings, select the check box. If the check box is cleared, network settings are ignored on import.

Update

Click the [Execute] button to display the [Select File] dialog box (default: Directly under USB storage). Select the update file and click the [OK] button to update the VS Creator.
The latest update file can be downloaded from the user support website.

User Support Website
www.keyence.com/vs-support

Point
The display expansion monitor/unit reboots several times during update.

Displaying the Custom Screen Viewer

#N006

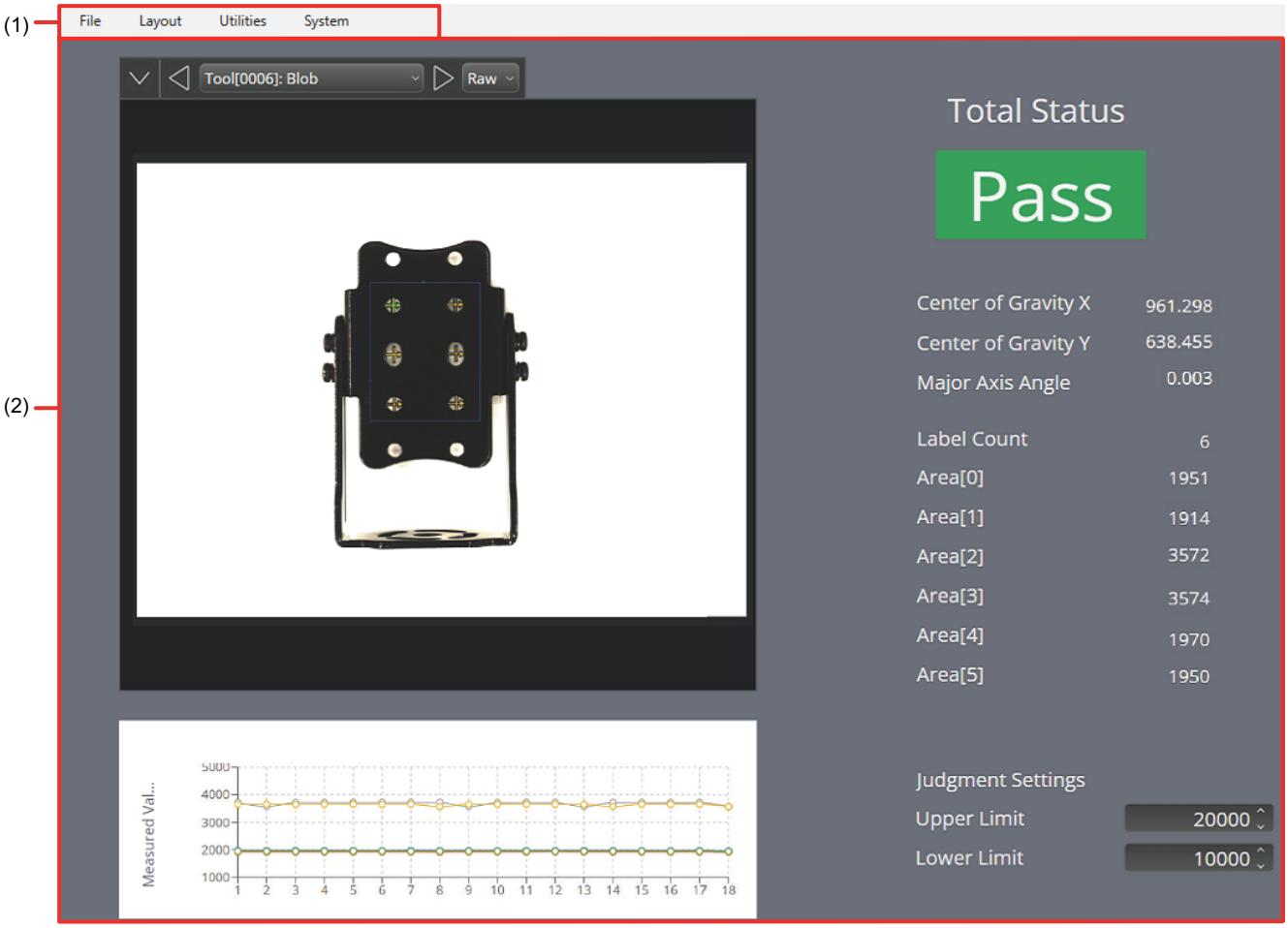
Launch the [Custom Screen Viewer] screen using one of the following methods to display the custom screen of VS Camera to be connected.

- Select the VS Camera in the device list on the [Connect to Device] screen to select [Display Custom Screen Viewer] from the context menu displayed by right-clicking.
- Select the VS Camera in the device list on the [Connect to Device] screen to click [Display Custom Screen Viewer] outside the list.
- Start up the display expansion monitor/unit in the state where [Custom Screen Viewer] is selected in [System Settings] - [Startup Screen Settings] of the display expansion monitor/unit.

On the [Custom Screen Viewer] screen, the operation status of the VS camera can be checked and the setting parameters that are set to be edited on the custom screen can be adjusted. Custom screens from multiple VS Cameras can also be displayed side by side.

Screen Details

This section explains the screen details of the [Custom Screen Viewer] screen.



(1) Menu Bar

The menus for operating the [Custom Screen Viewer] screen are grouped together. For details on each menu, refer to [Menu Bar].

(2) Browser Display

Displays the custom screen of the VS Camera to be connected. Configure the screen settings for the browser display from the menu bar - [Layout] - [Display Configuration Settings]. Two VS Cameras can be displayed simultaneously with two split screens.

Menu Bar

The menus for operating the [Custom Screen Viewer] screen are grouped together. This section describes the function and operation of each menu.

File

Import Certificate

Click this button to open the [Import Certificate] dialog box. Configure the location of the file to be imported and the certificate store, click the [OK] button, and reboot to enable the certificate.

End

Click this to close the [Custom Screen Viewer] screen and display the [Connect to Device] screen.

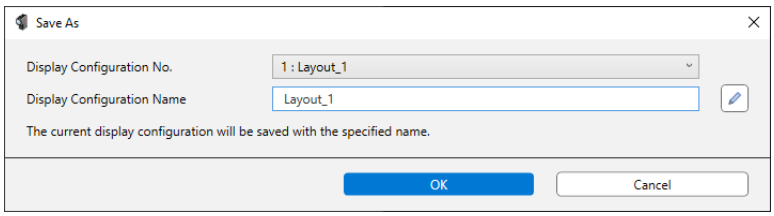
Layout

Overwrite and Save

Overwrite and save the current browser screen configuration. The screen ratio (when multiple screens are selected by display division) and default display (when [Overwrite and Save] is enabled) are saved.

Save As

Save the current browser screen configuration to another display configuration number. Click the menu to open the [Save As] dialog.



Specify the save destination number in [Display Configuration No.] and enter the name of the display configuration in [Display Configuration Name]. Click the [OK] button and close the dialog to save the display configuration, and the browser display switches to the display configuration number.

Reference

- A maximum of eight display configurations can be set. By default, "Layout n" (n: 1 to 8) is set as the name of display configuration number n.
- For more details on the settings of each display configuration, refer to [Display Configuration Settings].

Update Screen

Updates the browser display. If multiple VS cameras are displayed, all displays are updated.

Switch Screen Configuration

The screen configuration can be switched according to the usage situation. Click the menu to display a list of screen configurations that can be switched on the submenu. Select a screen configuration to be switched to switch the screen. Select [Default] to display Screen 1 of the currently displayed screen configuration on a single screen.

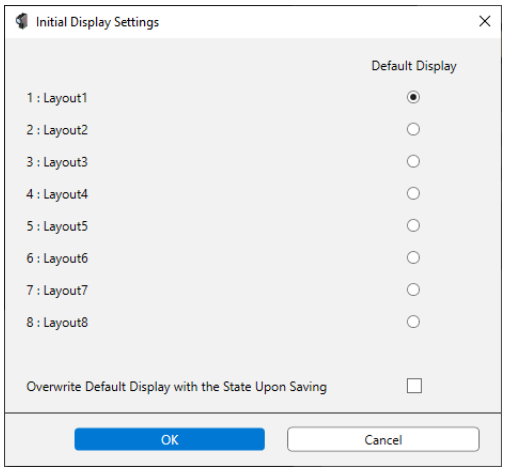
Reference When the custom screen viewer is displayed from the "Connect to Device" screen, the connected VS camera is displayed on a single screen while "Default" is selected.

Display Configuration Settings

Set the display configuration. Click the menu to open the [Display Configuration Settings] dialog. For details on the settings, refer to [Display Configuration Settings].

Initial Display Settings

Set the default display configuration when the custom screen viewer is launched. Click the menu to open the [Initial Display Settings] dialog.



Select a display configuration number to be set as the default display. Select the checkbox of [Overwrite Default Display with the State Upon Saving] to set the display configuration number that was displayed at the time of saving as the default display.

Always Display Menu

Click this to add a check mark and the menu bar will always be displayed at the top of the screen. Unselect the checkbox to automatically hide the menu bar. Click on the screen to display the menu.

Fix Display Size

Click this to add a check mark, and if 2-screen display or 4-screen display is set in [Display Configuration Settings], the screen display will be fixed and the size of each screen will not be able to be changed. This option is disabled if the screen configuration is a single screen.

Initialize Display Size

Click this to display each screen equally divided when 2- or 4-screen display is set in [Display Configuration Settings]. This option is disabled if the screen configuration is a single screen.

Utilities

Screenshot

Click this to save a screenshot of the screen to USB storage. If no USB storage is inserted, an error message will be displayed.

Remove USB Storage

Click this to display "The USB storage is ready to be removed." The USB storage can be safely removed.

Software Keyboard

Click this to launch software keyboard, allowing you to enter characters.

System

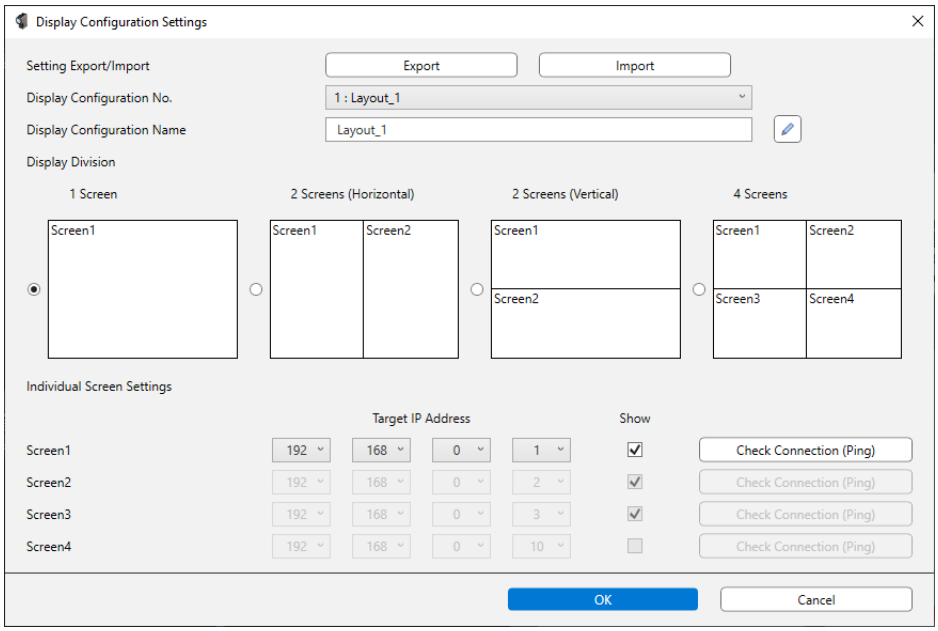
Display Expansion Unit Settings

Click the to display the [Display Expansion Unit Settings] dialog. Configure settings related to the display expansion monitor/unit, such as network settings. For details on the settings, refer to [Display Expansion Unit Settings].

Display Configuration Settings

Select the menu bar - [System] - [Custom Screen Viewer Settings] - [Display Configuration Settings] to display the [Display Configuration Settings] dialog, and the display configuration for the browser display can be set. The VS cameras to be connected can be specified, and the screen can be set to display two VS cameras simultaneously with two split screens.

Reference The [Display Configuration Settings] dialog can also be displayed from [System] - [Custom Screen Viewer Settings] - [Display Configuration Settings] on the [Connect to Device] screen.



Export/Import Settings

Export

Export the screen configuration file to USB storage. Click the [Export] button to open the [Export Display Configuration Settings] dialog. Specify the export destination USB storage folder and click the [OK] button to export the settings file. The setting files for all display configuration numbers will be exported in a batch to the specified folder.

Import

Import the screen configuration file from USB storage. Click the [Import] button to open the [Import Display Configuration Settings] dialog. Specify the USB storage folder where the display configuration file is saved and click the [OK] button to import the settings file.

Point If a certificate file exists, it will also be exported/imported.

Display Configuration Number

Select a display configuration number to set the display configuration from the pull-down menu.

Display Configuration Name

Displays the name of the display configuration number selected in [Display Configuration No.]. Set any desired name.

Display Division

Select how to divide the browser display from the following (default: 1 screen).

- 1 screen
- 2 screens (horizontal)
- 2 screens (vertical)
- 4 screens

Individual Screen Settings

Set individual settings for screens 1 to 4 according to the number of screens selected in [Display Division].

Target IP Address

Specify the IP address of the VS camera to be connected.

Display

Set whether to show or hide the screen. Unselect the checkbox to hide the screen. To display three VS Cameras, select four screens in [Display Division] and unselect the checkbox of [Display] on Screen 4.

Check Connection (Ping)

Click this to issue a ping to the specified IP address and display the result of connection check.

Restrictions on the Display Expansion Monitor/Unit

#N007

Some functions are restricted when using the VS Creator with display expansion monitors/units. This section describes the restrictions on the [Connect to Device] screen and on the main screen.

Items Common to the [Connect to Device] and Main Screens

Window Operations

- When the display expansion monitor/unit starts, the [Connect to Device] screen is initially displayed. The window size of the [Connect to Device] screen is fixed at full screen. In addition, the [Connect to Device] screen cannot be closed. The relevant buttons and menu item, such as the [Close] button, are not displayed.
- The main screen will appear when you connect to the VS camera from the [Connect to Device] screen. The window size of the main screen is fixed at full screen. After the main screen is closed, the [Connect to Device] screen reappears.

Software Keyboard

[Display] - [Software Keyboard] in the menu bar is a menu item that only appears for display expansion monitors/units. When selected, the software keyboard is launched and text can be entered. It can also be launched by pressing the ■ button on the title bar.

Display Expansion Unit Settings

[System] - [Display Expansion Unit Settings] in the menu bar is a menu item that only appears for display expansion monitors/units. Set the IP address and other settings for the display expansion monitor/unit. For details, see "Display Expansion Unit Settings".

Language Setting

The language for the display expansion monitor/unit is set in [System] - [Display Expansion Unit Settings] - [Language] from the menu bar. [System] - [VS Creator Settings] - [Language] (or [System] - [Language] for the main screen) is not displayed.

Simulator

The simulator function is not available for display expansion monitors/units. The relevant button and menu items, such as the [Add Simulator] button and [Transfer File (Program Settings)], are not displayed.

Manual

The browser in which the manual is displayed appears on the entire screen. The manual must be closed when operating VS Creator.

User Support Website

Display expansion monitors/units do not support links to the user support website. The relevant button and menu items are not displayed.

Main Screen

Operations by the Touch Panel

You cannot zoom in or out on images by pinching or spreading your fingers. Use the mouse wheel to zoom in or out.

Reference If the connected monitor supports multi-touch, you can zoom in or out on images by pinching or spreading your fingers when using a display expansion unit.

AI Inspection Tool

- The adding/copying/deleting of AI Inspection tools and execution of training are not possible on display expansion monitors/units. To add/copy/delete and perform training, use the VS Creator installed on your computer.
- The [Train] tab does not appear in the [Properties] view. The contents of the [General], [Region], and [Image Enhance] tabs in the [Properties] view are inactive as they relate to training.
- Simulation is not available for the AI Segmentation tool and the AI OCR tool.
- [Add Function] does not appear in the context menu. To perform AI activation, use the VS Creator installed on your computer.

Industrial Ethernet Settings

EDS and GSDML files cannot be created on display expansion monitors/units. The relevant items, such as [EDS File] under [Global Settings] - [Industrial Ethernet Settings] - [EtherNet/IP] in the menu bar, are not displayed.

Print Calibration Pattern

Display expansion monitors/units do not support the Print Calibration Pattern function. [Print Calibration Pattern] is not displayed in [Utilities] on the menu bar.

Vision Dashboard

- Display expansion monitors/units do not support Vision Dashboard external links. [External Link] under [Link Type] on the [Insert/Edit Link] dialog box is not displayed.
- Display expansion monitors/units do not support the template list. [Insert Template] and [Register to Template List] are not displayed on the Template function. It is possible to export template files to USB storage and to import template files saved on the USB storage.

Custom Screen

Display expansion monitors/units do not support the custom screen setting function. The [Custom Screen] tab is not displayed on the main screen.

File Save Destination

- The following image files are temporarily saved in the internal storage and can be referenced and used via [Simulation Image Settings]:
  - Image files that are obtained using the "Export Archived Images" function
  - Image files that are obtained using the "Record" function
  - Image files that are obtained using the "Save Image" function

> **Point** Image files temporarily saved in the internal storage are deleted when the display expansion monitor/unit is rebooted. If you want to use the image files after rebooting, store them on the USB storage instead of the internal storage.

- Other files, such as the display expansion monitor/unit settings file and timing chart data, can only be stored on USB storage.

Displaying the Camera Image on Multiple Screens

When displaying multiple camera images at the same time, for example, when displaying two screens in [Image Viewer], the camera images may not be fully displayed due to insufficient memory in the display expansion monitor/unit. An error occurs if there is insufficient memory. If an error occurs, operate the display expansion monitor/unit according to the message.

Limit on the Number of Camera Pixels

- A 25 megapixel camera cannot be connected. If there is a 25 megapixel camera on the network, it will appear in the device list on the [Connect to Device] screen, but an error message will appear when you try to connect to it.
- When a 15 megapixel camera is used in a program with many tools, image processing is executed and the result data is displayed, but the camera image may show a black image due to insufficient memory in the display expansion monitor/unit. To ensure that the camera image displays correctly, reduce the number of tools by deleting them, or reduce the number of times an image is captured if Multi-Capture is used in the Capture tool.

Error

#N008

This section describes error messages that may occur when using the VS Creator with display expansion monitors/units.

Error Message	Cause	Corrective Action
An error occurred.	• The [Connect to Device] screen closed due to insufficient memory or other reasons. • The main screen closed due to insufficient memory or other reasons.	Switch the display expansion monitor/unit on again, or reboot the display expansion monitor/unit by clicking the [Reboot] button in the dialog box.
Update failed.	The update failed because the power got cut off during the update or because of some other reason.	The display expansion unit settings screen will open, so run the update again.
A touch panel is not connected.	Calibration of the touch panel was performed when the touch panel was not recognized.	Check the connection between the display expansion unit and the touch panel.
Failed to verify connection with the server.	No ping response was received from the NTP server.	• Check the network settings. • Make sure that the NTP server can respond to pings.
The executable file does not exist.	The VS Creator executable file could not be found.	The display expansion unit settings screen will open, so run the update.
Failed to connect to [Target IP Address].	Connection to the camera of the specified IP address failed.	• Check the destination IP address and other settings on the [Connect to Device] screen. • Make sure that the startup user is correctly set.
The memory space is insufficient. Please reduce the size of the images to display.	There is not enough memory.	• Reduce the resolution of the camera images to be displayed. • Reduce the number of camera images to be displayed.
The memory space is insufficient. Please reboot the system.	There is not enough memory.	Select the [Reboot] button to reboot the display expansion monitor/unit.
Cannot access the internal storage.	The internal storage could no longer be recognized.	The display expansion monitor/unit may be faulty. Contact your nearest sales office.
Cannot recognize as a file for updating. Please check the specified file.	The update file (.mupd file) is corrupt.	• Get the update file again from the user support website. • Format the USB storage to be used.
Cannot display the Image Viewer content due to insufficient memory capacity. Recovery from this condition may be possible by doing the following: • Close a dialog • Reduce the number of items displayed in the Image Viewer	There is not enough memory.	• Close a dialog box. • Reduce the number of camera images to be displayed. • Reduce the tools. • Reduce the number of times the Capture tool takes images.

Chapter 15 Appendix

This appendix describes detailed information about the main specifications, setting parameters, and result data of VS cameras, display expansion units, and other devices.

Main Specifications

Point The number of settings actually available for all items listed depends on the memory capacity and remaining amount of available memory in the device.

Camera Units (VS-S___MX/CX, VS-L___MX/CX, VS-C___MX/CX)

#O001

Model[*1]		VS-S___MX/CX				VS-L___MX/CX				VS-C___MX/CX				
		160	320	500	1500	160	320	500	1500	160	320	500	1500	2500
Storage	Internal Storage	3 GB	7 GB	7 GB	7 GB	3 GB	7 GB	7 GB	7 GB	3 GB	7 GB	7 GB	7 GB	7 GB
	microSD card (external)[*2]	CA-MSD32G CA-MSD64G				CA-MSD32G CA-MSD64G				CA-MSD32G CA-MSD64G				
Archive Capture Image Count[*3]	Gray	226	632	404	419	226	632	404	419	226	632	390	419	212
	Color	221	623	400	416	221	623	400	416	221	623	385	416	211
	Color (free rotation ON)	70	206	130	135	70	206	130	135	-				
Image sensor	Image size	-				-				1/2.9 in	1/1.8 in	2/3 in	1.1 in	1.1 in
	Pixel size	-				-				3.45µm	3.45µm	3.45µm	2.5µm	2.5µm
Lens	Mount	Integrated lens				Integrated lens				C mount				
	Maximum optical magnification	x3.5	x2.4	x2.0	x1.1	x8.75	x6.0	x5.0	x2.75	-				
	Installation distance[*8]	50 mm - 500 mm				150 mm - 5000 mm				-				
Power, I/O connections	Connector	M12 A code 12-pin male connector												
	Input ch	1 (insulated)												
	Output ch	3 (insulated)												
	I/O ch	2 (insulated) (input/output switchable via settings)												
Ethernet	Connector	M12 X code 8-pin female connector												
	Standard	1000BASE-T/100BASE-TX/10BASE-T												
Light Control	Connector	Dedicated 12-pin round connector												
Interface		Ethernet, EtherNet/IP, PROFINET (Conformance Class B), PLC-Link, SNTP, PTP												

Model*1		VS-S___MX/CX				VS-L___MX/CX				VS-C___MX/CX				
		160	320	500	1500	160	320	500	1500	160	320	500	1500	2500
Function	Capture Mode	1.6M	1.6M 3.2M	1.6M 3.2M 5M	1.6M 3.2M 5M 15M	1.6M	1.6M 3.2M	1.6M 3.2M 5M	1.6M 3.2M 5M 15M	1.6M	1.6M 3.2M	1.6M 3.2M 5M	1.6M 3.2M 5M 15M	1.6M 3.2M 5M 15M 25M
	Maximum valid pixel count	1440x1072	2048x1536	2544x1904	4400x3296	1440x1072	2048x1536	2544x1904	4400x3296	1440x1072	2048x1536	2464x2048	4400x3296	5120x5120
	Output image pixel count	1440x1072 1072x1440 1248x1248 1664x928 928x1664 2160x720 720x2160	2048x1536 1536x2048 1776x1776 2368x1328 1328x2368 3072x1024 1024x3072	2544x1904 1904x2544 2224x2224 2976x1664 1664x2976 3824x1280 1280x3824	4400x3296	1440x1072 1072x1440 1248x1248 1664x928 928x1664 2160x720 720x2160	2048x1536 1536x2048 1776x1776 2368x1328 1328x2368 3072x1024 1024x3072	2544x1904 1904x2544 2224x2224 2976x1664 1664x2976 3824x1280 1280x3824	4400x3296	1440x1072	2048x1536	2464x2048	4400x3296	5120x5120
	Minimum exposure time (ms)	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.015	0.015	0.015	0.008	0.008
	Maximum exposure time (ms)	1.000												
	Image correction functions	Gain/Offset/Gamma correction/White balance/Fine HDR												

Model[*1]		VS-S___MX/CX				VS-L___MX/CX				VS-C___MX/CX				
		160	320	500	1500	160	320	500	1500	160	320	500	1500	2500
Function	Tools	Capture, Calibration, Scaling Correction, Area, Intensity, Color Detection, Pattern Search, ShapeTrax3A, Edge Position, Edge Width, Edge Pitch, Edge Pairs, Profile Position, Profile Width, Profile Defect, Defect, Blob, Grayscale Blob, OCR2, 1D Code Reader, 2D Code Reader, AI Classification, AI Detection, AI OCR, AI Segmentation, Points Distance, Point/Line Distance, Lines Distance, Point/Circle Distance, Line/Circle Distance, Circles Distance, Line Detection, Line Passing Two Points, Bisection of Two Lines, Angle Formed by Two Lines, Circle Detection, Line/V-line Intersection, Two Lines Intersection, Center of Quadrangle, Midpoint of Points, Shared Region, Image Region (Current Image), Image Region (Model Image), Shared Pattern (ShapeTrax3A), Shared Image Enhance, Subtraction Filter, Image Position Adjustment, Calibration (Robot), Pick/Place, Grip Shift Correction, Robot Coordinate Transformation, Data Input (Industrial Ethernet), Data Input (Non-Procedural), Data Output (Industrial Ethernet), Data Output (Non-Procedural), Data Output (FTP/Storage), Data Output (Terminal), Image Output (FTP/Storage), Image Output with Graphics (FTP/Storage), Graphics Display, Statistics, Yield Rate, Data History, Change Program Setting (PL), Save Settings (PS), Issue Soft Event (SEI), Clear Error (ERC), Clear Tool Buffer (TBC), Reset (RS), Initialize Output Data (RSOD), Disable Output (OD), Disable Trigger Input (TD), Register Model Image (MG), Change Model Image (MS), Update Pattern Information (PDU), Update Position Adjustment Reference Value (RPU), Update Registered String (JSU), Update Collation Pattern (CRU), Copy Cell Value (CCV), Export Cell Values (CEV), Import Cell Values (CIV)												
	Display	Display/Status LED/Ethernet LED (Link/Act)/SD card access lamp												
	Buttons	Operation buttons x 3												
	Installation aids	Pointer (Class 1 laser product[*4])/Angle monitor								Angle monitor				
Power	Voltage	24V +25%/-20% or PoE (IEEE802.3at power class 4)												
	Current consumption (camera only)	0.97 A, 18.7 W (at 19.2 V)/0.78 A, 18.7 W (at 24 V)												
	Current consumption (including lighting)	4.7A, 89.7W (at 19.2 V)/3.8A, 89.7W (at 24 V)												
	Current consumption (at CA-DE*10X)[*5]	11.3A, 216.7W (at 19.2 V)/9.1A, 216.7W (at 24 V)												

Model[*1]		VS-S___MX/CX				VS-L___MX/CX				VS-C___MX/CX				
		160	320	500	1500	160	320	500	1500	160	320	500	1500	2500
Other	Weight	Approx. 570 g				Approx. 700 g				Approx. 420 g				
	Size (HxWxD)	122.3 mm x 52.6 mm x 69.2 mm (excluding connector protrusions)				122.5 mm x 52.6 mm x 99.1 mm (excluding connector protrusions)				93.2 mm x 52.6 mm x 66.0 mm (excluding connector protrusions)				
	Enclosure rating	IP67 (IEC 60529)												
	Material[*6]	Main unit case: Aluminium die-cast Front cover: Glass												
	Case temperature rating[*7]	0 to 65°C												
	Operating ambient humidity	85% Rh or less (no condensation)												
	Standard certification	CE, UKCA, NRTL, KC, CSA												
	Vibration resistance	10 to 500 Hz Power spectral density: 0.05 G2/Hz 0.5 hours in X, Y and Z directions (IEC 60068-2-64)												
	Shock resistance	50G 6 directions 3 times each (IEC 60068-2-27)												

*1: Models ending with "MX" refer to a type with a monochrome image sensor and "CX" refers to a type with a color image sensor.

*2: Use the configuration software and use it after formatting.

*3: Standard capture mode value.

*4: FDA (CDRH) Part 1040.10 (classified according to the criteria in IEC 60825-1 in compliance with Laser Notice No. 50), IEC 60825-1:2014.

*5: Maximum instantaneous current (max. 100 ms). The average current is below the “Current consumption (including lighting)” value.

*6: ESD-Safe, IEC-61340-5-1 compliant.

*7: Reference values: 200 mm x 200 mm x 10 mm aluminium plate mounted, ambient temperature 40°C, case temperature 65°C.

*8: The VS-S___MX/CX has a field of view measurable distance of 50 mm to 500 mm. The VS-L___MX/CX has a field of view measurable distance of 150 mm to 3000 mm.

Display Unit (CG-MU100)

#O002

Model		CG-MU100
External monitor	Interface	HDMI
	Resolution	Max. 1920 x 1080
	Touch Panel	Supported (USB connection)*1
Interface	Ethernet	RJ45 connector x2 (1000BASE-T/100BASE-TX/10BASE-T)
	Number of USB ports	3
Power	Voltage	24 V +25%/-20%
	Current consumption	2.3 A, 44.2 W (at 19.2 V)/1.9A, 18.7 W (at 24 V)
Other	Weight	Approx. 830 g
	Size (HxWxD)	56.5 mm x 180.0 mm x 161.4 mm
	Material	Unit case: Polycarbonate
	Operating ambient temperature	0 to 45°C (DIN), 0 to 40°C (placed vertically, placed flat)
	Operating ambient humidity	85% RH or less (no condensation)
	Standard certification	CE, FCC, NRTL, KC, UKCA

*1: Supports external touch panel control. However, this does not guarantee operation on all devices.

12-inch Display Panel (CG-MP120T)

#O003

Model		CG-MP120T
Internal monitor (LCD panel)	Display device	TFT LCD
	Display colors	Approx. 16 million colors
	Display dots	1024 (W) x 768 (H)
	Active display area	12.1-inch (245.7 mm (W) x 184.3 mm (H))
	Backlight - method	White LED (non-replaceable)
	Backlight - lifespan	Approx. 50,000 hours (normal temperature and humidity)
	Touch panel - method	analog resistive
	Touch panel - actuating force	0.98 N or less
	Touch panel - lifespan	More than one million times
Interface	Ethernet	RJ45 connector x2 (1000BASE-T/100BASE-TX/10BASE-T)
	Number of USB ports	Front: 1, Back: 2
Power	Voltage	24 V +25%/-20%
	Current consumption	2.5A, 48 W (at 19.2 V)/2.0A, 48 W (at 24 V)
Other	Weight	Approx. 2400 g
	Size (HxWxD)	312.3 mm x 245.3 mm x 60.1 mm
	Enclosure rating	Integrated panel, dustproof and drip-proof construction equivalent to IP65f for the front control panel only*1
	Material	Unit case: Polycarbonate Front sheet: PET
	Operating ambient temperature	0 to 50 °C (vertical mounting)*2
	Operating ambient humidity	85% RH or less (no condensation)
	Standard certification	CE, FCC, NRTL, KC, UKCA

*1: If the front USB cover is closed.

*2: For details of mounting condition values other than vertical, see “Connecting the Display Expansion Monitor” in the “Customizable Vision System VS Series Setup Manual”.

IP67 Lighting Controller (CG-LC100)

#O004

Model		CG-LC100
Output	No. of channels	2
	Connector	M12 A cord 4-pin female connector
	Light control methods	1. Constant voltage control method (DC lighting with linearization function) 2. Pulse duration modulation method (emission frequency 100 kHz)
	Gradation	1024-step digital
	Voltage	12 V DC/24 V DC (switchable)
	Capacity	Max. 30 W (60 W total for 2 channels)
	Synchronization	Ethernet synchronization/FLASH input synchronization/Continuous lighting
	Light control responsiveness	1. Constant voltage control method: Within 3 ms 2. Pulse duration modulation method: Within 1 ms
Input Terminals	Connector	M12 A cord 8-pin female connector
	FLASH inputs	2 (insulated)
	Lighting forced stop inputs	2 (insulated)
	Power output (for auxiliary input)	24 V DC 100 mA
Ethernet	No. of ports	2
	Connector	M12 X cord 8-pin female connector
	Standard	1000BASE-T/100BASE-TX/10BASE-Te
Display/operation	Display	Display/Power LED/Status LED/Ethernet LED (LINK/ACT)
	Operation	Operation buttons/dial
Power	Connector	M12 L cord 5-pin male connector
	Voltage	24 V DC +25%/-20%
	Current consumption	4.4A, 84.5 W (at 19.2 V)/3.4 A, 81.6 W (at 24 V)
Other	Weight	Approx. 500 g
	Size (HxWxD)	176.4 mm x 75.4 mm x 40.4 mm (excluding connector protrusions and operation dial)
	Enclosure rating	IP67 (IEC 60529)
	Material	Main unit case: (Top) Polycarbonate, (Bottom) Aluminium die-cast
	Case temperature rating*1 *2	0 to 70°C
	Operating ambient humidity	85% RH or less (no condensation)
	Standard certification	CE, FCC, NRTL, KC, UKCA
	Vibration resistance	10-500 Hz power spectral density: 0.05 G2/Hz X, Y and Z directions 0.5 hours (IEC 60068-2-64)
	Shock resistance	50G 6 directions 3 times each (IEC 60068-2-27)

*1: (Reference values) 226 mm x 125 mm x 10 mm aluminium plate mounted, ambient temperature 50°C, case surface 70°C.

*2: Be sure to consider the requirements listed in the operating instructions included with the product when using this product as a CAS certified product.

PoE Switching Hub (CG-SW100)

#O005

Model		CG-SW100
Ethernet	No. of ports (PoE supported)	4
	No. of ports (PoE not supported)	2
	Connector	M12 X cord 8-pin female connector
	Standard	1000BASE-T/100BASE-TX/10BASE-Te
	PoE standard	IEEE 802.3af/at (max. 30 W/port output)
Display	LED	Power LED/Status LED/Ethernet LED (LINK/ACT,PoE)
Power	Connector	M12 L cord 5-pin male connector
	Voltage	24 V DC +25%/-20%
	Current consumption ratings (with PoE output)	10.8A, 207.4W (at 19.2 V)/7.6A, 182.4W (at 24 V)
	Current consumption (without PoE output)	0.4A, 8.5W (at 19.2 V)/0.4A, 8.6W (at 24 V)
Other	Weight	Approx. 750 g
	Size (HxWxD)	176.4 mm x 80.4 mm x 43.4 mm (excluding connector protrusions)
	Enclosure rating	IP67 (IEC 60529)
	Material	Main unit case: Aluminium die-cast
	Case temperature rating*1 *2	0 to 70°C
	Operating ambient humidity	85% RH or less (no condensation)
	Standard certification	CE, FCC, NRTL, KC, UKCA
	Vibration resistance	10-500 Hz power spectral density: 0.05 G2/Hz X, Y and Z directions 0.5 hours (IEC 60068-2-64)
	Shock resistance	50G 6 directions 3 times each (IEC 60068-2-27)

*1: (Reference values) For 90 W PoE output: 226 mm x 200 mm x 10 mm aluminium plate mounted, ambient temperature 45°C, case temperature 70°C. For 120 W PoE output: 296 mm x 200 mm × 10 mm aluminium plate mounted, ambient temperature 45°C, case temperature 70°C.

*2: Be sure to consider the requirements listed in the operating instructions included with the product when using this product as a CAS certified product.

Lighting Conversion Unit (directly connected to camera) (CG-LC10, CG-LC20)

#O006

	Model	CG-LC10	CG-LC20
Light output	No. of channels	1	1
	Connector	M12 A cord 4-pin female connector	M12 A cord 5-pin female connector
	Light control methods	1. Constant voltage control method (DC lighting with linearization function) 2. Pulse duration modulation method (emission frequency 100 kHz)	Depends on the LED light connected
	Gradation	1024-step digital	1024-step digital
	Voltage	12 V DC	24 V DC
	Capacity*1	When powered by 24 V DC: Max. 30 W*2 At PoE: Max. 10 W	Maximum 30W
	Synchronization	Synchronized to trigger to camera and/or shutter speed/Continuous lighting	Synchronized to trigger to camera and/or shutter speed/Continuous lighting
	Light control responsiveness	1. Constant voltage control method: Within 3 ms 2. Pulse duration modulation method: Within 1 ms	Depends on the LED light connected
Control interface	Connector	Dedicated 12-pin round connector	Dedicated 12-pin round connector
Power		Powered via control interface 24 V DC, -20%/+25% (19.2 to 30.0 V DC) PoE-compatible (38 to 58 V DC)	Powered via control interface
Other	Weight	Approx. 110 g	Approx. 110 g
	Size (HxWxD)	21 mm x 100 mm x 26 mm (excluding cables) Overall length 400 mm (including cables)	21 mm x 100 mm x 26 mm (excluding cables) Overall length 400 mm (including cables)
	Enclosure rating	IP67 (IEC 60529)	IP67 (IEC 60529)
	Material	Main unit: Polyamide	Main unit: Polyamide
	Operating ambient temperature	0 to 50°C (but not exceeding 65°C main unit temperature)	0 to 50°C (but not exceeding 65°C main unit temperature)
	Operating ambient humidity	85% RH or less (no condensation)	85% RH or less (no condensation)
	Vibration resistance	10 to 500 Hz Power spectrum density: 0.05 G2/Hz 0.5 hours in X, Y, Z directions (IEC 60068-2-64)	10 to 500 Hz Power spectrum density: 0.05 G2/Hz 0.5 hours in X, Y, Z directions (IEC 60068-2-64)
	Shock resistance	50G 6 directions, 3 times each (IEC 60068-2-27)	50G 6 directions, 3 times each (IEC 60068-2-27)

*1: The maximum value varies depending on the power supply method of the customizable vision system to which the unit is connected.

*2: Continuous lighting 15 W max.

How to Read the Settings Parameters/Results Data List

This section describes how to read the settings parameters and results data list.

Composition of the list

Both settings parameters and results data consist of common and individual data, except for some tools that do not have individual data.
The list only includes individual data for each tool, so see the common data if necessary.
The corresponding common data for each tool is shown below.

Tool-specific data correspondence table

Category	Tool Type	Setting Parameter						Result Data
		Common Settings for All Tools	Image Setting	Color Extraction Settings	Inspection Region Settings	Pattern Region Setting	Image Enhancement Filter Settings	
Capture	Capture	✓	–	–	–	–	–	✓
	Calibration	✓	–	–	–	–	–	✓
	Scaling	✓	–	–	–	–	–	✓
Inspection	Area	✓	✓	✓	✓	–	✓	✓
	Intensity	✓	✓	✓	✓	–	✓	✓
	Color Detection	✓	✓	–	✓	–	–	✓
	Pattern Search	✓	✓	✓	✓	✓	✓	✓
	ShapeTrax3A	✓	✓	✓	✓	✓	✓	✓
	Edge Position	✓	✓	✓	✓	–	✓	✓
	Edge Width	✓	✓	✓	✓	–	✓	✓
	Edge Pitch	✓	✓	✓	✓	–	✓	✓
	Edge Pairs	✓	✓	✓	✓	–	✓	✓
	Profile Position	✓	✓	✓	✓	–	✓	✓
	Profile Width	✓	✓	✓	✓	–	✓	✓
	Profile Defect	✓	✓	✓	✓	–	✓	✓
	Defect	✓	✓	✓	✓	–	✓	✓
	Blob	✓	✓	✓	✓	–	✓	✓
	Grayscale Blob	✓	✓	✓	✓	–	✓	✓
	OCR2	✓	✓	✓	✓	–	✓	✓
	1D Code Reader	✓	✓	✓	✓	–	✓	✓
	2D Code Reader	✓	✓	✓	✓	–	✓	✓
AI Inspection	AI Classification	✓	–	✓	–	–	–	✓
	AI Detection	✓	–	✓*1	✓	–	–	✓
	AI Segmentation	✓	–	✓	✓	–	–	✓
	AI OCR	✓	✓	✓	✓	–	✓	✓

Category	Tool Type	Setting Parameter						Result Data
		Common Settings for All Tools	Image Setting	Color Extraction Settings	Inspection Region Settings	Pattern Region Setting	Image Enhancement Filter Settings	
Measurements & Dimensions	Points Distance	✓	–	–	–	–	–	✓
	Point/Line Distance	✓	–	–	–	–	–	✓
	Lines Distance	✓	–	–	–	–	–	✓
	Point/Circle Distance	✓	–	–	–	–	–	✓
	Line/Circle Distance	✓	–	–	–	–	–	✓
	Circles Distance	✓	–	–	–	–	–	✓
	Line Detection	✓	✓	✓	✓	–	✓	✓
	Line Passing Two Points	✓	–	–	–	–	–	✓
	Bisection of Two Lines	✓	–	–	–	–	–	✓
	Angle Formed by Two Lines	✓	–	–	–	–	–	✓
	Circle Detection	✓	✓	✓	✓	–	✓	✓
	Line/V-Line Intersection	✓	–	–	–	–	–	✓
	Two Lines Intersection	✓	–	–	–	–	–	✓
	Center of Quadrangle	✓	–	–	–	–	–	✓
	Midpoint of Points	✓	–	–	–	–	–	✓
Region	Shared Region	✓	–	–	–	–	–	✓
	Image Region (Current Image)	✓	–	✓	–	–	✓	✓
	Image Region (Model Image)	✓	–	✓	–	–	✓	✓
	Shared Pattern (ShapeTrax3A)	✓	✓	✓	–	✓	✓	✓
Image Conversion	Shared Image Enhance	✓	✓	✓	–	–	✓	✓
	Subtraction Filter	✓	✓	✓	–	–	✓	✓
	Image Position Adjustment	✓	–	–	–	–	–	✓
Vision-Guided Robotics	Calibration (Robot)	✓	–	–	–	–	–	✓
	Pick/Place	✓	–	–	–	–	–	✓
	Grip Shift Correction	✓	–	–	–	–	–	✓
	Robot Coordinate Transformation	✓	–	–	–	–	–	✓
Communication	Data Input (Industrial Ethernet)	✓	–	–	–	–	–	✓
	Data Input (Non-Procedural)	✓	–	–	–	–	–	✓
	Data Output (Industrial Ethernet)	✓	–	–	–	–	–	✓
	Data Output (Non-Procedural)	✓	–	–	–	–	–	✓
	Data Output (FTP/Storage)	✓	–	–	–	–	–	✓
	Data Output (Terminal)	✓	–	–	–	–	–	✓
	Image Output (FTP/Storage)	✓	–	–	–	–	–	✓
	Image Output with Graphics (FTP/Storage)	✓	–	–	–	–	–	✓
Display	Graphics Display	✓	–	–	–	–	–	✓
Data Analysis	Statistics	✓	–	–	–	–	–	✓
	Yield Rate	✓	–	–	–	–	–	✓
	Data History	✓	–	–	–	–	–	✓

Category	Tool Type	Setting Parameter						Result Data
		Common Settings for All Tools	Image Setting	Color Extraction Settings	Inspection Region Settings	Pattern Region Setting	Image Enhancement Filter Settings	
Control	Change Program Setting (PL)	✓	–	–	–	–	–	✓
	Save Settings (PS)	✓	–	–	–	–	–	✓
	Issue Soft Event (SEI)	✓	–	–	–	–	–	✓
	Clear Error (ERC)	✓	–	–	–	–	–	✓
	Clear Tool Buffer (TBC)	✓	–	–	–	–	–	✓
	Reset (RS)	✓	–	–	–	–	–	✓
	Initialize Output Data (RSOD)	✓	–	–	–	–	–	✓
	Disable Output (OD)	✓	–	–	–	–	–	✓
	Disable Trigger Input (TD)	✓	–	–	–	–	–	✓
	Register Model Image (MG)	✓	–	–	–	–	–	✓
	Change Model Image (MS)	✓	–	–	–	–	–	✓
	Update Pattern Information (PDU)	✓	–	–	–	–	–	✓
	Update Position Adjustment Reference Value (RPU)	✓	–	–	–	–	–	✓
	Update Registered String (JSU)	✓	–	–	–	–	–	✓
	Update Collation Pattern (CRU)	✓	–	–	–	–	–	✓
	Copy Cell Value (CCV)	✓	–	–	–	–	–	✓
	Export Cell Values (CEV)	✓	–	–	–	–	–	✓
	Import Cell Values (CIV)	✓	–	–	–	–	–	✓

*1:When the [MultiSpectrum Mode] is selected in the [Capture Mode] of the [Capture] tool and MultiSpectrum images are specified as an input image for the AI Detection tool.

Notations

The following notations are used in the program.

Setting Parameter

Tool [Tool ID].Name

The name is prefixed by “Input.”.

Result Data

For system properties: SystemProperty.Name

For tasks: Task[Task ID].Name

For tools: Tool[Tool ID].Name

The name is prefixed by “Output.”.

Reference When entering the name directly, the auto-fill function activates. Enter S to display “SystemProperty” or T to display the task/tool list. If you subsequently enter a dot (.), it is conveniently followed by the symbols that make up the subsequent name, which are displayed as candidates for selection.

Settings Parameters and Results Data that Possess Arrays

- Setting parameters and results data with an array structure storing multiple settings and results in the same tool are, in principle, described with the first one (index 0) as representative and the second and subsequent ones in simplified form.
- Arrays that store multiple detections are marked with [*].

Absolute Measured Values of Results Data

Some results data, such as position X and angles, have measured and absolute measured values.
Example: Pattern Search result data position X

Output.Position.X: Measured value

Output.Position.X.Abs: Absolute measured value

The measured value is the value output as the measurement result.
Absolute measured values (.Abs) are the values output as measurement results before any change of origin coordinates, correction of the coordinate axes, or scaling is applied.

Settings Parameters List

This section describes the names of the settings parameters, the range of values, their format, and whether they can be referenced by the tool.

Common to Tools

#O007

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	Tool ID	Input.General.Id			-	-	-	-	-	-
	Tool Type	Input.General.Type	Capture	3	-	-	-	-	-	-
			Calibration	70						
			Scaling	63						
			Area	18						
			Intensity	0						
			Color Detection	28						
			Pattern Search	1						
			ShapeTrax3A	21						
			Edge Position	36						
			Edge Width	38						
			Edge Pitch	74						
			Edge Pairs	39						
			Profile Position	32						
			Profile Width	34						
			Profile Defect	33						
			Defect	22						
			Blob	24						
			Grayscale Blob	27						
			OCR2	20						
			1D Code Reader	69						
			2D Code Reader	81						
			AI Classification	64						
			AI Detection	48						
			AI Segmentation	113						
			AI OCR	96						
			Points Distance	29						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	Tool Type	Input.General.Type	Point/Line Distance	43	-	-	-	-	-	-
			Lines Distance	45						
			Point/Circle Distance	44						
			Line/Circle Distance	46						
			Circles Distance	47						
			Line Detection	90						
			Line Passing Two Points	58						
			Bisection of Two Lines	56						
			Angle Formed by Two Lines	54						
			Circle Detection	89						
			Line/V-Line Intersection	53						
			Two Lines Intersection	55						
			Center of Quadrangle	57						
			Midpoint of Points	52						
			Shared Region	66						
			Image Region (Current Image)	61						
			Image Region (Model Image)	93						
			Shared Pattern (ShapeTrax3A)	95						
			Shared Image Enhance	59						
			Subtraction Filter	51						
			Image Position Adjustment	26						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	Tool Type	Input.General.Type	Calibration (Robot)	99	-	-	-	-	-	-
			Pick/Place	97						
			Grip Shift Correction	103						
			Robot Coordinate Transformation	104						
			Data Input (Industrial Ethernet)	71						
			Data Output (Industrial Ethernet)	37						
			Data Output (Non-Procedural)	40						
			Data Output (FTP/Storage)	41						
			Data Output (Terminal)	68						
			Image Output (FTP/Storage)	2						
			Image Output with Graphics (FTP/Storage)	119						
			Graphics Display	75						
			Statistics	23						
			Yield Rate	91						
			Data History	94						
			Change Program Setting (PL)	76						
			Save Settings (PS)	78						
			Issue Soft Event (SEI)	79						
			Clear Error (ERC)	83						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	Tool Type	Input.General.Type	Clear Tool Buffer (TBC)	109	-	-	-	-	-	-
			Reset (RS)	77						
			Initialize Output Data (RSOD)	120						
			Disable Output (OD)	84						
			Disable Trigger Input (TD)	82						
			Register Model Image (MG)	108						
			Change Model Image (MS)	85						
			Update Pattern Information (PDU)	87						
			Update Position Adjustment Reference Value (RPU)	86						
			Update Registered String (JSU)	106						
			Update Collation Pattern (CRU)	107						
			Copy Cell Value (CCV)	112						
			Export Cell Values (CEV)	115						
			Import Cell Values (CIV)	116						
	Current Image	Input.General.Image			-	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	Execute Condition: Setting Method	Input.General.ExecuteCondition.Type	Fixed Condition	0	Fixed Condition					-
			Follow Judgment Result of Other Tool	1						
			Specify Condition	2						
	Execute Condition: Tool Execution	Input.General.ExecuteCondition.Execution			True	-	-	1	1	✓
	Execute Condition: Reference Tool	Input.General.ExecuteCondition.ID			None	-	-	-	-	-
	Execute Condition: Execute when Judgment Result is	Input.General.ExecuteCondition.Status	Pass	0	Pass	-	-	-	-	-
			Fail	1						
	Execute Condition: Reference Value	Input.General.ExecuteCondition.ReferenceValue			0	-1000000000	1000000000	10	0	✓
	Execute Condition: Condition	Input.General.ExecuteCondition.ConditionValue			0	-1000000000	1000000000	10	0	✓
	Judgment Targets	Input.General.JudgementTarget			-	-	-	-	-	-
	Origin Coordinate X	Input.General.OriginPoint.X			0.000	9600.000	-9600.000	4	3	-
	Origin Coordinate Y	Input.General.OriginPoint.Y			0.000	9600.000	-9600.000	4	3	-
	Detection Point Offset X	Input.General.DetectionPointOffset.X			0.000	9600.000	-9600.000	4	3	✓
	Detection Point Offset Y	Input.General.DetectionPointOffset.Y			0.000	9600.000	-9600.000	4	3	✓
	Scaling: Specify Individually	Input.General.ScalingCorrection.Individual			False	-	-	-	-	-
	Scaling: Specify	Input.General.ScalingCorrection.ID			None	-	-	-	-	-
	Scaling: X Enabled	Input.General.ScalingCorrection.EnableX			True	-	-	-	-	-
	Scaling: X	Input.General.ScalingCorrection.X			1.000000	9999.999999	-9999.999999	4	6	✓
	Scaling: Y Enabled	Input.General.ScalingCorrection.EnableY			True	-	-	-	-	-
	Scaling: Y	Input.General.ScalingCorrection.Y			1.000000	9999.999999	-9999.999999	4	6	✓
	Scaling: Lengthwise Enabled	Input.General.ScalingCorrection.EnableLength			True	-	-	-	-	-
	Scaling: Lengthwise	Input.General.ScalingCorrection.Length			1.000000	9999.999999	-9999.999999	4	6	✓
	Coordinate Value	Input.General.CoordinateSystem	Before Adjustment	0	Before Adjustment					-
			After Adjustment	1						
	Model Image: Name	Input.General.ModelImage.Name			-	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	Judgment Conditions: Do Not Judge Invalid Data	Input.General.Limit.AvoidInvalidData			-	-	-	-	-	-
	Image Generation: Generate Filtered Image	Input.FilteredImage.Visible			False	-	-	-	-	-
	Image Generation: Generate Contrast Image	Input.ContrastImage.Visible			False	-	-	-	-	-

Region

#O008

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Position Adjustment	Specify Individually	Input.Region.PositionAdjustment.Individual			False	-	-	-	-	-
	Specify	Input.Region.PositionAdjustment.ID			None	-	-	-	-	-
	X Enabled	Input.Region.PositionAdjustment.EnableX			True	-	-	-	-	-
	X	Input.Region.PositionAdjustment.X			0.000	16383.000	-16383.000	5	3	✓
	Y Enabled	Input.Region.PositionAdjustment.EnableY			True	-	-	-	-	-
	Y	Input.Region.PositionAdjustment.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle Enabled	Input.Region.PositionAdjustment.EnableAngle			True	-	-	-	-	-
	Angle	Input.Region.PositionAdjustment.Angle			0.000	359.999	0.000	3	3	✓
Inspection Region	Shape	Input.Region.Shape.Type	Rectangle	2	Rectangle	-	-	-	-	-
			Circle	3						
			Oval	4						
			Ring	5						
			Arc	6						
			Polygon	7						
			All Regions	9						
Inspection Region - Rectangle	Width	Input.Region.Shape.Width			*	16383	1	5	0	✓
	Height	Input.Region.Shape.Height			*	16383	1	5	0	✓
	Center X	Input.Region.Shape.Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.Region.Shape.Center.Y			*	16382.000	-16382.000	5	3	✓
	Rotation Angle	Input.Region.Shape.Angle			0.000	359.999	0.000	3	3	✓
Inspection Region - Circle	Center X	Input.Region.Shape.Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.Region.Shape.Center.Y			*	16382.000	-16382.000	5	3	✓
	Radius	Input.Region.Shape.Radius			*	9600	0	4	0	✓
Inspection Region - Oval	Center X	Input.Region.Shape.Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.Region.Shape.Center.Y			*	16382.000	-16382.000	5	3	✓
	Radius 1	Input.Region.Shape.Radius1			*	2580	8	4	0	✓
	Radius 2	Input.Region.Shape.Radius2			*	2580	8	4	0	✓
	Rotation Angle	Input.Region.Shape.Angle			0.000	359.999	0.000	3	3	✓
Inspection Region - Ring	Center X	Input.Region.Shape.Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.Region.Shape.Center.Y			*	16382.000	-16382.000	5	3	✓
	Radius 1	Input.Region.Shape.Radius1			*	9600	0	4	0	✓
	Radius 2	Input.Region.Shape.Radius2			*	9600	0	4	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Inspection Region - Arc	Center X	Input.Region.Shape.Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.Region.Shape.Center.Y			*	16382.000	-16382.000	5	3	✓
	Radius 1	Input.Region.Shape.Radius1			*	9600	0	4	0	✓
	Radius 2	Input.Region.Shape.Radius2			*	9600	0	4	0	✓
	Starting Angle	Input.Region.Shape.StartingAngle			*	359.999	0.000	3	3	✓
	Ending Angle	Input.Region.Shape.EndAngle			*	359.999	0.000	3	3	✓
Inspection Region - Polygon	Number of Vertices	Input.Region.Shape.NodeCount			0	100	0	3	0	-
	Vertex [n]: Position X	Input.Region.Shape.Node[n].Position.X			*	16383.000	-16383.000	5	3	✓
	Vertex [n]: Position Y	Input.Region.Shape.Node[n].Position.Y			*	16383.000	-16383.000	5	3	✓
Inspection Region - Mask Region	Mask Region [n]: Shape	Input.Region.Mask[n].Type	Rectangle	2	Rectangle	-	-	-	-	-
			Circle	3						
			Oval	4						
			Ring	5						
			Arc	6						
			Polygon	7						
Inspection Region - Mask Region - Rectangle	Width	Input.Region.Mask[n].Width			*	16383	1	5	0	✓
	Height	Input.Region.Mask[n].Height			*	16383	1	5	0	✓
	Center X	Input.Region.Mask[n].Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.Region.Mask[n].Center.Y			*	16382.000	-16382.000	5	3	✓
	Rotation Angle	Input.Region.Mask[n].Angle			0.000	359.999	0.000	3	3	✓
Inspection Region - Mask Region - Circle	Center X	Input.Region.Mask[n].Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.Region.Mask[n].Center.Y			*	16382.000	-16382.000	5	3	✓
	Radius	Input.Region.Mask[n].Radius			*	9600	0	4	0	✓
Inspection Region - Mask Region - Oval	Center X	Input.Region.Mask[n].Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.Region.Mask[n].Center.Y			*	16382.000	-16382.000	5	3	✓
	Radius 1	Input.Region.Mask[n].Radius1			*	2580	8	4	0	✓
	Radius 2	Input.Region.Mask[n].Radius2			*	2580	8	4	0	✓
	Rotation Angle	Input.Region.Mask[n].Angle			0.000	359.999	0.000	3	3	✓
Inspection Region - Mask Region - Ring	Center X	Input.Region.Mask[n].Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.Region.Mask[n].Center.Y			*	16382.000	-16382.000	5	3	✓
	Radius 1	Input.Region.Mask[n].Radius1			*	9600	0	4	0	✓
	Radius 2	Input.Region.Mask[n].Radius2			*	9600	0	4	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Inspection Region - Mask Region - Arc	Center X	Input.Region.Mask[n].Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.Region.Mask[n].Center.Y			*	16382.000	-16382.000	5	3	✓
	Radius 1	Input.Region.Mask[n].Radius1			*	9600	0	4	0	✓
	Radius 2	Input.Region.Mask[n].Radius2			*	9600	0	4	0	✓
	Starting Angle	Input.Region.Mask[n].StartingAngle			*	359.999	0.000	3	3	✓
	Ending Angle	Input.Region.Mask[n].EndAngle			*	359.999	0.000	3	3	✓
Inspection Region - Mask Region - Polygon	Number of Vertices	Input.Region.Mask[n].NodeCount			0	100	0	3	0	-
	Vertex [n]: Position X	Input.Region.Mask[n].Node[n].Position.X			*	16383	-16383	5	0	✓
	Vertex [n]: Position Y	Input.Region.Mask[n].Node[n].Position.Y			*	16383	-16383	5	0	✓
Inspection Region	Reference Shared Region Tool: Enabled	Input.Region.Reference.Enable			False	-	-	-	-	-
	Reference Shared Region Tool: Reference Tool	Input.Region.Reference.ToolId			None	-	-	-	-	-
	Reference Image Region Tool: Enabled	Input.Region.ExternalRegion.Enable			False	-	-	-	-	-
	Reference Image Region Tool: Reference Tool	Input.Region.ExternalRegion.ToolId			None	-	-	-	-	-
	Reference Image Region Tool: Detection Color	Input.Region.ExternalRegion.DetectionColor	Black	0	White	-	-	-	-	✓
			White	1						
Pattern Region	Shape	Input.PatternRegion.Shape.Type	Rectangle	2	Rectangle	-	-	-	-	-
			Circle	3						
			Oval	4						
			Ring	5						
			Arc	6						
			Polygon	7						
Pattern Region - Rectangle	Width	Input.PatternRegion.Shape.Width			*	16383	1	5	0	✓
	Height	Input.PatternRegion.Shape.Height			*	16383	1	5	0	✓
	Center X	Input.PatternRegion.Shape.Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.PatternRegion.Shape.Center.Y			*	16382.000	-16382.000	5	3	✓
	Rotation Angle	Input.PatternRegion.Shape.Angle			0.000	359.999	0.000	3	3	✓
Pattern Region - Circle	Center X	Input.PatternRegion.Shape.Center.X			*	16383.000	-16383.000	5	3	✓
	Center Y	Input.PatternRegion.Shape.Center.Y			*	16383.000	-16383.000	5	3	✓
	Radius	Input.PatternRegion.Shape.Radius			*	9600	0	4	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Pattern Region - Oval	Center X	Input.PatternRegion.Shape.Center.X			*	16383.000	-16383.000	5	3	✓
	Center Y	Input.PatternRegion.Shape.Center.Y			*	16383.000	-16383.000	5	3	✓
	Radius 1	Input.PatternRegion.Shape.Radius1			*	2580	8	4	0	✓
	Radius 2	Input.PatternRegion.Shape.Radius2			*	2580	8	4	0	✓
	Rotation Angle	Input.PatternRegion.Shape.Angle			0.000	359.999	0.000	3	3	✓
Pattern Region - Ring	Center X	Input.PatternRegion.Shape.Center.X			*	16383.000	-16383.000	5	3	✓
	Center Y	Input.PatternRegion.Shape.Center.Y			*	16383.000	-16383.000	5	3	✓
	Radius 1	Input.PatternRegion.Shape.Radius1			*	9600	0	4	0	✓
	Radius 2	Input.PatternRegion.Shape.Radius2			*	9600	0	4	0	✓
Pattern Region - Arc	Center X	Input.PatternRegion.Shape.Center.X			*	16383.000	-16383.000	5	3	✓
	Center Y	Input.PatternRegion.Shape.Center.Y			*	16383.000	-16383.000	5	3	✓
	Radius 1	Input.PatternRegion.Shape.Radius1			*	9600	0	4	0	✓
	Radius 2	Input.PatternRegion.Shape.Radius2			*	9600	0	4	0	✓
	Starting Angle	Input.PatternRegion.Shape.StartingAngle			*	359.999	0.000	3	3	✓
	Ending Angle	Input.PatternRegion.Shape.EndAngle			*	359.999	0.000	3	3	✓
Pattern Region - Polygon	Number of Vertices	Input.PatternRegion.Shape.NodeCount			0	100	0	3	0	-
	Vertex [n]: Position X	Input.PatternRegion.Shape.Node[n].Position.X			*	16383.000	-16383.000	5	3	✓
	Vertex [n]: Position Y	Input.PatternRegion.Shape.Node[n].Position.Y			*	16383.000	-16383.000	5	3	✓
Pattern Region - Mask Region	Mask Region [n]: Shape	Input.PatternRegion.Mask[n].Type	Rectangle	2	Rectangle	-	-	-	-	-
			Circle	3						
			Oval	4						
			Ring	5						
			Arc	6						
			Polygon	7						
Pattern Region - Mask Region - Rectangle	Width	Input.PatternRegion.Mask[n].Width			*	16383	1	5	0	✓
	Height	Input.PatternRegion.Mask[n].Height			*	16383	1	5	0	✓
	Center X	Input.PatternRegion.Mask[n].Center.X			*	16382.000	-16382.000	5	3	✓
	Center Y	Input.PatternRegion.Mask[n].Center.Y			*	16382.000	-16382.000	5	3	✓
	Rotation Angle	Input.PatternRegion.Mask[n].Angle			0.000	359.999	0.000	3	3	✓
Pattern Region - Mask Region - Circle	Center X	Input.PatternRegion.Mask[n].Center.X			*	16383.000	-16383.000	5	3	✓
	Center Y	Input.PatternRegion.Mask[n].Center.Y			*	16383.000	-16383.000	5	3	✓
	Radius	Input.PatternRegion.Mask[n].Radius			*	9600	0	4	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Pattern Region - Mask Region - Oval	Center X	Input.PatternRegion.Mask[n].Center.X			*	16383.000	-16383.000	5	3	✓
	Center Y	Input.PatternRegion.Mask[n].Center.Y			*	16383.000	-16383.000	5	3	✓
	Radius 1	Input.PatternRegion.Mask[n].Radius1			*	2580	8	4	0	✓
	Radius 2	Input.PatternRegion.Mask[n].Radius2			*	2580	8	4	0	✓
	Rotation Angle	Input.PatternRegion.Mask[n].Angle			0.000	359.999	0.000	3	3	✓
Pattern Region - Mask Region - Ring	Center X	Input.PatternRegion.Mask[n].Center.X			*	16383.000	-16383.000	5	3	✓
	Center Y	Input.PatternRegion.Mask[n].Center.Y			*	16383.000	-16383.000	5	3	✓
	Radius 1	Input.PatternRegion.Mask[n].Radius1			*	9600	0	4	0	✓
	Radius 2	Input.PatternRegion.Mask[n].Radius2			*	9600	0	4	0	✓
Pattern Region - Mask Region - Arc	Center X	Input.PatternRegion.Mask[n].Center.X			*	16383.000	-16383.000	5	3	✓
	Center Y	Input.PatternRegion.Mask[n].Center.Y			*	16383.000	-16383.000	5	3	✓
	Radius 1	Input.PatternRegion.Mask[n].Radius1			*	9600	0	4	0	✓
	Radius 2	Input.PatternRegion.Mask[n].Radius2			*	9600	0	4	0	✓
	Starting Angle	Input.PatternRegion.Mask[n].StartingAngle			*	359.999	0.000	3	3	✓
	Ending Angle	Input.PatternRegion.Mask[n].EndAngle			*	359.999	0.000	3	3	✓
Pattern Region - Mask Region - Polygon	Number of Vertices	Input.PatternRegion.Mask[n].NodeCount			0	100	0	3	0	-
	Vertex [n]: X	Input.PatternRegion.Mask[n].Node[n].Position.X			*	16383.000	-16383.000	5	3	✓
	Vertex [n]: Y	Input.PatternRegion.Mask[n].Node[n].Position.Y			*	16383.000	-16383.000	5	3	✓
Pattern Region	Reference Shared Pattern Tool: Enabled	Input.PatternRegion.TrainReference.Enable			False	-	-	-	-	-
	Reference Shared Pattern Tool: Reference Tool	Input.PatternRegion.TrainReference.ToolId			-	-	-	-	-	-

Color Extraction

#O009

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Color Extraction	Extraction Method	Input.ColorExtraction.Type	Color to Binary	0	RGB Grayscale	-	-	-	-	-
			Fine Color	1						
			Color to Grayscale	2						
			Grayscale	3						
			RGB Grayscale	4						
			R Grayscale	5						
			G Grayscale	6						
			B Grayscale	7						
	Extraction Sensitivity	Input.ColorExtraction.Sensitivity			3	10	0	2	0	-
	Extraction Area	Input.ColorExtraction.Size			3	32	1	2	0	-
	Hue: Upper Limit	Input.ColorExtraction.Hue.Max			255	255	0	3	0	✓
	Hue: Lower Limit	Input.ColorExtraction.Hue.Min			0	255	0	3	0	✓
	Hue Slope: Upper Limit	Input.ColorExtraction.HueSlope.Max			10	10	100	3	0	✓
	Hue Slope: Lower Limit	Input.ColorExtraction.HueSlope.Min			10	10	100	3	0	✓
	Saturation: Upper Limit	Input.ColorExtraction.Saturation.Max			255	255	0	3	0	✓
	Saturation: Lower Limit	Input.ColorExtraction.Saturation.Min			0	255	0	3	0	✓
	Saturation Slope: Upper Limit	Input.ColorExtraction.SaturationSlope.Max			10	10	100	3	0	✓
	Saturation Slope: Lower Limit	Input.ColorExtraction.SaturationSlope.Min			10	10	100	3	0	✓
	Brightness: Upper Limit	Input.ColorExtraction.Brightness.Max			255	255	0	3	0	✓
	Brightness: Lower Limit	Input.ColorExtraction.Brightness.Min			0	255	0	3	0	✓
	Brightness Slope: Upper Limit	Input.ColorExtraction.BrightnessSlope.Max			10	10	100	3	0	✓
	Brightness Slope: Lower Limit	Input.ColorExtraction.BrightnessSlope.Min			10	10	100	3	0	✓

MultiSpectrum Color Extraction

#O010

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
MultiSpectrum Color Extraction	Extraction Method	Input.Extraction.MSColorType	Average Grayscale	0	Average Grayscale	-	-	-	-	-
			Color to Binary	1						
			Color to Grayscale	2						
			Fine Color	3						
	Average	Input.Extraction.Average			True	-	-	-	-	-
	Size (pixel)	Input.Extraction.AveragingSize			3	63	3	2	0	-
	Count	Input.Extraction.AveragingCount			1	9	1	1	0	-
	Registered Colors: UV	Input.Extraction.RegistrationColor.UV			*	-	-	-	-	-
	Registered Colors: B	Input.Extraction.RegistrationColor.Blue			*	-	-	-	-	-
	Registered Colors: G	Input.Extraction.RegistrationColor.Green			*	-	-	-	-	-
	Registered Colors: AM	Input.Extraction.RegistrationColor.Amber			*	-	-	-	-	-
	Registered Colors: R	Input.Extraction.RegistrationColor.Red			*	-	-	-	-	-
	Registered Colors: FR	Input.Extraction.RegistrationColor.FR			*	-	-	-	-	-
	Registered Colors: IR	Input.Extraction.RegistrationColor.IR			*	-	-	-	-	-
	Registered Colors: W	Input.Extraction.RegistrationColor.White			*	-	-	-	-	-
	Extract Tone: Registered Count	Input.Extraction.ExtractedColor.ValidNumberOfColors			0	16	0	-	-	-
	Extract Tone [n]: Enabled/ Disabled	Input.Extraction.ExtractedColor[n].Enabled			Enabled	-	-	-	-	-
	Extract Tone [n]: Color Range	Input.Extraction.ExtractedColor[n].ColorRange			1.000	999.999	0.001	3	3	-
	Extract Tone [n]: Brightness Range (±%)	Input.Extraction.ExtractedColor[n].BrightnessRange			0.0	0.0	50.0	2	1	-
	Excluded Colors: Registered Count	Input.Extraction.ExcludedColor.ValidNumberOfColors			0	16	0	-	-	-
	Excluded Colors [n]: Enabled/ Disabled	Input.Extraction.ExcludedColor[n].Enabled			Enabled	-	-	-	-	-
	Excluded Colors [n]: Color Range	Input.Extraction.ExcludedColor[n].ColorRange			1.000	999.999	0.001	3	3	-
	Excluded Colors [n]: Brightness Range (±%)	Input.Extraction.ExcludedColor[n].BrightnessRange			0.0	0.0	50.0	2	1	-
	Color Range	Input.Extraction.ColorRange			1.000	999.999	0.001	3	3	-
	Brightness Range (±%)	Input.Extraction.BrightnessRange			0.0	0.0	50.0	2	1	-

Image Enhance

#O011

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Image Enhance	Image Enhance [n]: Type	Input.ImageEnhancement.Filter[n].Type	None	0	None	-	-	-	-	-
			Expand	1						
			Shrink	2						
			Average	3						
			Median	4						
			Binary	5						
			Contrast Conversion	6						
			Prewitt	8						
			Roberts	9						
			Laplacian	10						
			Sobel	11						
			Sobel X	12						
			Sobel Y	13						
			Sharpen	14						
			Shading Correction	15						
			Noise Isolation	16						
			Scratch Defect Extraction	17						
			Blur	18						
			Image Extraction	19						
			Convex Hull	20						
			Blob Filter	21						
			Custom	22						
			Contrast Expansion	23						
	Image Enhance[n]: Enable	Input.ImageEnhancement.Filter[n].Enable			True	-	-	-	-	✓
Binary	Upper Limit Value	Input.ImageEnhancement.Filter[n].Binary.Max			255	255	0	3	0	✓
	Lower Limit Value	Input.ImageEnhancement.Filter[n].Binary.Min			128	255	0	3	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Blob Filter	Detection Color	Input.ImageEnhancement.Filter[n].DetectionColor	Black	0	White	-	-	-	-	✓
			White	1						
	Detection Count	Input.ImageEnhancement.Filter[n].Count			30	30000	1	5	0	✓
	Fill Holes	Input.ImageEnhancement.Filter[n].FillHoles			True	-	-	-	-	✓
	Active Border	Input.ImageEnhancement.Filter[n].ActiveBorder			False	-	-	-	-	✓
	Label Specification Type	Input.ImageEnhancement.Filter[n].PrimaryTargetType	All	0	All	-	-	-	-	-
			Specified	1						
	Label Number	Input.ImageEnhancement.Filter[n].PrimaryTarget			0	299999	0	6	0	✓
	Detection Order	Input.ImageEnhancement.Filter[n].DetectedOrder	Y>X: Ascending	0	Area: Descending	-	-	-	-	✓
			X>Y: Descending	1						
			X: Ascending	2						
			X: Descending	3						
			Y: Ascending	4						
			Y: Descending	5						
			Area: Ascending	6						
			Area: Descending	7						
			Roundness: Ascending	8						
			Roundness: Descending	9						
			Clockwise	10						
			Counterclockwise	11						
	Starting Angle	Input.ImageEnhancement.Filter[n].StartingAngle			0.000	359.999	0.000	3	3	✓
	Pixel Value After Conversion: Detection Color	Input.ImageEnhancement.Filter[n].ValueAfterConversion.Detected			255	255	0	3	0	✓
	Pixel Value After Conversion: Background Color	Input.ImageEnhancement.Filter[n].ValueAfterConversion.Background			0	255	0	3	0	✓
	Area Enabled	Input.ImageEnhancement.Filter[n].UseAreaFilter			True	-	-	-	-	-
	Area: Upper Limit	Input.ImageEnhancement.Filter[n].AreaFilter.Max			99999999	99999999	0	8	0	✓
	Area: Lower Limit	Input.ImageEnhancement.Filter[n].AreaFilter.Min			100	99999999	0	8	0	✓
	Roundness Enabled	Input.ImageEnhancement.Filter[n].UseRoundnessFilter			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Blob Filter	Roundness: Upper Limit	Input.ImageEnhancement.Filter[n].RoundnessFilter.Max			1.000	1.000	0.000	1	3	✓
	Roundness: Lower Limit	Input.ImageEnhancement.Filter[n].RoundnessFilter.Min			0.000	1.000	0.000	1	3	✓
	Major Axis Enabled	Input.ImageEnhancement.Filter[n].UseMajorAxisFilter			False	-	-	-	-	-
	Major Axis: Upper Limit	Input.ImageEnhancement.Filter[n].MajorAxisFilter.Max			99999.999	99999.999	0.000	5	3	✓
	Major Axis: Lower Limit	Input.ImageEnhancement.Filter[n].MajorAxisFilter.Min			0.000	99999.999	0.000	5	3	✓
	Axes Ratio Enabled	Input.ImageEnhancement.Filter[n].UseAxesRatioFilter			False	-	-	-	-	-
	Axes Ratio: Upper Limit	Input.ImageEnhancement.Filter[n].AxesRatioFilter.Max			99999.999	99999.999	0.000	5	3	✓
	Axes Ratio: Lower Limit	Input.ImageEnhancement.Filter[n].AxesRatioFilter.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis Enabled	Input.ImageEnhancement.Filter[n].UseDistOvalFilter			False	-	-	-	-	-
	Equivalent Oval Major Axis: Upper Limit	Input.ImageEnhancement.Filter[n].DistOvalFilter.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis: Lower Limit	Input.ImageEnhancement.Filter[n].DistOvalFilter.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio Enabled	Input.ImageEnhancement.Filter[n].UseAspectRatioFilter			False	-	-	-	-	-
	Equivalent Oval Aspect Ratio: Upper Limit	Input.ImageEnhancement.Filter[n].AspectRatioFilter.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio: Lower Limit	Input.ImageEnhancement.Filter[n].AspectRatioFilter.Min			0.000	99999.999	0.000	5	3	✓
Convex Hull	Detection Color	Input.ImageEnhancement.Filter[n].Color	Black	0	White	-	-	-	-	✓
			White	1						
	Fill Holes	Input.ImageEnhancement.Filter[n].FillHoles			True	-	-	-	-	✓
	Difference Detection	Input.ImageEnhancement.Filter[n].DifferenceDetection			False	-	-	-	-	-
	Noise Cut	Input.ImageEnhancement.Filter[n].NoiseCut			0	99	0	2	0	✓
Expand	Processing Shape	Input.ImageEnhancement.Filter[n].ProcessingShape	Square	0	Square	-	-	-	-	-
			Circle	1						
	Size	Input.ImageEnhancement.Filter[n].Size			3	31	3	2	0	✓
	Processing Direction	Input.ImageEnhancement.Filter[n].Direction	X	1	XY	-	-	-	-	✓
			Y	2						
			XY	3						
	Border	Input.ImageEnhancement.Filter[n].Border			False	-	-	-	-	✓
	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Shrink	Processing Shape	Input.ImageEnhancement.Filter[n].ProcessingShape	Square	0	Square	-	-	-	-	-
			Circle	1						
	Size	Input.ImageEnhancement.Filter[n].Size			3	31	3	2	0	✓
	Processing Direction	Input.ImageEnhancement.Filter[n].Direction	X	1	XY	-	-	-	-	✓
			Y	2						
			XY	3						
	Border	Input.ImageEnhancement.Filter[n].Border			False	-	-	-	-	✓
	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓
Noise Isolation	Target Tone	Input.ImageEnhancement.Filter[n].TargetTone	Bright	0	Dark	-	-	-	-	✓
			Dark	1						
	Process Type	Input.ImageEnhancement.Filter[n].ProcessType	Delete	0	Delete	-	-	-	-	✓
			Pick	1						
	Area	Input.ImageEnhancement.Filter[n].Area			10	99999999	1	8	0	✓
	Reduction	Input.ImageEnhancement.Filter[n].Reduction			2	32	1	2	0	✓
Average	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓
Median	Processing Shape	Input.ImageEnhancement.Filter[n].ProcessingShape	Square	0	Square	-	-	-	-	-
			Circle	1						
	Size	Input.ImageEnhancement.Filter[n].Size			3	31	3	2	0	✓
	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓
Blur	Filtering Level	Input.ImageEnhancement.Filter[n].Level			1	99	1	2	0	✓
	Processing Direction	Input.ImageEnhancement.Filter[n].Direction	X	1	XY	-	-	-	-	✓
			Y	2						
			XY	3						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Shading Correction	Correction Method	Input.ImageEnhancement.Filter[n].Method	Correction by Average	0	Shading Correction	-	-	-	-	-
			Correction by Median	1						
			Shading Correction	2						
			Shading Correction (High Speed)	3						
	Extract Size	Input.ImageEnhancement.Filter[n].ExtractionSize			16	2000	4	4	0	✓
	Processing Direction	Input.ImageEnhancement.Filter[n].Direction	X	1	XY	-	-	-	-	✓
			Y	2						
			XY	3						
	Extract Tone	Input.ImageEnhancement.Filter[n].ExtractionColor	Bright	0	Bright/Dark	-	-	-	-	-
			Dark	1						
			Bright/Dark	2						
			Individual	3						
	Gain	Input.ImageEnhancement.Filter[n].Gain			2.0	10.0	0.0	2	1	✓
	Noise Cut	Input.ImageEnhancement.Filter[n].Noise			0.0	255.0	0.0	3	1	✓
	Bright: Gain	Input.ImageEnhancement.Filter[n].BrightArea.Gain			2.0	10.0	0.0	2	1	✓
	Bright: Noise Cut	Input.ImageEnhancement.Filter[n].BrightArea.Noise			0.0	255.0	0.0	3	1	✓
	Dark: Gain	Input.ImageEnhancement.Filter[n].DarkArea.Gain			2.0	10.0	0.0	2	1	✓
	Dark: Noise Cut	Input.ImageEnhancement.Filter[n].DarkArea.Noise			0.0	255.0	0.0	3	1	✓
	Uniform Contrast	Input.ImageEnhancement.Filter[n].UniformContrast			False	-	-	-	-	✓
	Border	Input.ImageEnhancement.Filter[n].Border			False	-	-	-	-	✓
Image Extraction	Extract Tone	Input.ImageEnhancement.Filter[n].Color	Bright	0	Dark	-	-	-	-	✓
			Dark	1						
	Extract Size	Input.ImageEnhancement.Filter[n].Size			5	39	3	2	0	✓
	Processing Direction	Input.ImageEnhancement.Filter[n].Direction	X	1	XY					✓
			Y	2						
			XY	3						
	Border	Input.ImageEnhancement.Filter[n].Border			False	-	-	-	-	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Scratch Defect Extraction	Processing Method	Input.ImageEnhancement.Filter[n].ProcessingMethod	Scratch Defect Extraction	0	High-Speed Scratch Defect Extraction	-	-	-	-	-
			High-Speed Scratch Defect Extraction	1						
	Reduction	Input.ImageEnhancement.Filter[n].Reduction			2	32	1	2	0	✓
	Extract Size	Input.ImageEnhancement.Filter[n].ExtractSize			4	32	2	2	0	✓
	Extract Tone	Input.ImageEnhancement.Filter[n].ExtractTone	Bright	0	Dark	-	-	-	-	✓
			Dark	1						
			Bright/Dark	2						
	Gain	Input.ImageEnhancement.Filter[n].Gain			2.0	99.9	0.0	2	1	✓
	Linearity	Input.ImageEnhancement.Filter[n].Linearity			2	4	1	1	0	-
	Linear Length	Input.ImageEnhancement.Filter[n].LinearLength			2	16	1	2	0	✓
	Noise Cut	Input.ImageEnhancement.Filter[n].NoiseCut			0.0	255.0	0.0	3	1	✓
	Extraction Direction	Input.ImageEnhancement.Filter[n].Direction	All Angles	0	All Angles	-	-	-	-	-
			Specify Angle	1						
	Starting Angle	Input.ImageEnhancement.Filter[n].StartingAngle			0.000	179.999	0.000	3	3	✓
	Angle Range	Input.ImageEnhancement.Filter[n].AngleRange			45.000	90.000	1.000	2	3	✓
Contrast Conversion	Offset	Input.ImageEnhancement.Filter[n].Shift			0	255	-255	3	0	✓
	Span	Input.ImageEnhancement.Filter[n].Span			1.0	7.9	0.0	1	1	✓
Contrast Expansion	Expansion Width	Input.ImageEnhancement.Filter[n].ExpansionWidth			15	30	0	2	0	✓
	Noise Cut	Input.ImageEnhancement.Filter[n].NoiseCut			0	30	0	2	0	✓
Sharpen	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓
Sobel X	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓
Sobel Y	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓
Sobel	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓
Prewitt	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓
Roberts	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓
Laplacian	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Custom	Size	Input.ImageEnhancement.Filter[n].Size	3 x 3	0	3 x 3	-	-	-	-	-
			5 x 5	1						
			7 x 7	2						
			9 x 9	3						
			11 x 11	4						
			13 x 13	5						
			15 x 15	6						
			17 x 17	7						
			19 x 19	8						
			21 x 21	9						
	Processing Method	Input.ImageEnhancement.Filter[n].Operation	Convolution	0	Convolution	-	-	-	-	-
			Expand	1						
			Shrink	2						
	Divisor	Input.ImageEnhancement.Filter[n].Divisor			1.000	99999.999	0.001	5	3	✓
	Offset	Input.ImageEnhancement.Filter[n].Shift			0	255	-255	3	0	✓
	Negative Pixel Correction	Input.ImageEnhancement.Filter[n].NegativeCorrection	Fixed to 0	0	Fixed to 0	-	-	-	-	✓
			Absolute Value	1						
	Border	Input.ImageEnhancement.Filter[n].Border			True	-	-	-	-	✓
	Count	Input.ImageEnhancement.Filter[n].Count			1	9	1	1	0	✓
	Filter Coefficient[n]	Input.ImageEnhancement.Filter[n].KernelCoefficient[n]			Convolution: "1" for the center of the coefficient array determined by the size setting, otherwise "0" Expansion, shrink: "1" for all values in the array	Convolution: 127 Expansion, shrink: 1	Convolution: -128 Expansion, shrink: 0	3	0	-

Capture

#O012

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Multi-Capture Settings	Capture Count	Tool[n].Input.MultiCapture.Count			1	10	1	2	0	-
Image Capture Buffer Settings	Image Buffer Capacity	Tool[n].Input.ImageBuffer.Count			1	1024	1	4	0	-
	Type	Tool[n].Input.ImageBuffer.Mode	Fixed	0	Overwriting	-	-	-	-	-
			Overwriting	1						
Capture Settings	Capture Mode	Tool[n][n].Input.Camera[n].CaptureMode	Standard Lighting Mode	0	Standard Lighting Mode	-	-	-	-	-
			LumiTrax Mode	1						
			MultiSpectrum Mode	2						
			HDR	3						
			Flickerless Mode	4						
Camera Attitude	Monitor Camera Attitude	Tool[n][n].Input.Camera[n].AngleMonitor			False	-	-	-	-	-
Capture Settings	ZoomTrax Setting	Tool[n][n].Input.Camera[n].OpticsFileName			-	-	-	-	-	-
	Exposure Time (ms) (VS-C160MX/VS-C320MX/VS-C500MX)	Tool[n][n].Input.Camera[n].ShutterSpeed			4.170	1000.000	0.015	4	3	✓
	Exposure Time (ms) (VS-C160CX/VS-C320CX/VS-C500CX)	Tool[n][n].Input.Camera[n].ShutterSpeed			10.000	1000.000	0.015	4	3	✓
	Exposure Time (ms) (VS-C1500MX/VS-C2500MX)	Tool[n][n].Input.Camera[n].ShutterSpeed			4.170	1000.000	0.008	4	3	✓
	Exposure Time (ms) (VS-C1500CX/VS-C2500CX)	Tool[n][n].Input.Camera[n].ShutterSpeed			16.700	1000.000	0.008	4	3	✓
	Exposure Time (ms) (VS-L160CX/VS-L320CX/VS-L500CX/VS-L1500CX/VS-S160CX/VS-S320CX/VS-S500CX/VS-S1500CX)	Tool[n][n].Input.Camera[n].ShutterSpeed			15.000	1000.000	0.037	4	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Exposure Time (ms) (VS-L160MX/VS-L320MX/VS-L500MX/VS-L1500MX/VS-S160MX/VS-S320MX/VS-S500MX/VS-S1500MX)	Tool[n][n].Input.Camera[n].ShutterSpeed			10.000	1000.000	0.037	4	3	✓
	Brightness (VS-C160MX/VS-C160CX/VS-C320MX/VS-C320CX/VS-C500MX/VS-C500CX)	Tool[n][n].Input.Camera[n].Flickerless.Brightness			16.000	16.000	0.015	2	3	-
	Brightness (VS-C1500MX/VS-C1500CX/VS-C2500MX/VS-C2500CX)	Tool[n][n].Input.Camera[n].Flickerless.Brightness			16.000	16.000	0.010	2	3	-
	Brightness (VS-L160MX/VS-L160CX/VS-L320MX/VS-L320CX/VS-L500MX/VS-L500CX/VS-L1500MX/VS-L1500CX/VS-S160MX/VS-S160CX/VS-S320MX/VS-S320CX/VS-S500MX/VS-S500CX/VS-S1500MX/VS-S1500CX)	Tool[n][n].Input.Camera[n].Flickerless.Brightness			14.400	14.400	0.050	2	3	-
	Focus	Tool[n][n].Input.Camera[n].Focus			0	500.0	0.0	3	1	-
	Zoom Factor (L1.6M:H2160_V720:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	5.75	1.00	1	2	-
	Zoom Factor (L1.6M:H1664_V928:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	7.50	1.00	1	2	-
	Zoom Factor (L1.6M:H1440_V1072:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	8.75	1.00	1	2	-
	Zoom Factor (L1.6M:H1248_V1248:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	7.50	1.00	1	2	-
	Zoom Factor (L1.6M:H1072_V1440:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	6.25	1.00	1	2	-
	Zoom Factor (L1.6M:H928_V1664:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	5.50	1.00	1	2	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Zoom Factor (L1.6M:H720_V2160:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	4.25	1.00	1	2	-
	Zoom Factor (L3.2M:H3072_V1024:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	4.00	1.00	1	2	-
	Zoom Factor (L3.2M:H2368_V1328:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	5.00	1.00	1	2	-
	Zoom Factor (L3.2M:H2048_V1536:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	6.00	1.00	1	2	-
	Zoom Factor (L3.2M:H1776_V1776:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	5.00	1.00	1	2	-
	Zoom Factor (L3.2M:H1536_V2048:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	4.50	1.00	1	2	-
	Zoom Factor (L3.2M:H1328_V2368:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	4.00	1.00	1	2	-
	Zoom Factor (L3.2M:H1024_V3072:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	3.00	1.00	1	2	-
	Zoom Factor (L5M:H3824_V1280:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	3.25	1.00	1	2	-
	Zoom Factor (L5M:H2976_V1664:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	4.25	1.00	1	2	-
	Zoom Factor (L5M:H2544_V1904:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	5.00	1.00	1	2	-
	Zoom Factor (L5M:H2224_V2224:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	4.25	1.00	1	2	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Zoom Factor (L5M:H1904_V2544:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	3.75	1.00	1	2	-
	Zoom Factor (L5M:H1664_V2976:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	3.00	1.00	1	2	-
	Zoom Factor (L5M:H1280_V3824:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	2.50	1.00	1	2	-
	Zoom Factor (L15M:H4400_V3296:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	2.75	1.00	1	2	-
	Zoom Factor (SL1.6M:H2160_V720:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	2.30	1.00	1	2	-
	Zoom Factor (SL1.6M:H1664_V928:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	3.00	1.00	1	2	-
	Zoom Factor (SL1.6M:H1440_V1072:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	3.50	1.00	1	2	-
	Zoom Factor (SL1.6M:H1248_V1248:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	3.00	1.00	1	2	-
	Zoom Factor (SL1.6M:H1072_V1440:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	2.50	1.00	1	2	-
	Zoom Factor (SL1.6M:H928_V1664:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	2.20	1.00	1	2	-
	Zoom Factor (SL1.6M:H720_V2160:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.70	1.00	1	2	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Zoom Factor (SL3.2M:H3072_V1024:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.60	1.00	1	2	-
	Zoom Factor (SL3.2M:H2368_V1328:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	2.00	1.00	1	2	-
	Zoom Factor (SL3.2M:H2048_V1536:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	2.40	1.00	1	2	-
	Zoom Factor (SL3.2M:H1776_V1776:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	2.00	1.00	1	2	-
	Zoom Factor (SL3.2M:H1536_V2048:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.80	1.00	1	2	-
	Zoom Factor (SL3.2M:H1328_V2368:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.60	1.00	1	2	-
	Zoom Factor (SL3.2M:H1024_V3072:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.20	1.00	1	2	-
	Zoom Factor (SL5M:H3824_V1280:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.30	1.00	1	2	-
	Zoom Factor (SL5M:H2976_V1664:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.70	1.00	1	2	-
	Zoom Factor (SL5M:H2544_V1904:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	2.00	1.00	1	2	-
	Zoom Factor (SL5M:H2224_V2224:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.70	1.00	1	2	-
	Zoom Factor (SL5M:H1904_V2544:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.50	1.00	1	2	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Zoom Factor (SL5M:H1664_V2976:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.20	1.00	1	2	-
	Zoom Factor (SL5M:H1280_V3824:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.00	1.00	1	2	-
	Zoom Factor (SL15M:H4400_V3296:Gray)	Tool[n][n].Input.Camera[n].ZoomMagnification			1.00	1.10	1.00	1	2	-
	Horizontal Position (1.6M:H2160_V720:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	38	-38	2	0	-
	Horizontal Position (1.6M:H1664_V928:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	32	-32	2	0	-
	Horizontal Position (1.6M:H1440_V1072:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	20	-20	2	0	-
	Horizontal Position (1.6M:H1248_V1248:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	344	-344	3	0	-
	Horizontal Position (1.6M:H1072_V1440:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	610	-610	3	0	-
	Horizontal Position (1.6M:H928_V1664:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	769	-769	3	0	-
	Horizontal Position (1.6M:H720_V2160:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	974	-974	3	0	-
	Horizontal Position (3.2M:H3072_V1024:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	51	-51	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Horizontal Position (3.2M:H2368_V1328:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	96	-96	2	0	-
	Horizontal Position (3.2M:H2048_V1536:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	51	-51	2	0	-
	Horizontal Position (3.2M:H1776_V1776:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	392	-392	3	0	-
	Horizontal Position (3.2M:H1536_V2048:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	589	-589	3	0	-
	Horizontal Position (3.2M:H1328_V2368:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	749	-749	3	0	-
	Horizontal Position (3.2M:H1024_V3072:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	973	-973	3	0	-
	Horizontal Position (5M:H3824_V1280:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	37	-37	2	0	-
	Horizontal Position (5M:H2976_V1664:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	15	-15	2	0	-
	Horizontal Position (5M:H2544_V1904:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	8	-8	1	0	-
	Horizontal Position (5M:H2224_V2224:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	335	-335	3	0	-
	Horizontal Position (5M:H1904_V2544:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	566	-566	3	0	-
	Horizontal Position (5M:H1664_V2976:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	781	-781	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Horizontal Position (5M:H1280_V3824:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	960	-960	3	0	-
	Horizontal Position (15M:H4400_V3296:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	70	-70	2	0	-
	Horizontal Position (1.6M:H2160_V720:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	29	-29	2	0	-
	Horizontal Position (1.6M:H1664_V928:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	20	-20	2	0	-
	Horizontal Position (1.6M:H1440_V1072:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	6	-6	1	0	-
	Horizontal Position (1.6M:H1248_V1248:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	332	-332	3	0	-
	Horizontal Position (1.6M:H1072_V1440:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	600	-600	3	0	-
	Horizontal Position (1.6M:H928_V1664:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	761	-761	3	0	-
	Horizontal Position (1.6M:H720_V2160:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	967	-967	3	0	-
	Horizontal Position (3.2M:H3072_V1024:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	45	-45	2	0	-
	Horizontal Position (3.2M:H2368_V1328:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	88	-88	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Horizontal Position (3.2M:H2048_V1536:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	41	-41	2	0	-
	Horizontal Position (3.2M:H1776_V1776:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	384	-384	3	0	-
	Horizontal Position (3.2M:H1536_V2048:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	581	-581	3	0	-
	Horizontal Position (3.2M:H1328_V2368:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	742	-742	3	0	-
	Horizontal Position (3.2M:H1024_V3072:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	968	-968	3	0	-
	Horizontal Position (5M:H3824_V1280:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	32	-32	2	0	-
	Horizontal Position (5M:H2976_V1664:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	8	-8	1	0	-
	Horizontal Position (5M:H2544_V1904:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	0	0	1	0	-
	Horizontal Position (5M:H2224_V2224:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	15	-15	2	0	-
	Horizontal Position (5M:H1904_V2544:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	560	-560	3	0	-
	Horizontal Position (5M:H1664_V2976:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	776	-776	3	0	-
	Horizontal Position (5M:H1280_V3824:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	956	-956	3	0	-
	Horizontal Position (15M:H4400_V3296:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldX			0	65	-65	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Vertical Position (1.6M:H2160_V720:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	546	-546	3	0	-
	Vertical Position (1.6M:H1664_V928:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	264	-264	3	0	-
	Vertical Position (1.6M:H1440_V1072:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	22	-22	2	0	-
	Vertical Position (1.6M:H1248_V1248:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	24	-24	2	0	-
	Vertical Position (1.6M:H1072_V1440:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	60	-60	2	0	-
	Vertical Position (1.6M:H928_V1664:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	45	-45	2	0	-
	Vertical Position (1.6M:H720_V2160:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	42	-42	2	0	-
	Vertical Position (3.2M:H3072_V1024:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	550	-550	3	0	-
	Vertical Position (3.2M:H2368_V1328:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	296	-296	3	0	-
	Vertical Position (3.2M:H2048_V1536:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	38	-38	2	0	-
	Vertical Position (3.2M:H1776_V1776:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	72	-72	2	0	-
	Vertical Position (3.2M:H1536_V2048:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	38	-38	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Vertical Position (3.2M:H1328_V2368:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	13	-13	2	0	-
	Vertical Position (3.2M:H1024_V3072:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	38	-38	2	0	-
	Vertical Position (5M:H3824_V1280:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	544	-544	3	0	-
	Vertical Position (5M:H2976_V1664:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	253	-253	3	0	-
	Vertical Position (5M:H2544_V1904:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	8	-8	1	0	-
	Vertical Position (5M:H2224_V2224:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	15	-15	2	0	-
	Vertical Position (5M:H1904_V2544:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	6	-6	1	0	-
	Vertical Position (5M:H1664_V2976:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	67	-67	2	0	-
	Vertical Position (5M:H1280_V3824:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	4	-4	1	0	-
	Vertical Position (15M:H4400_V3296:Gray)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	53	-53	2	0	-
	Vertical Position (1.6M:H2160_V720:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	537	-537	3	0	-
	Vertical Position (1.6M:H1664_V928:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	252	-252	3	0	-
	Vertical Position (1.6M:H1440_V1072:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	8	-8	1	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings	Vertical Position (1.6M:H1248_V1248:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	12	-12	2	0	-
	Vertical Position (1.6M:H1072_V1440:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	50	-50	2	0	-
	Vertical Position (1.6M:H928_V1664:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	36	-36	2	0	-
	Vertical Position (1.6M:H720_V2160:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	35	-35	2	0	-
	Vertical Position (3.2M:H3072_V1024:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	544	-544	3	0	-
	Vertical Position (3.2M:H2368_V1328:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	288	-288	3	0	-
	Vertical Position (3.2M:H2048_V1536:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	29	-29	2	0	-
	Vertical Position (3.2M:H1776_V1776:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	64	-64	2	0	-
	Vertical Position (3.2M:H1536_V2048:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	31	-31	2	0	-
	Vertical Position (3.2M:H1328_V2368:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	6	-6	1	0	-
	Vertical Position (3.2M:H1024_V3072:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	33	-33	2	0	-
	Vertical Position (5M:H3824_V1280:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	539	-539	3	0	-
	Vertical Position (5M:H2976_V1664:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	246	-246	3	0	-
	Vertical Position (5M:H2544_V1904:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	0	0	1	0	-
	Vertical Position (5M:H2224_V2224:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	8	-8	1	0	-
	Vertical Position (5M:H1904_V2544:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	0	0	1	0	-
	Vertical Position (5M:H1664_V2976:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	62	-62	2	0	-
	Vertical Position (5M:H1280_V3824:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	0	0	1	0	-
	Vertical Position (15M:H4400_V3296:Color)	Tool[n][n].Input.Camera[n].CenterOfFieldY			0	49	-49	2	0	-
	Angle Setting: Specify Angle	Tool[n][n].Input.Camera[n].ImageRotation.Enable			False	-	-	-	-	-
	Angle Setting: Rotation Angle (°)	Tool[n][n].Input.Camera[n].ImageRotation.Angle			0.000	10.000	-10.000	2	3	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Capture Settings - Field of View Information	Field of View: Field of View X (mm)	Tool[n][n].Input.Camera[n].ActualDimension.FieldOfView.X			0.000	999999999999.999	0.000	12	3	-
	Field of View: Field of View Y (mm)	Tool[n][n].Input.Camera[n].ActualDimension.FieldOfView.Y			0.000	999999999999.999	0.000	12	3	-
	Field of View: Pixel Resolution (µm/pixel)	Tool[n][n].Input.Camera[n].ActualDimension.FieldOfView.SpatialResolution			0.000	999999999999.999	0.000	12	3	-
	Working Distance (mm)	Tool[n][n].Input.Camera[n].ActualDimension.WorkingDistance			0.000	999999999999.999	0.000	12	3	-
	Exposure Delay (µs)	Tool[n][n].Input.Camera[n].ExposureDelayTime			0	100000	0	6	0	✓
	Sensitivity (VS-C160MX/VS-C160CX/VS-C320MX/VS-C320CX/VS-C500MX/VS-C500CX)	Tool[n][n].Input.Camera[n].Sensitivity			4.0	12.3	0.7	2	1	✓
	Sensitivity (VS-C1500MX/VS-C1500CX/VS-C2500MX/VS-C2500CX)	Tool[n][n].Input.Camera[n].Sensitivity			4.0	10.7	2.2	2	1	✓
	Sensitivity (VS-L160MX/VS-L160CX/VS-L320MX/VS-L320CX/VS-L500MX/VS-L500CX/VS-L1500MX/VS-L1500CX/VS-S160MX/VS-S160CX/VS-S320MX/VS-S320CX/VS-S500MX/VS-S500CX/VS-S1500MX/VS-S1500CX)	Tool[n][n].Input.Camera[n].Sensitivity			4.0	11.3	3.0	2	1	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Fine HDR	Enable	Tool[n][n].Input.Camera[n].ToneMapping.Enable	False	0	False	-	-	-	-	-
	Sharpen	Tool[n][n].Input.Camera[n].ToneMapping.EdgeEnhancement	Large	0	Medium	-	-	-	-	-
			Medium	1						
			Small	2						
			Minuscule	3						
	Specify Mapping Range	Tool[n][n].Input.Camera[n].ToneMapping.EnableMappingArea			False	-	-	-	-	-
	Mapping Range	Tool[n][n].Input.Camera[n].ToneMapping.MappingArea	Medium	0	Medium	-	-	-	-	-
			Small	1						
			Flat	2						
	Mapping Level	Tool[n][n].Input.Camera[n].ToneMapping.Brightness			2	3	1	1	0	-
	Glare Suppression	Tool[n][n].Input.Camera[n].ToneMapping.HalationSuppression	Large	0	Large	-	-	-	-	-
			Medium	1						
			Small	2						
	Stack Average	Tool[n][n].Input.Camera[n].ToneMapping.Enable			True	-	-	-	-	-
	Fine HDR (Options): Ambient Light Cut	Tool[n][n].Input.Camera[n].HDR.AmbientLightCut			False	-	-	-	-	-
	Fine HDR (Options): Capture Image Count	Tool[n][n].Input.Camera[n].HDR.NumberOfImages			1	8	1	1	0	-
Image Intensity Adjustment	Offset	Tool[n][n].Input.Camera[n].GammaCorrection.Offset			0	255	-255	3	0	-
	Gain	Tool[n][n].Input.Camera[n].GammaCorrection.Gain			1.0	7.0	0.0	1	1	-
	Gamma Correction	Tool[n][n].Input.Camera[n].GammaCorrection.Gamma			1.0	5.0	0.1	1	1	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
LumiTrax Capture Settings	Track Moving Object: Enable	Tool[n][n].Input.Camera[n].TrackObject.Enable			False	-	-	-	-	-
	Track Moving Object: Search Region: Center X	Tool[n][n].Input.Camera[n].TrackObject.Region.Center .X			*	16382	-16382	5	0	✓
	Track Moving Object: Search Region: Center Y	Tool[n][n].Input.Camera[n].TrackObject.Region.Center .Y			*	16382	-16382	5	0	✓
	Track Moving Object: Search Region: Width	Tool[n][n].Input.Camera[n].TrackObject.Region.Width			*	16383	1	5	0	✓
	Track Moving Object: Search Region: Height	Tool[n][n].Input.Camera[n].TrackObject.Region.Height			*	16383	1	5	0	✓
	Track Moving Object: Search Region: Rotation Angle	Tool[n][n].Input.Camera[n].TrackObject.Region.Angle			0.0	359.9	0.0	3	1	✓
	Track Moving Object: Pattern Region: Center X	Tool[n][n].Input.Camera[n].TrackObject.PatternRegion .Center.X			*	16382	-16382	5	0	✓
	Track Moving Object: Pattern Region: Center Y	Tool[n][n].Input.Camera[n].TrackObject.PatternRegion .Center.Y			*	16382	-16382	5	0	✓
	Track Moving Object: Pattern Region: Width	Tool[n][n].Input.Camera[n].TrackObject.PatternRegion .Width			*	16383	1	5	0	✓
	Track Moving Object: Pattern Region: Height	Tool[n][n].Input.Camera[n].TrackObject.PatternRegion .Height			*	16383	1	5	0	✓
	Track Moving Object: Pattern Region: Rotation Angle	Tool[n][n].Input.Camera[n].TrackObject.PatternRegion .Angle			0.0	359.9	0.0	3	1	✓
	Track Moving Object: Search Sensitivity	Tool[n][n].Input.Camera[n].TrackObject.Sensitivity	Lowest	0	Normal	-	-	-	-	✓
			Lower	1						
			Low	2						
			Normal	3						
			High	4						
			Higher	5						
			Highest	6						
			Highest+	7						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
LumiTrax Capture Settings	Track Moving Object: Search Accuracy	Tool[n][n].Input.Camera[n].TrackObject.Accuracy	Lowest	0	Normal	-	-	-	-	✓
			Lower	1						
			Low	2						
			Normal	3						
			High	4						
			Higher	5						
			Highest	6						
	Track Moving Object: Minimum Match %	Tool[n][n].Input.Camera[n].TrackObject.MinimumMatch			40.000	99.999	1.000	2	3	✓
	Track Moving Object: Angle Range: + Direction	Tool[n][n].Input.Camera[n].TrackObject.AngleRange.Plus			30.000	180.000	0.000	3	3	✓
	Track Moving Object: Angle Range: - Direction	Tool[n][n].Input.Camera[n].TrackObject.AngleRange.Minus			-30.000	0.000	-179.999	3	3	✓
	Track Moving Object: Vibration Correction	Tool[n][n].Input.Camera[n].TrackObject.VibrationCorrection			False	-	-	-	-	-
	Ambient Light Cut: Enable	Tool[n][n].Input.Camera[n].Options.AmbientCut.Enable			False	-	-	-	-	-
	Lighting Width	Tool[n][n].Input.Camera[n].Options.LightingWidth	Standard	0	Standard	-	-	-	-	-
			Narrow	1						
Processed Image	Normal Image: Enable	Tool[n][n].Input.Camera[n].Normal.Enable			True	-	-	-	-	-
	Shape / Topography Image 1: Enable	Tool[n][n].Input.Camera[n].Shape[0].Enable			True	-	-	-	-	-
	Shape / Topography Image 1: Feature Size (pixel)	Tool[n][n].Input.Camera[n].Shape[0].FeatureSize			4	999	1	3	0	✓
	Shape / Topography Image 1: Feature Size Margin	Tool[n][n].Input.Camera[n].Shape[0].FeatureSizeMargin			2	5	0	1	0	✓
	Shape / Topography Image 1: Contrast	Tool[n][n].Input.Camera[n].Shape[0].Contrast			1.0	9.9	0.1	1	1	✓
	Shape / Topography Image 1: Level	Tool[n][n].Input.Camera[n].Shape[0].Level			128	255	0	3	0	✓
	Shape / Topography Image 1: Noise Cut (tone)	Tool[n][n].Input.Camera[n].Shape[0].NoiseCut			0.0	255.0	0.0	3	1	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Processed Image	Shape / Topography Image 1: Texture Pattern Cut	Tool[n][n].Input.Camera[n].Shape[0].TexturePatternCut	None	0	None	-	-	-	-	✓
			Weak	1						
			Strong	2						
			Very Strong	3						
	Shape / Topography Image 2: Enable	Tool[n][n].Input.Camera[n].Shape[1].Enable			False	-	-	-	-	-
	Shape / Topography Image 2: Feature Size (pixel)	Tool[n][n].Input.Camera[n].Shape[1].FeatureSize			4	999	1	3	0	✓
	Shape / Topography Image 2: Feature Size Margin	Tool[n][n].Input.Camera[n].Shape[1].FeatureSizeMargin			2	5	0	1	0	✓
	Shape / Topography Image 2: Contrast	Tool[n][n].Input.Camera[n].Shape[1].Contrast			1.0	9.9	0.1	1	1	✓
	Shape / Topography Image 2: Level	Tool[n][n].Input.Camera[n].Shape[1].Level			128	255	0	3	0	✓
	Shape / Topography Image 2: Noise Cut (tone)	Tool[n][n].Input.Camera[n].Shape[1].NoiseCut			0.0	255.0	0.0	3	1	✓
	Shape / Topography Image 2: Texture Pattern Cut	Tool[n][n].Input.Camera[n].Shape[1].TexturePatternCut	None	0	None	-	-	-	-	✓
			Weak	1						
			Strong	2						
			Very Strong	3						
	Shape / Topography Image 3: Enable	Tool[n][n].Input.Camera[n].Shape[2].Enable			False	-	-	-	-	-
	Shape / Topography Image 3: Feature Size (pixel)	Tool[n][n].Input.Camera[n].Shape[2].FeatureSize			4	999	1	3	0	✓
	Shape / Topography Image 3: Feature Size Margin	Tool[n][n].Input.Camera[n].Shape[2].FeatureSizeMargin			2	5	0	1	0	✓
	Shape / Topography Image 3: Contrast	Tool[n][n].Input.Camera[n].Shape[2].Contrast			1.0	9.9	0.1	1	1	✓
	Shape / Topography Image 3: Level	Tool[n][n].Input.Camera[n].Shape[2].Level			128	255	0	3	0	✓
	Shape / Topography Image 3: Noise Cut (tone)	Tool[n][n].Input.Camera[n].Shape[2].NoiseCut			0.0	255.0	0.0	3	1	✓
	Shape / Topography Image 3: Texture Pattern Cut	Tool[n][n].Input.Camera[n].Shape[2].TexturePatternCut	None	0	None	-	-	-	-	✓
			Weak	1						
			Strong	2						
			Very Strong	3						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Processed Image	Texture Pattern Image: Enable	Tool[n][n].Input.Camera[n].TexturePattern.Enable			True	-	-	-	-	-
	Texture Pattern Image: Halation Cut	Tool[n][n].Input.Camera[n].TexturePattern.HalationCut	None	0	Strong					✓
			Weak	1						
			Strong	2						
			Very Strong	3						
	Texture Pattern Image: Contrast	Tool[n][n].Input.Camera[n].TexturePattern.Contrast			1.0	9.9	0.1	1	1	✓
	Gradient X Image: Enable	Tool[n][n].Input.Camera[n].GradientX.Enable			False	-	-	-	-	-
	Gradient Y Image: Enable	Tool[n][n].Input.Camera[n].GradientY.Enable			False	-	-	-	-	-
	Common to Images: Halation Cut (Common)	Tool[n][n].Input.Camera[n].Correction.HalationCut	None	0	None	-	-	-	-	-
			Weak	1						
			Strong	2						
			Very Strong	3						
	Common to Images: Directional Emphasis (Common)	Tool[n][n].Input.Camera[n].Correction.DirectionalEmphasis	None	0	None	-	-	-	-	-
			X Direction	1						
			Y Direction	2						
	Common to Images: Emphasis Degree (Common)	Tool[n][n].Input.Camera[n].Correction.EmphasisDegree	Weak	0	Strong	-	-	-	-	-
			Strong	1						
			Very Strong	2						
MultiSpectrum Capture Settings	Specify Individually	Tool[n][n].Input.Camera[n].Options.IndividualIntensity			False	-	-	-	-	-
	Lighting Color	Tool[n][n].Input.Camera[n].Options.TrackingLightColor	UV	0	W	-	-	-	-	-
			B	1						
			G	2						
			AM	3						
			R	4						
			FR	5						
			IR	6						
			W	7						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
MultiSpectrum Capture Settings	Ambient Light Cut: Enable	Tool[n][n].Input.Camera[n].Options.AmbientCut.Enable			False	-	-	-	-	-
	UV: Enable	Tool[n][n].Input.Camera[n].UV.Enable			True	-	-	-	-	-
	UV: Light Volume	Tool[n][n].Input.Camera[n].UV.Intensity			511	1023	0	4	0	✓
	B: Enable	Tool[n][n].Input.Camera[n].Blue.Enable			True	-	-	-	-	-
	B: Light Volume	Tool[n][n].Input.Camera[n].Blue.Intensity			511	1023	0	4	0	✓
	G: Enable	Tool[n][n].Input.Camera[n].Green.Enable			True	-	-	-	-	-
	G: Light Volume	Tool[n][n].Input.Camera[n].Green.Intensity			511	1023	0	4	0	✓
	AM: Enable	Tool[n][n].Input.Camera[n].Amber.Enable			True	-	-	-	-	-
	AM: Light Volume	Tool[n][n].Input.Camera[n].Amber.Intensity			511	1023	0	4	0	✓
	R: Enable	Tool[n][n].Input.Camera[n].Red.Enable			True	-	-	-	-	-
	R: Light Volume	Tool[n][n].Input.Camera[n].Red.Intensity			511	1023	0	4	0	✓
	FR: Enable	Tool[n][n].Input.Camera[n].FR.Enable			True	-	-	-	-	-
	FR: Light Volume	Tool[n][n].Input.Camera[n].FR.Intensity			511	1023	0	4	0	✓
	IR: Enable	Tool[n][n].Input.Camera[n].IR.Enable			True	-	-	-	-	-
	IR: Light Volume	Tool[n][n].Input.Camera[n].IR.Intensity			511	1023	0	4	0	✓
	W: Enable	Tool[n][n].Input.Camera[n].White.Enable			True	-	-	-	-	-
	W: Light Volume	Tool[n][n].Input.Camera[n].White.Intensity			511	1023	0	4	0	✓
	Track Moving Object: Enable	Tool[n][n].Input.Camera[n].TrackObject.Enable			False	-	-	-	-	-
	Track Moving Object: Search Region: Center X	Tool[n][n].Input.Camera[n].TrackObject.Region.Center.X			*	16382	-16382	5	0	✓
	Track Moving Object: Search Region: Center Y	Tool[n][n].Input.Camera[n].TrackObject.Region.Center.Y			*	16382	-16382	5	0	✓
	Track Moving Object: Search Region: Width	Tool[n][n].Input.Camera[n].TrackObject.Region.Width			*	16383	1	5	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
MultiSpectrum Capture Settings	Track Moving Object: Search Region: Height	Tool[n][n].Input.Camera[n].TrackObject.Region.Height			*	16383	1	5	0	✓
	Track Moving Object: Pattern Region: Center X	Tool[n][n].Input.Camera[n].TrackObject.PatternRegion .Center.X			*	16382	-16382	5	0	✓
	Track Moving Object: Pattern Region: Center Y	Tool[n][n].Input.Camera[n].TrackObject.PatternRegion .Center.Y			*	16382	-16382	5	0	✓
	Track Moving Object: Pattern Region: Width	Tool[n][n].Input.Camera[n].TrackObject.PatternRegion .Width			*	16383	1	5	0	✓
	Track Moving Object: Pattern Region: Height	Tool[n][n].Input.Camera[n].TrackObject.PatternRegion .Height			*	16383	1	5	0	✓
	Track Moving Object: Search Sensitivity	Tool[n][n].Input.Camera[n].TrackObject.Sensitivity	Lowest	0	Normal	-	-	-	-	✓
			Lower	1						
			Low	2						
			Normal	3						
			High	4						
			Higher	5						
			Highest	6						
			Highest+	7						
	Track Moving Object: Search Accuracy	Tool[n][n].Input.Camera[n].TrackObject.Accuracy	Lowest	0	Normal	-	-	-	-	✓
			Lower	1						
			Low	2						
			Normal	3						
			High	4						
			Higher	5						
			Highest	6						
	Track Moving Object: Minimum Match %	Tool[n][n].Input.Camera[n].TrackObject.MinimumMatch			40.000	99.999	0.000	2	3	✓
	Track Moving Object: Angle Range: + Direction	Tool[n][n].Input.Camera[n].TrackObject.AngleRange.Plus			30.000	180.000	0.000	3	3	✓
	Track Moving Object: Angle Range: - Direction	Tool[n][n].Input.Camera[n].TrackObject.AngleRange.Minus			-30.000	0.000	179.999	3	3	✓
	Track Moving Object: Vibration Correction	Tool[n][n].Input.Camera[n].TrackObject.VibrationCorrection			False	-	-	-	-	-
	Output MultiSpectrum Color Images: Enable	Tool[n][n].Input.Camera[n].Color.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Camera-Connected Light Settings	Enable	Tool[n][n].Input.Camera[n].Light.Enable			True	-	-	-	-	-
	Light Volume	Tool[n][n].Input.Camera[n].Light.Intensity			511	1023	0	4	0	✓
	Continuous Lighting	Tool[n][n].Input.Camera[n].Light.Continuous			False	-	-	-	-	-
	Lighting Delay (µs)	Tool[n][n].Input.Camera[n].Light.DelayTime			0.000	999.999	0.000	3	3	✓
	Duration (ms)	Tool[n][n].Input.Camera[n].Light.OutputTime			0.1	999.9	0.1	3	1	✓
	Synchronize With Shutter Speed	Tool[n][n].Input.Camera[n].Light.SynchronizeWithShutterSpeed			False	-	-	-	-	-
	Lighting Color	Tool[n][n].Input.Camera[n].Light.LightingColor	UV	0	W	-	-	-	-	-
			B	1						
			G	2						
			AM	3						
			R	4						
			FR	5						
			IR	6						
			W	7						
	Control Light Intensity	Tool[n][n].Input.Camera[n].Light.IntensityControl			False	-	-	-	-	-
	Overdrive Lighting: Enable	Tool[n][n].Input.Camera[n].Light.OverDrive.Enable			False	-	-	-	-	-
	Overdrive Lighting: Apply Max Brightness	Tool[n][n].Input.Camera[n].Light.OverDrive.MaxMagnification			False	-	-	-	-	-
	Overdrive Lighting: Overdrive Factor (times)	Tool[n][n].Input.Camera[n].Light.OverDrive.Magnification			2	10	2	2	0	-
	Lighting Time	Tool[n][n].Input.Camera[n].Light.LightOnDuration			0	65535	0	5	0	-
	Lighting Off Time	Tool[n][n].Input.Camera[n].Light.LightOffDuration			0	65535	0	5	0	-
	LED Segment Selection: Top (↑)	Tool[n][n].Input.Camera[n].Light.LightingPosition.Upper			True	-	-	-	-	-
	LED Segment Selection: Right (→)	Tool[n][n].Input.Camera[n].Light.LightingPosition.Right			True	-	-	-	-	-
	LED Segment Selection: Bottom (↓)	Tool[n][n].Input.Camera[n].Light.LightingPosition.Lower			True	-	-	-	-	-
	LED Segment Selection: Left (←)	Tool[n][n].Input.Camera[n].Light.LightingPosition.Left			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Trigger Settings	Trigger [n]: Trigger Delay (ms)	Tool[n][n].Input.Trigger[n].DelayTime			0.000	999.999	0.000	3	3	✓
	Trigger [n]: Wait for Trigger Input	Tool[n][n].Input.Trigger[n].TriggerWait			True	-	-	-	-	-
	Trigger [n]: Screen Update in Run Mode	Tool[n][n].Input.Trigger[n].ContinuousUpdate	Trigger	0		-	-	-	-	-
			Live Image	1						
Light Settings	LIGHT[n]: Enable	Tool[n][n].Input.Light[n].Enable			False	-	-	-	-	-
	LIGHT[n]: Light Volume	Tool[n][n].Input.Light[n].Intensity			511	1023	0	4	0	✓
	LIGHT[n]: Continuous Lighting	Tool[n][n].Input.Light[n].Continuous			False	-	-	-	-	-
	LIGHT[n]: Lighting Delay (µs)	Tool[n][n].Input.Light[n].DelayTime			1.000	999.999	0.000	3	3	✓
	LIGHT[n]: Duration (ms)	Tool[n][n].Input.Light[n].OutputTime			0.1	999.9	0.1	3	1	✓
	LIGHT[n]: Synchronize With Shutter Speed	Tool[n][n].Input.Light[n].SynchronizeWithShutterSpeed			False	-	-	-	-	-
External Flash	FLASH[n]: Enable	Tool[n][n].Input.ExternalFlash[n].Enable			False	-	-	-	-	-
	FLASH[n]: Lighting Delay (µs)	Tool[n][n].Input.ExternalFlash[n].DelayTime			0	100000	0	6	0	✓
	FLASH[n]: Duration (ms)	Tool[n][n].Input.ExternalFlash[n].OutputTime			100.0	999.9	0.1	3	1	✓
	FLASH[n]: Synchronize With Shutter Speed	Tool[n][n].Input.ExternalFlash[n].SynchronizeWithShutterSpeed			False	-	-	-	-	-

Calibration

#O013

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Calibration	File Name	Input.FileName			-	-	-	-	-	-
Image Correction	Distortion Correction	Input.DistortionCorrection	Lens & Perspective	0	Lens & Perspective	-	-	-	-	-
			Lens Only	1						
			Perspective Only	2						
	Pattern Interval (Full Scale)	Input.PatternInterval			10.000	999.999	0.001	3	3	✓
	Unit	Input.Unit	None	0	mm	-	-	-	-	-
			cm	1						
			m	2						
			mm	3						
			µm	4						
	Region: Correction RegionShape	Input.CorrectionRegion.Shape.Type	Full Image	0	Full Image	-	-	-	-	-
			Rectangle	1						
	Region: Correction Region: Upper Left Position X	Input.CorrectionRegion.Shape.UpperLeft.X			70	16383	-16383	5	0	✓
	Region: Correction Region: Upper Left Position Y	Input.CorrectionRegion.Shape.UpperLeft.Y			70	16383	-16383	5	0	✓
	Region: Correction Region: Lower Right Position X	Input.CorrectionRegion.Shape.LowerRight.X			400	16383	-16383	5	0	✓
	Region: Correction Region: Lower Right Position Y	Input.CorrectionRegion.Shape.LowerRight.Y			400	16383	-16383	5	0	✓
	Rotation Correction: Enabled	Input.Rotation.AutomaticCorrection			False	-	-	-	-	✓
	Rotation Correction: Corrective Angle	Input.Rotation.Angle			0.000	359.999	0.000	3	3	✓
	Size	Input.SizeType	By Scaling	0	By Scaling	-	-	-	-	✓
			By Pixel	1						
	Scale	Input.Scaling			1.000	5.000	0.200	1	3	✓
	Pattern Interval (Pixel)	Input.Division			50.000	1000.000	5.000	4	3	✓
	Shift X (Pixel)	Input.Shift.X			0.000	9999.999	-9999.999	4	3	✓
	Shift Y (Pixel)	Input.Shift.Y			0.000	9999.999	-9999.999	4	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Correction Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	✓
	Correction Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	✓
	Correction Region: Color: Enabled	Input.Graphic.Region.Color.Visible			True					✓
	Correction Region: Color: Red	Input.Graphic.Region.Color.Red			42	255	0	3	0	-
	Correction Region: Color: Green	Input.Graphic.Region.Color.Green			86	255	0	3	0	-
	Correction Region: Color: Blue	Input.Graphic.Region.Color.Blue			175	255	0	3	0	-

Scaling

#O014

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Scaling	Scale	Input.Scale			1.000000	9999.999999	-9999.999999	4	6	-
	X	Input.ScaleX			1.000000	9999.999999	-9999.999999	4	6	-
	Y	Input.ScaleY			1.000000	9999.999999	-9999.999999	4	6	-
	Lengthwise	Input.ScaleLength			1.000000	9999.999999	0.000000	4	6	-
	Unit	Input.Unit	None	0	mm/pixel	-	-	-	-	-
			cm/pixel	1						
			m/pixel	2						
			mm/pixel	3						
			µm/pixel	4						
	Specify by Direction	Input.Individual			False					-
Detailed Settings	File Name	Input.FileName			-	-	-	-	-	-

Area

#O015

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Detection Color	Input.DetectionColor	Black	0	White	-	-	-	-	✓
			White	1						
Judgment Conditions	Area: Upper Limit Enabled	Input.Limit.Area.Max.Enable			False	-	-	-	-	-
	Area: Upper Limit	Input.Limit.Area.Max			Current Value	99999999	0	8	0	✓
	Area: Lower Limit Enabled	Input.Limit.Area.Min.Enable			False	-	-	-	-	-
	Area: Lower Limit	Input.Limit.Area.Min			Current Value	99999999	0	8	0	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-

Intensity

#O016

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Judgment Conditions	Average: Upper Limit Enabled	Input.Limit.Average.Max.Enable			False	-	-	-	-	-
	Average: Upper Limit	Input.Limit.Average.Max			Current Value	255.000	0.000	3	3	✓
	Average: Lower Limit Enabled	Input.Limit.Average.Min.Enable			False	-	-	-	-	-
	Average: Lower Limit	Input.Limit.Average.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: Upper Limit Enabled	Input.Limit.Deviation.Max.Enable			False	-	-	-	-	-
	Deviation: Upper Limit	Input.Limit.Deviation.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: Lower Limit Enabled	Input.Limit.Deviation.Min.Enable			False	-	-	-	-	-
	Deviation: Lower Limit	Input.Limit.Deviation.Min			Current Value	255.000	0.000	3	3	✓
	Intensity: Upper Limit Enabled	Input.Limit.Intensity.Max.Enable			False	-	-	-	-	-
	Intensity: Upper Limit	Input.Limit.Intensity.Max			Current Value	255.000	0.000	3	3	✓
	Intensity: Lower Limit Enabled	Input.Limit.Intensity.Min.Enable			False	-	-	-	-	-
	Intensity: Lower Limit	Input.Limit.Intensity.Min			Current Value	255.000	0.000	3	3	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-

Color Detection

#O017

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Detection Conditions	Colorspace	Input.ColorSpace	RGB	0	RGB	-	-	-	-	-
			HSB	1						
Judgment Conditions - RGB	Average: R: Upper Limit Enabled	Input.Limit.Average.Red.Max.Enable			False	-	-	-	-	-
	Average: R: Upper Limit	Input.Limit.Average.Red.Max			Current Value	255.000	0.000	3	3	✓
	Average: R: Lower Limit Enabled	Input.Limit.Average.Red.Min.Enable			False	-	-	-	-	-
	Average: R: Lower Limit	Input.Limit.Average.Red.Min			Current Value	255.000	0.000	3	3	✓
	Average: G: Upper Limit Enabled	Input.Limit.Average.Green.Max.Enable			False	-	-	-	-	-
	Average: G: Upper Limit	Input.Limit.Average.Green.Max			Current Value	255.000	0.000	3	3	✓
	Average: G: Lower Limit Enabled	Input.Limit.Average.Green.Min.Enable			False	-	-	-	-	-
	Average: G: Lower Limit	Input.Limit.Average.Green.Min			Current Value	255.000	0.000	3	3	✓
	Average: B: Upper Limit Enabled	Input.Limit.Average.Blue.Max.Enable			False	-	-	-	-	-
	Average: B: Upper Limit	Input.Limit.Average.Blue.Max			Current Value	255.000	0.000	3	3	✓
	Average: B: Lower Limit Enabled	Input.Limit.Average.Blue.Min.Enable			False	-	-	-	-	-
	Average: B: Lower Limit	Input.Limit.Average.Blue.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: R: Upper Limit Enabled	Input.Limit.Deviation.Red.Max.Enable			False	-	-	-	-	-
	Deviation: R: Upper Limit	Input.Limit.Deviation.Red.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: R: Lower Limit Enabled	Input.Limit.Deviation.Red.Min.Enable			False	-	-	-	-	-
	Deviation: R: Lower Limit	Input.Limit.Deviation.Red.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: G: Upper Limit Enabled	Input.Limit.Deviation.Green.Max.Enable			False	-	-	-	-	-
	Deviation: G: Upper Limit	Input.Limit.Deviation.Green.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: G: Lower Limit Enabled	Input.Limit.Deviation.Green.Min.Enable			False	-	-	-	-	-
	Deviation: G: Lower Limit	Input.Limit.Deviation.Green.Min			Current Value	255.000	0.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions - RGB	Deviation: B: Upper Limit Enabled	Input.Limit.Deviation.Blue.Max.Enable			False	-	-	-	-	-
	Deviation: B: Upper Limit	Input.Limit.Deviation.Blue.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: B: Lower Limit Enabled	Input.Limit.Deviation.Blue.Min.Enable			False	-	-	-	-	-
	Deviation: B: Lower Limit	Input.Limit.Deviation.Blue.Min			Current Value	255.000	0.000	3	3	✓
	Intensity: H: Upper Limit Enabled	Input.Limit.Intensity.Red.Max.Enable			False	-	-	-	-	-
	Intensity: H: Upper Limit	Input.Limit.Intensity.Red.Max			Current Value	255	0	3	0	✓
	Intensity: H: Lower Limit Enabled	Input.Limit.Intensity.Red.Min.Enable			False	-	-	-	-	-
	Intensity: H: Lower Limit	Input.Limit.Intensity.Red.Min			Current Value	255	0	3	0	✓
	Intensity: G: Upper Limit Enabled	Input.Limit.Intensity.Green.Max.Enable			False	-	-	-	-	-
	Intensity: G: Upper Limit	Input.Limit.Intensity.Green.Max			Current Value	255	0	3	0	✓
	Intensity: G: Lower Limit Enabled	Input.Limit.Intensity.Green.Min.Enable			False	-	-	-	-	-
	Intensity: G: Lower Limit	Input.Limit.Intensity.Green.Min			Current Value	255	0	3	0	✓
	Intensity: B: Upper Limit Enabled	Input.Limit.Intensity.Blue.Max.Enable			False	-	-	-	-	-
	Intensity: B: Upper Limit	Input.Limit.Intensity.Blue.Max			Current Value	255	0	3	0	✓
	Intensity: B: Lower Limit Enabled	Input.Limit.Intensity.Blue.Min.Enable			False	-	-	-	-	-
	Intensity: B: Lower Limit	Input.Limit.Intensity.Blue.Min			0	255	0	3	0	✓
Judgment Conditions - HSB	Average: H: Upper Limit Enabled	Input.Limit.Average.Hue.Max.Enable			False	-	-	-	-	-
	Average: H: Upper Limit	Input.Limit.Average.Hue.Max			Current Value	256.000	0.000	3	3	✓
	Average: H: Lower Limit Enabled	Input.Limit.Average.Hue.Min.Enable			False	-	-	-	-	-
	Average: H: Lower Limit	Input.Limit.Average.Hue.Min			Current Value	256.000	0.000	3	3	✓
	Average: S: Upper Limit Enabled	Input.Limit.Average.Saturation.Max.Enable			False	-	-	-	-	-
	Average: S: Upper Limit	Input.Limit.Average.Saturation.Max			Current Value	255.000	0.000	3	3	✓
	Average: S: Lower Limit Enabled	Input.Limit.Average.Saturation.Min.Enable			False	-	-	-	-	-
	Average: S: Lower Limit	Input.Limit.Average.Saturation.Min			Current Value	255.000	0.000	3	3	✓
	Average: B: Upper Limit Enabled	Input.Limit.Average.Brightness.Max.Enable			False	-	-	-	-	-
	Average: B: Upper Limit	Input.Limit.Average.Brightness.Max			Current Value	255.000	0.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions - HSB	Average: B: Lower Limit Enabled	Input.Limit.Average.Brightness.Min.Enable			False	-	-	-	-	-
	Average: B: Lower Limit	Input.Limit.Average.Brightness.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: H: Upper Limit Enabled	Input.Limit.Deviation.Hue.Max.Enable			False	-	-	-	-	-
	Deviation: H: Upper Limit	Input.Limit.Deviation.Hue.Max			Current Value	256.000	0.000	3	3	✓
	Deviation: H: Lower Limit Enabled	Input.Limit.Deviation.Hue.Min.Enable			False	-	-	-	-	-
	Deviation: H: Lower Limit	Input.Limit.Deviation.Hue.Min			Current Value	256.000	0.000	3	3	✓
	Deviation: S: Upper Limit Enabled	Input.Limit.Deviation.Saturation.Max.Enable			False	-	-	-	-	-
	Deviation: S: Upper Limit	Input.Limit.Deviation.Saturation.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: S: Lower Limit Enabled	Input.Limit.Deviation.Saturation.Min.Enable			False	-	-	-	-	-
	Deviation: S: Lower Limit	Input.Limit.Deviation.Saturation.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: B: Upper Limit Enabled	Input.Limit.Deviation.Brightness.Max.Enable			False	-	-	-	-	-
	Deviation: B: Upper Limit	Input.Limit.Deviation.Brightness.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: B: Lower Limit Enabled	Input.Limit.Deviation.Brightness.Min.Enable			False	-	-	-	-	-
	Deviation: B: Lower Limit	Input.Limit.Deviation.Brightness.Min			Current Value	255.000	0.000	3	3	✓
	Intensity: H: Upper Limit Enabled	Input.Limit.Intensity.Hue.Max.Enable			False	-	-	-	-	-
	Intensity: H: Upper Limit	Input.Limit.Intensity.Hue.Max			Current Value	255	0	3	0	✓
	Intensity: H: Lower Limit Enabled	Input.Limit.Intensity.Hue.Min.Enable			False	-	-	-	-	-
	Intensity: H: Lower Limit	Input.Limit.Intensity.Hue.Min			Current Value	255	0	3	0	✓
	Intensity: S: Upper Limit Enabled	Input.Limit.Intensity.Saturation.Max.Enable			False	-	-	-	-	-
	Intensity: S: Upper Limit	Input.Limit.Intensity.Saturation.Max			Current Value	255	0	3	0	✓
	Intensity: S: Lower Limit Enabled	Input.Limit.Intensity.Saturation.Min.Enable			False	-	-	-	-	-
	Intensity: S: Lower Limit	Input.Limit.Intensity.Saturation.Min			Current Value	255	0	3	0	✓
	Intensity: B: Upper Limit Enabled	Input.Limit.Intensity.Brightness.Max.Enable			False	-	-	-	-	-
	Intensity: B: Upper Limit	Input.Limit.Intensity.Brightness.Max			Current Value	255	0	3	0	✓
	Intensity: B: Lower Limit Enabled	Input.Limit.Intensity.Brightness.Min.Enable			False	-	-	-	-	-
	Intensity: B: Lower Limit	Input.Limit.Intensity.Brightness.Min			Current Value	255	0	3	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions - UV/B/G/AM/R/FR/IR/W	Average: UV: Upper Limit Enabled	Input.Limit.Average.UV.Max.Enable			False	-	-	-	-	-
	Average: UV: Upper Limit	Input.Limit.Average.UV.Max			Current Value	255.000	0.000	3	3	✓
	Average: UV: Lower Limit Enabled	Input.Limit.Average.UV.Min.Enable			False	-	-	-	-	-
	Average: UV: Lower Limit	Input.Limit.Average.UV.Min			Current Value	255.000	0.000	3	3	✓
	Average: B: Upper Limit Enabled	Input.Limit.Average.B.Max.Enable			False	-	-	-	-	-
	Average: B: Upper Limit	Input.Limit.Average.B.Max			Current Value	255.000	0.000	3	3	✓
	Average: B: Lower Limit Enabled	Input.Limit.Average.B.Min.Enable			False	-	-	-	-	-
	Average: B: Lower Limit	Input.Limit.Average.B.Min			Current Value	255.000	0.000	3	3	✓
	Average: G: Upper Limit Enabled	Input.Limit.Average.G.Max.Enable			False	-	-	-	-	-
	Average: G: Upper Limit	Input.Limit.Average.G.Max			Current Value	255.000	0.000	3	3	✓
	Average: G: Lower Limit Enabled	Input.Limit.Average.G.Min.Enable			False	-	-	-	-	-
	Average: G: Lower Limit	Input.Limit.Average.G.Min			Current Value	255.000	0.000	3	3	✓
	Average: AM: Upper Limit Enabled	Input.Limit.Average.AM.Max.Enable			False	-	-	-	-	-
	Average: AM: Upper Limit	Input.Limit.Average.AM.Max			Current Value	255.000	0.000	3	3	✓
	Average: AM: Lower Limit Enabled	Input.Limit.Average.AM.Min.Enable			False	-	-	-	-	-
	Average: AM: Lower Limit	Input.Limit.Average.AM.Min			Current Value	255.000	0.000	3	3	✓
	Average: R: Upper Limit Enabled	Input.Limit.Average.R.Max.Enable			False	-	-	-	-	-
	Average: R: Upper Limit	Input.Limit.Average.R.Max			Current Value	255.000	0.000	3	3	✓
	Average: R: Lower Limit Enabled	Input.Limit.Average.R.Min.Enable			False	-	-	-	-	-
	Average: R: Lower Limit	Input.Limit.Average.R.Min			Current Value	255.000	0.000	3	3	✓
	Average: FR: Upper Limit Enabled	Input.Limit.Average.FR.Max.Enable			False	-	-	-	-	-
	Average: FR: Upper Limit	Input.Limit.Average.FR.Max			Current Value	255.000	0.000	3	3	✓
	Average: FR: Lower Limit Enabled	Input.Limit.Average.FR.Min.Enable			False	-	-	-	-	-
	Average: FR: Lower Limit	Input.Limit.Average.FR.Min			Current Value	255.000	0.000	3	3	✓
	Average: IR: Upper Limit Enabled	Input.Limit.Average.IR.Max.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions - UV/B/G/AM/R/FR/IR/W	Average: IR: Upper Limit	Input.Limit.Average.IR.Max			Current Value	255.000	0.000	3	3	✓
	Average: IR: Lower Limit Enabled	Input.Limit.Average.IR.Min.Enable			False	-	-	-	-	-
	Average: IR: Lower Limit	Input.Limit.Average.IR.Min			Current Value	255.000	0.000	3	3	✓
	Average: W: Upper Limit Enabled	Input.Limit.Average.W.Max.Enable			False	-	-	-	-	-
	Average: W: Upper Limit	Input.Limit.Average.W.Max			Current Value	255.000	0.000	3	3	✓
	Average: W: Lower Limit Enabled	Input.Limit.Average.W.Min.Enable			False	-	-	-	-	-
	Average: W: Lower Limit	Input.Limit.Average.W.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: UV: Upper Limit Enabled	Input.Limit.Deviation.UV.Max.Enable			False	-	-	-	-	-
	Deviation: UV: Upper Limit	Input.Limit.Deviation.UV.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: UV: Lower Limit Enabled	Input.Limit.Deviation.UV.Min.Enable			False	-	-	-	-	-
	Deviation: UV: Lower Limit	Input.Limit.Deviation.UV.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: B: Upper Limit Enabled	Input.Limit.Deviation.B.Max.Enable			False	-	-	-	-	-
	Deviation: B: Upper Limit	Input.Limit.Deviation.B.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: B: Lower Limit Enabled	Input.Limit.Deviation.B.Min.Enable			False	-	-	-	-	-
	Deviation: B: Lower Limit	Input.Limit.Deviation.B.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: G: Upper Limit Enabled	Input.Limit.Deviation.G.Max.Enable			False	-	-	-	-	-
	Deviation: G: Upper Limit	Input.Limit.Deviation.G.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: G: Lower Limit Enabled	Input.Limit.Deviation.G.Min.Enable			False	-	-	-	-	-
	Deviation: G: Lower Limit	Input.Limit.Deviation.G.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: AM: Upper Limit Enabled	Input.Limit.Deviation.AM.Max.Enable			False	-	-	-	-	-
	Deviation: AM: Upper Limit	Input.Limit.Deviation.AM.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: AM: Lower Limit Enabled	Input.Limit.Deviation.AM.Min.Enable			False	-	-	-	-	-
	Deviation: AM: Lower Limit	Input.Limit.Deviation.AM.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: R: Upper Limit Enabled	Input.Limit.Deviation.R.Max.Enable			False	-	-	-	-	-
	Deviation: R: Upper Limit	Input.Limit.Deviation.R.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: R: Lower Limit Enabled	Input.Limit.Deviation.R.Min.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions - UV/B/G/AM/R/FR/IR/W	Deviation: R: Lower Limit	Input.Limit.Deviation.R.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: FR: Upper Limit Enabled	Input.Limit.Deviation.FR.Max.Enable			False	-	-	-	-	-
	Deviation: FR: Upper Limit	Input.Limit.Deviation.FR.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: FR: Lower Limit Enabled	Input.Limit.Deviation.FR.Min.Enable			False	-	-	-	-	-
	Deviation: FR: Lower Limit	Input.Limit.Deviation.FR.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: IR: Upper Limit Enabled	Input.Limit.Deviation.IR.Max.Enable			False	-	-	-	-	-
	Deviation: IR: Upper Limit	Input.Limit.Deviation.IR.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: IR: Lower Limit Enabled	Input.Limit.Deviation.IR.Min.Enable			False	-	-	-	-	-
	Deviation: IR: Lower Limit	Input.Limit.Deviation.IR.Min			Current Value	255.000	0.000	3	3	✓
	Deviation: W: Upper Limit Enabled	Input.Limit.Deviation.W.Max.Enable			False	-	-	-	-	-
	Deviation: W: Upper Limit	Input.Limit.Deviation.W.Max			Current Value	255.000	0.000	3	3	✓
	Deviation: W: Lower Limit Enabled	Input.Limit.Deviation.W.Min.Enable			False	-	-	-	-	-
	Deviation: W: Lower Limit	Input.Limit.Deviation.W.Min			Current Value	255.000	0.000	3	3	✓
	Intensity: UV: Upper Limit Enabled	Input.Limit.Intensity.UV.Max.Enable			False	-	-	-	-	-
	Intensity: UV: Upper Limit	Input.Limit.Intensity.UV.Max			Current Value	255	0	3	0	✓
	Intensity: UV: Lower Limit Enabled	Input.Limit.Intensity.UV.Min.Enable			False	-	-	-	-	-
	Intensity: UV: Lower Limit	Input.Limit.Intensity.UV.Min			Current Value	255	0	3	0	✓
	Intensity: B: Upper Limit Enabled	Input.Limit.Intensity.B.Max.Enable			False	-	-	-	-	-
	Intensity: B: Upper Limit	Input.Limit.Intensity.B.Max			Current Value	255	0	3	0	✓
	Intensity: B: Lower Limit Enabled	Input.Limit.Intensity.B.Min.Enable			False	-	-	-	-	-
	Intensity: B: Lower Limit	Input.Limit.Intensity.B.Min			Current Value	255	0	3	0	✓
	Intensity: G: Upper Limit Enabled	Input.Limit.Intensity.G.Max.Enable			False	-	-	-	-	-
	Intensity: G: Upper Limit	Input.Limit.Intensity.G.Max			Current Value	255	0	3	0	✓
	Intensity: G: Lower Limit Enabled	Input.Limit.Intensity.G.Min.Enable			False	-	-	-	-	-
	Intensity: G: Lower Limit	Input.Limit.Intensity.G.Min			Current Value	255	0	3	0	✓
	Intensity: AM: Upper Limit Enabled	Input.Limit.Intensity.AM.Max.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions - UV/B/G/AM/R/FR/IR/W	Intensity: AM: Upper Limit	Input.Limit.Intensity.AM.Max			Current Value	255	0	3	0	✓
	Intensity: AM: Lower Limit Enabled	Input.Limit.Intensity.AM.Min.Enable			False	-	-	-	-	-
	Intensity: AM: Lower Limit	Input.Limit.Intensity.AM.Min			Current Value	255	0	3	0	✓
	Intensity: R: Upper Limit Enabled	Input.Limit.Intensity.R.Max.Enable			False	-	-	-	-	-
	Intensity: R: Upper Limit	Input.Limit.Intensity.R.Max			Current Value	255	0	3	0	✓
	Intensity: R: Lower Limit Enabled	Input.Limit.Intensity.R.Min.Enable			False	-	-	-	-	-
	Intensity: R: Lower Limit	Input.Limit.Intensity.R.Min			Current Value	255	0	3	0	✓
	Intensity: FR: Upper Limit Enabled	Input.Limit.Intensity.FR.Max.Enable			False	-	-	-	-	-
	Intensity: FR: Upper Limit	Input.Limit.Intensity.FR.Max			Current Value	255	0	3	0	✓
	Intensity: FR: Lower Limit Enabled	Input.Limit.Intensity.FR.Min.Enable			False	-	-	-	-	-
	Intensity: FR: Lower Limit	Input.Limit.Intensity.FR.Min			Current Value	255	0	3	0	✓
	Intensity: IR: Upper Limit Enabled	Input.Limit.Intensity.IR.Max.Enable			False	-	-	-	-	-
	Intensity: IR: Upper Limit	Input.Limit.Intensity.IR.Max			Current Value	255	0	3	0	✓
	Intensity: IR: Lower Limit Enabled	Input.Limit.Intensity.IR.Min.Enable			False	-	-	-	-	-
	Intensity: IR: Lower Limit	Input.Limit.Intensity.IR.Min			Current Value	255	0	3	0	✓
	Intensity: W: Upper Limit Enabled	Input.Limit.Intensity.W.Max.Enable			False	-	-	-	-	-
	Intensity: W: Upper Limit	Input.Limit.Intensity.W.Max			Current Value	255	0	3	0	✓
	Intensity: W: Lower Limit Enabled	Input.Limit.Intensity.W.Min.Enable			False	-	-	-	-	-
	Intensity: W: Lower Limit	Input.Limit.Intensity.W.Min			Current Value	255	0	3	0	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-

Pattern Search

#O018

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Angle Range: + Direction	Input.AngleRange.Plus			30.000	179.999	0.000	3	3	✓
	Angle Range: - Direction	Input.AngleRange.Minus			-30.000	0.000	-180.000	3	3	✓
	Detection Count	Input.Count			1	99	1	2	0	-
	Search Sensitivity	Input.Sensitivity	Lowest	0	Normal	-	-	-	-	✓
			Lower	1						
			Low	2						
			Normal	3						
			High	4						
			Higher	5						
			Highest	6						
			Highest+	7						
	Search Accuracy	Input.Accuracy	Lowest	0	Normal	-	-	-	-	✓
			Lower	1						
			Low	2						
			Normal	3						
			High	4						
			Higher	5						
			Highest	6						
	Minimum Match %	Input.MinimumMatch			40.000	99.999	0.000	2	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Detection Order	Input.Order	X Ascending	0	Match %: Descending	-	-	-	-	✓
			X Descending	1						
			Y Ascending	2						
			Y Descending	3						
			Match %: Ascending	4						
			Match %: Descending	5						
			Clockwise	6						
			Counterclockwise	7						
			From Upper Left (Left to Right)	8						
			From Upper Left (Downward)	9						
			From Upper Right (Right to Left)	10						
			From Upper Right (Downward)	11						
			From Lower Left (Left to Right)	12						
			From Lower Left (Upward)	13						
			From Lower Right (Right to Left)	14						
			From Lower Right (Upward)	15						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Starting Angle	Input.StartingAngle			0.000	359.999	0.000	3	3	✓
	Grouping Method	Input.GroupingMethod	Pattern Length (Long Side)	0	Pattern Length (Long Side)	-	-	-	-	✓
			Pattern Length (XY)	1						
			Value Specification	2						
	Grouping Range	Input.GroupingRange			20	9999	1	4	0	✓
	Judged Label	Input.PrimaryTarget			0	99	0	2	0	-
Reference Position	Reference Position X	Input.BasePosition.ReferencePoint.X			0.000	16383.000	-16383.000	5	3	-
	Reference Position Y	Input.BasePosition.ReferencePoint.Y			0.000	16383.000	-16383.000	5	3	-
	Starting Angle	Input.BasePosition.ReferencePoint.Angle			0.000	359.000	0.000	3	3	-
Judgment Conditions	Count: Upper Limit Enabled	Input.Limit.Count.Max.Enable			False	-	-	-	-	-
	Count: Upper Limit	Input.Limit.Count.Max			Current Value	99	0	2	0	✓
	Count: Lower Limit Enabled	Input.Limit.Count.Min.Enable			False	-	-	-	-	-
	Count: Lower Limit	Input.Limit.Count.Min			Current Value	99	0	2	0	✓
	Position X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Position X: Upper Limit	Input.Limit.Position.X.Max			Current Value	99999.999	-99999.999	5	3	✓
	Position X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Position X: Lower Limit	Input.Limit.Position.X.Min			Current Value	99999.999	-99999.999	5	3	✓
	Position Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Position Y: Upper Limit	Input.Limit.Position.Y.Max			Current Value	99999.999	-99999.999	5	3	✓
	Position Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-
	Position Y: Lower Limit	Input.Limit.Position.Y.Min			Current Value	99999.999	-99999.999	5	3	✓
	Angle: Upper Limit Enabled	Input.Limit.Position.Angle.Max.Enable			False	-	-	-	-	-
	Angle: Upper Limit	Input.Limit.Position.Angle.Max			Current Value	999.999	-999.999	5	3	✓
	Angle: Lower Limit Enabled	Input.Limit.Position.Angle.Min.Enable			False	-	-	-	-	-
	Angle: Lower Limit	Input.Limit.Position.Angle.Min			Current Value	999.999	-999.999	5	3	✓
	Match %: Upper Limit Enabled	Input.Limit.Match.Max.Enable			False	-	-	-	-	-
	Match %: Upper Limit	Input.Limit.Match.Max			Current Value	99.999	0.000	2	3	✓
	Match %: Lower Limit Enabled	Input.Limit.Match.Min.Enable			False	-	-	-	-	-
	Match %: Lower Limit	Input.Limit.Match.Min			Current Value	99.999	0.000	2	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Search Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Search Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Search Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Search Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Search Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Search Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			75	255	0	3	0	-
	Search Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Search Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			45	255	0	3	0	-
	Search Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			3	255	0	3	0	-
	Search Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Detected Position: Detected Position Shape	Input.Graphic.PrimaryTarget.Shape	Cross	1	L-shaped Arrow	-	-	-	-	-
			L-shaped Arrow	3						
			Circle	4						
	Detected Position: Size	Input.Graphic.PrimaryTarget.Size			32	1024	4	4	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Detected Position: Display Label Number: Enabled	Input.Graphic.PrimaryTarget.Index.Visible			True	-	-	-	-	-
	Detected Position: Display Match %: Enabled	Input.Graphic.PrimaryTarget.Match.Visible			False	-	-	-	-	-
	Detected Position: Display Position X: Enabled	Input.Graphic.PrimaryTarget.Position.X.Visible			False	-	-	-	-	-
	Detected Position: Display Position Y: Enabled	Input.Graphic.PrimaryTarget.Position.Y.Visible			False	-	-	-	-	-
	Detected Position: Angle: Enabled	Input.Graphic.PrimaryTarget.Position.Angle.Visible			False	-	-	-	-	-
	Detected Position: Font: Size	Input.Graphic.PrimaryTarget.Font.Size			12	256	6	3	0	-
	Detected Position (Excluding Judged Label): Enabled	Input.Graphic.ArrayTarget.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Detected Position Shape	Input.Graphic.ArrayTarget.Shape	Cross	1	L-shaped Arrow	-	-	-	-	-
			L-shaped Arrow	3						
			Circle	4						
	Detected Position (Excluding Judged Label): Size	Input.Graphic.ArrayTarget.Size			32	1024	4	4	0	-
	Detected Position (Excluding Judged Label): Line Thickness	Input.Graphic.ArrayTarget.StrokeWidth			1	64	1	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position (Excluding Judged Label): Pass Color: Enabled	Input.Graphic.ArrayTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Pass Color	Input.Graphic.ArrayTarget.ColorPass.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Green	Input.Graphic.ArrayTarget.ColorPass.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Blue	Input.Graphic.ArrayTarget.ColorPass.Blue			14	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Enabled	Input.Graphic.ArrayTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Fail Color: Red	Input.Graphic.ArrayTarget.ColorFail.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Green	Input.Graphic.ArrayTarget.ColorFail.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Blue	Input.Graphic.ArrayTarget.ColorFail.Blue			14	255	0	3	0	-

ShapeTrax3A

#O019

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Angle Range: + Direction	Input.AngleRange.Plus			30.000	179.999	0.000	3	3	✓
	Angle Range: - Direction	Input.AngleRange.Minus			-30.000	0.000	-180.000	3	3	✓
	Detection Count	Input.Count			1	2000	1	4	0	-
	Minimum Match %	Input.MinimumMatch			60.000	99.999	0.000	2	3	✓
	Scale Range (Upper Limit)	Input.Scale.Max			1.000	2.000	1.000	1	3	✓
	Scale Range (Lower Limit)	Input.Scale.Min			1.000	1.000	0.500	1	3	✓
	Fine Search Accuracy	Input.FineSearchAccuracy	Detailed	0	Detailed	-	-			✓
			Fast	1						
	Reverse Detection	Input.ReverseDetection			False	-	-			✓
	Allowable Distortion	Input.AllowableDistortion			0	50	0	2	0	✓
	Detection Region Expansion	Input.DetectionRegionExpansion			True	-	-			-
	Enable Eraser Tool	Input.Eraser.Enable			False	-	-			-
Rotation Direction-Added Search	Enable Rotation Direction-Added Search	Input.RotationDirectionAddedSearch.Enable			False	-	-			-
	Region N: Shape	Input.RotationDirectionAddedSearch.Region[N].Type	Rectangle	2	Rectangle	-	-			-
			Circle	3						
			Oval	4						
			Ring	5						
			Arc	6						
			Polygon	7						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Rotation Direction-Added Search	Region N: (Various Region Parameters) Width	Input.RotationDirectionAddedSearch.Region[N].Width			201	16383	1	5	0	✓
	Region N: (Various Region Parameters) Height	Input.RotationDirectionAddedSearch.Region[N].Height			161	16383	1	5	0	✓
	Region N: (Various Region Parameters) Center X	Input.RotationDirectionAddedSearch.Region[N].Center.X			260.000	16382.000	-16382.000	5	3	✓
	Region N: (Various Region Parameters) Center Y	Input.RotationDirectionAddedSearch.Region[N].Center.Y			240.000	16382.000	-16382.000	5	3	✓
	Region N: (Various Region Parameters) Rotation Angle	Input.RotationDirectionAddedSearch.Region[N].Angle			0.000	359.999	0.000	3	3	✓
	Region N: (Various Region Parameters) Radius 1	Input.RotationDirectionAddedSearch.Region[N].Radius1			120	9600	0	4	0	✓
	Region N: (Various Region Parameters) Radius 2	Input.RotationDirectionAddedSearch.Region[N].Radius2			120	9600	0	4	0	✓
	Region N: Mask	Input.RotationDirectionAddedSearch.Region[N].Mask			False	-	-			-
	Reference Selection Settings: Reference	Input.RotationDirectionAddedSearch.RotationCenter.Mode	Specified Point	0	Specified Point	-	-			-
			Center of Gravity	1						
	Reference Selection Settings: Offset X	Input.RotationDirectionAddedSearch.RotationCenter.Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Reference Selection Settings: Offset Y	Input.RotationDirectionAddedSearch.RotationCenter.Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Condition	Input.RotationDirectionAddedSearch.RotationMode	Whole Circumference	0	Whole Circumference	-	-	-	-	-
			180° Rotation	1						
			Polygon	2						
	Polygon Setting	Input.RotationDirectionAddedSearch.PolygonPoints			6	16	3	2	0	✓
	Follow Angle Range of Detection Conditions	Input.RotationDirectionAddedSearch.FollowAngleRange			False	-	-			-
	Rotation Feature Densification	Input.RotationDirectionAddedSearch.FeatureDensification			True	-	-			✓
	Concentricity Margin Range	Input.RotationDirectionAddedSearch.ConcentricityMarginRange			0	50	0	2	0	✓
Overlap Elimination	Enable Overlap Elimination	Input.OverlapElimination			False	-	-			-
	Elimination Target	Input.EliminationTarget	Other Than Best Match	0	Other Than Best Match	-	-			✓
			All	1						
	Elimination Basis Overlap Area (%)	Input.OverlapArea			30	100	0	3	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Target Selection Conditions	Enable Detection Target Selection Condition 1	Input.PixelCountSelection1.Enable			False	-	-			-
	Detection Target Selection Condition 1: Region N: Shape	Input.PixelCountSelection1.Region[N].Type	Rectangle	2	Rectangle	-	-			-
			Circle	3						
			Oval	4						
			Ring	5						
			Arc	6						
			Polygon	7						
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Width	Input.PixelCountSelection1.Region[N].Width			201	16383	1	5	0	✓
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Height	Input.PixelCountSelection1.Region[N].Height			161	16383	1	5	0	✓
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Center X	Input.PixelCountSelection1.Region[N].Center.X			260.000	16382.000	-16382.000	5	3	✓
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Center Y	Input.PixelCountSelection1.Region[N].Center.Y			240.000	16382.000	-16382.000	5	3	✓
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Rotation Angle	Input.PixelCountSelection1.Region[N].Angle			0.000	359.999	0.000	3	3	✓
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Radius 1	Input.PixelCountSelection1.Region[N].Radius1			120	9600	0	4	0	✓
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Radius 2	Input.PixelCountSelection1.Region[N].Radius2			120	9600	0	4	0	✓
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Starting Angle	Input.PixelCountSelection1.Region[N].StartingAngle			*	359.9	0.00	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Target Selection Conditions	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Ending Angle	Input.PixelCountSelection1.Region[N].EndAngle			*	359.900	0.000	3	3	✓
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Number of Vertices	Input.PixelCountSelection1.Region[N].NodeCount			0.000	100.000	0.000	3	0	✓
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Position X	Input.PixelCountSelection1.Region[N].Node[N].Position.X			*	16383.000	-16383.000	5	3	✓
	Detection Target Selection Condition 1: Region N: (Various Region Parameters) Position Y	Input.PixelCountSelection1.Region[N].Node[N].Position.Y			*	16383.000	-16383.000	5	3	✓
	Detection Target Selection Condition 1: Region N: Mask	Input.PixelCountSelection1.Region[N].Mask			False	-	-			-
	Detection Target Selection Condition 1: Feature Extraction Settings	Input.PixelCountSelection1.ExtractionMode	Link with Current Feature	0	Link with Current Feature	-	-			-
			Specified Value	1						
	Detection Target Selection Condition 1: Feature Intensity Lower Limit	Input.PixelCountSelection1.MinimumIntensity			10	255	1	3	0	✓
	Detection Target Selection Condition 1: Feature Pixel Count (Numeric Input Box)	Input.PixelCountSelection1.PixelCount			0	999999	0	6	0	✓
	Detection Target Selection Condition 1: Feature Pixel Count (Drop-down Menu)	Input.PixelCountSelection1.RatioMode	Or More are Retained	0	Or More are Retained	-	-			✓
			Or Fewer are Retained	1						
	Enable Detection Target Selection Condition 2	Input.PixelCountSelection2.Enable			False	-	-			-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Target Selection Conditions	Detection Target Selection Condition 2: Region N: Shape	Input.PixelCountSelection2.Region[N].Type	Rectangle	2	Rectangle	-	-			-
			Circle	3						
			Oval	4						
			Ring	5						
			Arc	6						
			Polygon	7						
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Width	Input.PixelCountSelection2.Region[N].Width			201	16383	1	5	0	✓
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Height	Input.PixelCountSelection2.Region[N].Height			161	16383	1	5	0	✓
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Center X	Input.PixelCountSelection2.Region[N].Center.X			260.000	16382.000	-16382.000	5	3	✓
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Center Y	Input.PixelCountSelection2.Region[N].Center.Y			240.000	16382.000	-16382.000	5	3	✓
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Rotation Angle	Input.PixelCountSelection2.Region[N].Angle			0.000	359.999	0.000	3	3	✓
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Radius 1	Input.PixelCountSelection2.Region[N].Radius1			120	9600	0	4	0	✓
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Radius 2	Input.PixelCountSelection2.Region[N].Radius2			120	9600	0	4	0	✓
	Detection Target Selection Condition 2: Region N: Mask	Input.PixelCountSelection2.Region[N].Mask			False	-	-			-
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Starting Angle	Input.PixelCountSelection2.Region[N].StartingAngle			*	359.9	0.00	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Target Selection Conditions	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Ending Angle	Input.PixelCountSelection2.Region[N].EndAngle			*	359.900	0.000	3	3	✓
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Number of Vertices	Input.PixelCountSelection2.Region[N].NodeCount			0.000	100.000	0.000	3	0	✓
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Position X	Input.PixelCountSelection2.Region[N].Node[N].Position.X			*	16383.000	-16383.000	5	3	✓
	Detection Target Selection Condition 2: Region N: (Various Region Parameters) Position Y	Input.PixelCountSelection2.Region[N].Node[N].Position.Y			*	16383.000	-16383.000	5	3	✓
	Detection Target Selection Condition 2: Feature Extraction Settings	Input.PixelCountSelection2.ExtractionMode	Link with Current Feature	0	Link with Current Feature	-	-			-
			Specified Value	1						
	Detection Target Selection Condition 2: Feature Intensity Lower Limit	Input.PixelCountSelection2.MinimumIntensity			10	255	1	3	0	✓
	Detection Target Selection Condition 2: Feature Pixel Count (Numeric Input Box)	Input.PixelCountSelection2.PixelCount			0	999999	0	6	0	✓
	Detection Target Selection Condition 2: Feature Pixel Count (Drop-down Menu)	Input.PixelCountSelection2.RatioMode	Or More are Retained	0	Or More are Retained	-	-			✓
			Or Fewer are Retained	1						
Adjacent Processing	Minimum Distance	Input.AdjacentProcessing.MinimumDistance			30	999	0	3	0	✓
	Angle Range (+/-)	Input.AdjacentProcessing.Angle			180	180	0	3	0	✓
	Starting Angle	Input.AdjacentProcessing.StartingAngle	0°	0	0°	-	-			✓
			0/180°	1						
			0/120/240°	2						
			0/90/180/270°	3						
	Minimum Scale (%) (+/-)	Input.AdjacentProcessing.MinimumScale			10	100	0	3	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Options	Detection Order	Input.Order	X: Ascending	0	Match %: Descending	-	-	-	-	✓
			X: Descending	1						
			Y: Ascending	2						
			Y: Descending	3						
			Match %: Ascending	4						
			Match %: Descending	5						
			Feature Pixel Count 1: Ascending	6						
			Feature Pixel Count 1: Descending	7						
			Feature Pixel Count 2: Ascending	8						
			Feature Pixel Count 2: Descending	9						
			Clockwise	10						
			Counterclockwise	11						
			Scale: Ascending	12						
			Scale: Descending	13						
			Scale Disjunction: Ascending	14						
			Scale Disjunction: Descending	15						
			From Upper Left (Left to Right)	16						
			From Upper Left (Downward)	17						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Options	Detection Order	Input.Order	From Upper Right (Right to Left)	18	Match %: Descending	-	-	-	-	✓
			From Upper Right (Downward)	19						
			From Lower Left (Left to Right)	20						
			From Lower Left (Upward)	21						
			From Lower Right (Right to Left)	22						
			From Lower Right (Upward)	23						
	Starting Angle	Input.StartingAngle			0.000	359.999	0.000	3	3	✓
	Grouping Method	Input.GroupingMethod	Pattern Length (Long Side)	0	Pattern Length (Long Side)	-	-	-	-	✓
			Pattern Length (XY)	1						
			User Specified	2						
	Grouping Range (pixel)	Input.GroupingRange			20	9999	1	4	0	✓
	Judged Label	Input.PrimaryTarget			0	1999	0	4	0	-
	Timeout (sec)	Input.TimeoutTime			5.0	60.0	0.5	2	1	-
Detailed Settings	Detection Point Reference Selection	Input.DetectionPoint.Mode	Specified Point	0	Specified Point					-
			Center of Gravity	1						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Feature Extraction Conditions	Display Feature	Input.DisplayFeature	Coarse	0	Coarse	-	-	-	-	-
			Fine	1						
	Feature Extraction Settings	Input.FeatureExtraction	Auto	0	Auto	-	-	-	-	-
			Automatic (Low Contrast)	1						
			Custom	2						
	Search Sensitivity	Input.Sensitivity	Fast	0	Standard	-	-	-	-	-
			Standard	1						
			Detailed	2						
			Custom	3						
	Registered Feature Intensity Lower Limit (Coarse Feat.)	Input.CoarseFeature.Registered.MinimumIntensity			30	255	1	3	0	✓
	Current Feature Intensity Lower Limit (Coarse Feat.)	Input.CoarseFeature.Current.MinimumIntensity			30	255	1	3	0	✓
	Coarse Search Image Reduction	Input.CoarseFeature.ImageReduction			4	10	0	2	0	✓
	Coarse Search Feature Reduction	Input.CoarseFeature.FeatureReduction			4	10	0	2	0	✓
	Registered Feature Intensity Lower Limit (Fine Feat.)	Input.FineFeature.Registered.MinimumIntensity			30	255	1	3	0	✓
	Current Feature Intensity Lower Limit (Fine Feat.)	Input.FineFeature.Current.MinimumIntensity			30	255	1	3	0	✓
	Fine Search Image Reduction	Input.FineFeature.ImageReduction			0	4	0	1	0	✓
	Feature Densification	Input.FeatureDensification	None	0	Automatic	-	-	-	-	✓
			Low	1						
			Medium	2						
			High	3						
			Automatic	4						
	Large Area Search Mode	Input.LargeAreaSearchMode.Enable			False	-	-	-	-	-
Reference Position	Reference Position X	Input.BasePosition.ReferencePoint.X			0.000	16383.000	-16383.000	5	3	-
	Reference Position Y	Input.BasePosition.ReferencePoint.Y			0.000	16383.000	-16383.000	5	3	-
	Starting Angle	Input.BasePosition.ReferencePoint.Angle			0.000	359.999	0.000	3	3	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Count: Upper Limit Enabled	Input.Limit.Count.Max.Enable			False	-	-	-	-	-
	Count: Upper Limit	Input.Limit.Count.Max			Current Value	9999	0	4	0	✓
	Count: Lower Limit Enabled	Input.Limit.Count.Min.Enable			False	-	-	-	-	-
	Count: Lower Limit	Input.Limit.Count.Min			Current Value	9999	0	4	0	✓
	Position X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Position X: Upper Limit	Input.Limit.Position.X.Max			Current Value	99999.999	-99999.999	5	3	✓
	Position X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Position X: Lower Limit	Input.Limit.Position.X.Min			Current Value	99999.999	-99999.999	5	3	✓
	Position Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Position Y: Upper Limit	Input.Limit.Position.Y.Max			Current Value	99999.999	-99999.999	5	3	✓
	Position Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-
	Position Y: Lower Limit	Input.Limit.Position.Y.Min			Current Value	99999.999	-99999.999	5	3	✓
	Angle: Upper Limit Enabled	Input.Limit.Position.Angle.Max.Enable			False	-	-	-	-	-
	Angle: Upper Limit	Input.Limit.Position.Angle.Max			Current Value	180.000	-180.000	3	3	✓
	Angle: Lower Limit Enabled	Input.Limit.Position.Angle.Min.Enable			False	-	-	-	-	-
	Angle: Lower Limit	Input.Limit.Position.Angle.Min			Current Value	180.000	-180.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Match %: Upper Limit Enabled	Input.Limit.Match.Max.Enable			False	-	-	-	-	-
	Match %: Upper Limit	Input.Limit.Match.Max			Current Value	99.999	0.000	2	3	✓
	Match %: Lower Limit Enabled	Input.Limit.Match.Min.Enable			False	-	-	-	-	-
	Match %: Lower Limit	Input.Limit.Match.Min			Current Value	99.999	0.000	2	3	✓
	Scale: Upper Limit Enabled	Input.Limit.Scale.Max.Enable			False	-	-	-	-	-
	Scale: Upper Limit	Input.Limit.Scale.Max			Current Value	9.999	0.000	1	3	✓
	Scale: Lower Limit Enabled	Input.Limit.Scale.Min.Enable			False	-	-	-	-	-
	Scale: Lower Limit	Input.Limit.Scale.Min			Current Value	9.999	0.000	1	3	✓
	Feature Pixel Count 1: Upper Limit Enabled	Input.Limit.FeaturePixelCount1.Max.Enable			False	-	-	-	-	-
	Feature Pixel Count 1: Upper Limit	Input.Limit.FeaturePixelCount1.Max			Current Value	999999	0	6	0	✓
	Feature Pixel Count 1: Lower Limit Enabled	Input.Limit.FeaturePixelCount1.Min.Enable			False	-	-	-	-	-
	Feature Pixel Count 1: Lower Limit	Input.Limit.FeaturePixelCount1.Min			Current Value	999999	0	6	0	✓
	Feature Pixel Count 2: Upper Limit Enabled	Input.Limit.FeaturePixelCount2.Max.Enable			False	-	-	-	-	-
	Feature Pixel Count 2: Upper Limit	Input.Limit.FeaturePixelCount2.Max			Current Value	999999	0	6	0	✓
	Feature Pixel Count 2: Lower Limit Enabled	Input.Limit.FeaturePixelCount2.Min.Enable			False	-	-	-	-	-
	Feature Pixel Count 2: Lower Limit	Input.Limit.FeaturePixelCount2.Min			Current Value	999999	0	6	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Search Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Search Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Search Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Search Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Search Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Search Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Search Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Search Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Search Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Search Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red				255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Detected Position: Detected Position Shape	Input.Graphic.PrimaryTarget.Shape	L-shaped Arrow	0	L-shaped Arrow	-	-	-	-	-
			Circle	1						
	Detected Position:Size	Input.Graphic.PrimaryTarget.Size			16	1024	4	4	0	-
	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Result Display	Display Label Number: Enabled	Input.Graphic.PrimaryTarget.Index.Visible			True	-	-	-	-	-
	Display Match %: Enabled	Input.Graphic.PrimaryTarget.Match.Visible			True	-	-	-	-	-
	Display Position X: Enabled	Input.Graphic.PrimaryTarget.Position.X.Visible			False	-	-	-	-	-
	Display Position Y: Enabled	Input.Graphic.PrimaryTarget.Position.Y.Visible			False	-	-	-	-	-
	Angle: Enabled	Input.Graphic.PrimaryTarget.Position.Angle.Visible			False	-	-	-	-	-
	Pattern Scale: Enabled	Input.Graphic.PrimaryTarget.Scale.Visible			False	-	-	-	-	-
	Display Feature Pixel Count 1: Enabled	Input.Graphic.PrimaryTarget.FeaturePixel.Count1.Visible			False	-	-	-	-	-
	Display Feature Pixel Count 2: Enabled	Input.Graphic.PrimaryTarget.FeaturePixel.Count2.Visible			False	-	-	-	-	-
	Font: Size	Input.Graphic.PrimaryTarget.Font.Size			12	256	6	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Feature Point Display	Pattern Region Display: Enabled	Input.Graphic.PrimaryTarget.PatternRegion.Visible			True	-	-	-	-	-
	Specify Registered Feature Display	Input.Graphic.PrimaryTarget.DisplayFeature	OFF	0	Fine Feature			-	-	-
			Fine Feature	1						
			Coarse Feature	2						
	Rotation Feature Region Display: Enabled	Input.Graphic.PrimaryTarget.RotationFeatureRegion.Visible			True	-	-	-	-	-
	Detection Target Selection Region 1 Display: Enabled	Input.Graphic.PrimaryTarget.SelectionCondition1.Visible			True	-	-	-	-	-
	Detection Target Selection Region 2 Display: Enabled	Input.Graphic.PrimaryTarget.SelectionCondition2.Visible			True	-	-	-	-	-
Rotation Feature Region	Rotation Feature Region Display: Line Thickness	Input.Graphic.PrimaryTarget.RotationFeatureRegion.StrokeWidth			1	64	1	2	0	-
	Rotation Feature Region Display: Pass Color: Enabled	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorPass.Visible			True	-	-	-	-	-
	Rotation Feature Region Display: Pass Color: Red	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorPass.Red			255	255	0	3	0	-
	Rotation Feature Region Display: Pass Color: Green	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorPass.Green			255	255	0	3	0	-
	Rotation Feature Region Display: Pass Color: Blue	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorPass.Blue			0	255	0	3	0	-
	Rotation Feature Region Display: Fail Color: Enabled	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorFail.Visible			True	-	-	-	-	-
	Rotation Feature Region Display: Fail Color: Red	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorFail.Red			255	255	0	3	0	-
	Rotation Feature Region Display: Fail Color: Green	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorFail.Green			255	255	0	3	0	-
	Rotation Feature Region Display: Fail Color: Blue	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorFail.Blue			0	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Target Selection Region	Detection Target Selection Conditions 1: Line Thickness	Input.Graphic.PrimaryTarget.SelectionCondition1.StrokeWidth			1	64	1	2	0	-
	Detection Target Selection Conditions 1: Pass Color: Enabled	Input.Graphic.PrimaryTarget.SelectionCondition1.Color.Visible			True	-	-	-	-	-
	Detection Target Selection Conditions 1: Pass Color: Red	Input.Graphic.PrimaryTarget.SelectionCondition1.Color.Red			45	255	0	3	0	-
	Detection Target Selection Conditions 1: Pass Color: Green	Input.Graphic.PrimaryTarget.SelectionCondition1.Color.Green			3	255	0	3	0	-
	Detection Target Selection Conditions 1: Pass Color: Blue	Input.Graphic.PrimaryTarget.SelectionCondition1.Color.Blue				255	0	3	0	-
	Detection Target Selection Conditions 2: Line Thickness	Input.Graphic.PrimaryTarget.SelectionCondition2.StrokeWidth			1	64	1	2	0	-
	Detection Target Selection Conditions 2: Fail Color: Enabled	Input.Graphic.PrimaryTarget.SelectionCondition2.Color.Visible						-	-	-
	Detection Target Selection Conditions 2: Fail Color: Red	Input.Graphic.PrimaryTarget.SelectionCondition2.Color.Red			245	255	0	3	0	-
	Detection Target Selection Conditions 2: Fail Color: Green	Input.Graphic.PrimaryTarget.SelectionCondition2.Color.Green			63	255	0	3	0	-
	Detection Target Selection Conditions 2: Fail Color: Blue	Input.Graphic.PrimaryTarget.SelectionCondition2.Color.Blue			8	255	0	3	0	-
	Detected Position (Excluding Judged Label): Enabled	Input.Graphic.ArrayTarget.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Target Selection Region	Detected Position (Excluding Judged Label): Detected Position Shape	Input.Graphic.ArrayTarget.Shape	L-shaped Arrow	0	L-shaped Arrow	-	-	-	-	-
			Circle	1						
	Detected Position (Excluding Judged Label):Size	Input.Graphic.ArrayTarget.Size			16	1024	4	4	0	-
	Detected Position (Excluding Judged Label): Line Thickness	Input.Graphic.ArrayTarget.StrokeWidth			1	64	1	2	0	-
	Detected Position (Excluding Judged Label): Pass Color: Enabled	Input.Graphic.ArrayTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Pass Color: Red	Input.Graphic.ArrayTarget.ColorPass.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Green	Input.Graphic.ArrayTarget.ColorPass.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Blue	Input.Graphic.ArrayTarget.ColorPass.Blue			14	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Enabled	Input.Graphic.ArrayTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Fail Color: Red	Input.Graphic.ArrayTarget.ColorFail.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Green	Input.Graphic.ArrayTarget.ColorFail.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Blue	Input.Graphic.ArrayTarget.ColorFail.Blue			14	255	0	3	0	-

Edge Position

#O020

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Scan Direction	Input.ScanDirection	→	0	Forward (Inspection region is a rectangle) → (Inspection region is a circle or oval) Clockwise (Inspection region is a ring or arc)	-	-	-	-	✓
			←	1						
			↑	2						
			↓	3						
			Forward	4						
			Reverse	5						
			Clockwise	6						
			Counterclockwise	7						
	Edge Direction	Input.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Starting Angle	Input.StartingAngle			0.000	359.999	0.000	3	3	✓
	Edge Sensitivity (%)	Input.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width	Input.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit	Input.Intensity.Max			255.000	255.000	0.000	3	3	✓
	Edge Intensity Lower Limit	Input.Intensity.Min			5.000	255.000	0.000	3	3	✓
	Judged Label	Input.PrimaryTarget			0	3599	0	4	0	✓
	Maximum Edge Count	Input.Count			1	3600	1	4	0	✓
	Angled Edge Detection	Input.AngledEdgeDetection			False	-	-	-	-	✓
Judgment Conditions	Number of Detected Edges: Upper Limit Enabled	Input.Limit.Count.Max.Enable			False					✓
	Number of Detected Edges: Upper Limit	Input.Limit.Count.Max			Current Value	9999	0	4	0	✓
	Number of Detected Edges: Lower Limit Enabled	Input.Limit.Count.Min.Enable			False					✓
	Number of Detected Edges: Lower Limit	Input.Limit.Count.Min			Current Value	9999	0	4	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Position X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False					✓
	Position X: Upper Limit	Input.Limit.Position.X.Max			Current Value	99999.999	-99999.999	5	3	✓
	Position X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False					✓
	Position X: Lower Limit	Input.Limit.Position.X.Min			Current Value	99999.999	-99999.999	5	3	✓
	Position Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False					✓
	Position Y: Upper Limit	Input.Limit.Position.Y.Max			Current Value	99999.999	-99999.999	5	3	✓
	Position Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False					✓
	Position Y: Lower Limit	Input.Limit.Position.Y.Min			Current Value	99999.999	-99999.999	5	3	✓
	Angle: Upper Limit Enabled	Input.Limit.Position.Angle.Max.Enable			False					✓
	Angle: Upper Limit	Input.Limit.Position.Angle.Max			Current Value	360.000	0.000	3	3	✓
	Angle: Lower Limit Enabled	Input.Limit.Position.Angle.Min.Enable			False					✓
	Angle: Lower Limit	Input.Limit.Position.Angle.Min			Current Value	360.000	0.000	3	3	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Shape of Detected Position	Input.Graphic.PrimaryTarget.Shape	Cross	0	Bar	-	-	-	-	-
			Circle	1						
			Bar	2						
	Size of Detected Position	Input.Graphic.PrimaryTarget.Size			16	1024	4	4	0	-
	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
Display Settings	Detected Position: Display Label Number: Enabled	Input.Graphic.PrimaryTarget.Index.Visible			True	-	-	-	-	-
	Detected Position: Display Position X: Enabled	Input.Graphic.PrimaryTarget.Position.X.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
	Detected Position: Display Position Y: Enabled	Input.Graphic.PrimaryTarget.Position.Y.Visible			True	-	-	-	-	-
	Detected Position: Display Angle: Enabled	Input.Graphic.PrimaryTarget.Position.Angle.Visible			True	-	-	-	-	-
	Detected Position: Font: Size	Input.Graphic.PrimaryTarget.Font.Size			12	256	6	3	0	-
	Detected Position (Excluding Judged Label): Enabled	Input.Graphic.ArrayTarget.Visible			True	-	-	-	-	-
	Shape of Detected Position (Excluding Judged Label)	Input.Graphic.ArrayTarget.Shape	Cross	0	Bar	-	-	-	-	-
			Circle	1						
			Bar	2						
	Size of Detected Position (Excluding Judged Label)	Input.Graphic.ArrayTarget.Size			16	1024	4	4	0	-
	Detected Position (Excluding Judged Label): Line Thickness	Input.Graphic.ArrayTarget.StrokeWidth			1	64	1	2	0	-
	Detected Position (Excluding Judged Label): Pass Color: Enabled	Input.Graphic.ArrayTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Pass Color: Red	Input.Graphic.ArrayTarget.ColorPass.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Green	Input.Graphic.ArrayTarget.ColorPass.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Blue	Input.Graphic.ArrayTarget.ColorPass.Blue			14	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Enabled	Input.Graphic.ArrayTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Fail Color: Red	Input.Graphic.ArrayTarget.ColorFail.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Green	Input.Graphic.ArrayTarget.ColorFail.Green			182	255	0	3	0	-
Display Settings	Detected Position (Excluding Judged Label): Fail Color: Blue	Input.Graphic.ArrayTarget.ColorFail.Blue			14	255	0	3	0	-

Edge Width

#O021

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Select Mode	Input.Mode	Outer Gap	1	Outer Gap	-	-	-	-	✓
			Inner Gap	2						
			1st/2nd Edges	5						
			Specified Edge	6						
	Scan Direction (1st Scan)	Input.Scan1.ScanDirection	→	0	Forward	-	-	-	-	✓
			←	1						
			↑	2						
			↓	3						
			Forward	4						
			Reverse	5						
			Clockwise	6						
			Counterclockwise	7						
	Edge Direction (1st Scan)	Input.Scan1.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Starting Angle (1st Scan)	Input.Scan1.StartingAngle			0.000	359.999	0.000	3	3	✓
	Specified Edge (1st Scan)	Input.Scan1.SpecifiedEdge			0	3599	-3600	4	0	✓
	Edge Sensitivity (%) (1st Scan)	Input.Scan1.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width (1st Scan)	Input.Scan1.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit (1st Scan)	Input.Scan1.Intensity.Max			255.000	255.000	0.000	3	3	✓
	Edge Intensity Lower Limit (1st Scan)	Input.Scan1.Intensity.Min			5.000	255.000	0.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Scan Direction (2nd Scan)	Input.Scan2.ScanDirection	→	0	Forward	-	-	-	-	✓
			←	1						
			↑	2						
			↓	3						
			Forward	4						
			Reverse	5						
			Clockwise	6						
			Counterclockwise	7						
	Edge Direction (2nd Scan)	Input.Scan2.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Starting Angle (2nd Scan)	Input.Scan2.StartingAngle			0.000	359.999	0.000	3	3	✓
	Specified Edge (2nd Scan)	Input.Scan2.SpecifiedEdge			0	3599	-3600	4	0	✓
	Edge Sensitivity (%) (2nd Scan)	Input.Scan2.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width (2nd Scan)	Input.Scan2.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit (2nd Scan)	Input.Scan2.Intensity.Max			255.000	255.000	0.000	3	3	✓
	Edge Intensity Lower Limit (2nd Scan)	Input.Scan2.Intensity.Min			5.000	255.000	0.000	3	3	✓
	Specified Edge 1	Input.SpecifiedEdge1			0	3599	-3600	4	0	✓
	Specified Edge 2	Input.SpecifiedEdge2			-1	3599	-3600	4	0	✓
	Angled Edge Detection	Input.AngledEdgeDetection			False	-	-	-	-	✓
Judgment Conditions	Edge Width: Upper Limit Enabled	Input.Limit.Width.Max.Enable			False	-	-	-	-	-
	Edge Width: Upper Limit	Input.Limit.Width.Max			Current Value	99999.999	0.000	5	3	✓
	Edge Width: Lower Limit Enabled	Input.Limit.Width.Min.Enable			False	-	-	-	-	-
	Edge Width: Lower Limit	Input.Limit.Width.Min			Current Value	99999.999	0.000	5	3	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Size of Detected Position	Input.Graphic.PrimaryTarget.Size			16	1024	4	4	0	-
	Shape of Detected Position	Input.Graphic.PrimaryTarget.Shape	Cross		Bar			-	-	-
			Circle							
			Bar							
	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Dimension Line (Pitch): Enabled	Input.Graphic.DimensionLine.Visible			True	-	-	-	-	-
	Dimension Line (Pitch): Line Thickness	Input.Graphic.DimensionLine.StrokeWidth			2	64	1	2	0	-
	Dimension Line (Pitch): Pass Color: Enabled	Input.Graphic.DimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Dimension Line (Pitch): Pass Color: Red	Input.Graphic.DimensionLine.ColorPass.Red			135	255	0	3	0	-
	Dimension Line (Pitch): Pass Color: Green	Input.Graphic.DimensionLine.ColorPass.Green			187	255	0	3	0	-
	Dimension Line (Pitch): Pass Color: Blue	Input.Graphic.DimensionLine.ColorPass.Blue			12	255	0	3	0	-
	Dimension Line (Pitch): Fail Color: Enabled	Input.Graphic.DimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Dimension Line (Pitch): Fail Color: Enabled Red	Input.Graphic.DimensionLine.ColorFail.Red			135	255	0	3	0	-
	Dimension Line (Pitch): Fail Color: Enabled Green	Input.Graphic.DimensionLine.ColorFail.Green			187	255	0	3	0	-
	Dimension Line (Pitch): Fail Color: Enabled Blue	Input.Graphic.DimensionLine.ColorFail.Blue			12	255	0	3	0	-

Edge Pitch

#O022

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Select Mode	Input.Mode	Gap Pitch	7	Center Pitch	-	-	-	-	-
			Center Pitch	8						
	Scan Direction	Input.ScanDirection	→	0	Forward	-	-	-	-	✓
			←	1						
			↑	2						
			↓	3						
			Forward	4						
			Reverse	5						
			Clockwise	6						
			Counterclockwise	7						
	Edge Direction	Input.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	First Edge	Input.StartingEdgeNumber	None	1	None	-	-	-	-	-
			Bright to Dark	2						
			Dark to Bright	3						
	Starting Angle	Input.StartingAngle			0.000	359.999	0.000	3	3	✓
	Edge Sensitivity (%)	Input.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width	Input.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit	Input.Intensity.Max			255.000	255.000	0.000	3	3	✓
	Edge Intensity Lower Limit	Input.Intensity.Min			5.000	255.000	0.000	3	3	✓
	Maximum Pitch Count	Input.Count			30	1800	1	4	0	✓
	Angled Edge Detection	Input.AngledEdgeDetection	False	1	False					✓
			True	2						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Pitch Count: Upper Limit Enabled	Input.Limit.Count.Max.Enable			False	-	-	-	-	-
	Pitch Count: Upper Limit	Input.Limit.Count.Max			Current Value	9999	0	4	0	✓
	Pitch Count: Lower Limit Enabled	Input.Limit.Count.Min.Enable			False	-	-	-	-	-
	Pitch Count: Lower Limit	Input.Limit.Count.Min			Current Value	9999	0	4	0	✓
	Pitch: Upper Limit Enabled	Input.Limit.Width.Max.Enable			False	-	-	-	-	-
	Pitch: Upper Limit	Input.Limit.Width.Max			Current Value	99999.999	0.000	5	3	✓
	Pitch: Lower Limit Enabled	Input.Limit.Width.Min.Enable			False	-	-	-	-	-
	Pitch: Lower Limit	Input.Limit.Width.Min			Current Value	99999.999	0.000	5	3	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Detected Position: Size	Input.Graphic.PrimaryTarget.Size			16	1024	4	4	0	-
	Detected Position: Shape	Input.Graphic.PrimaryTarget.Shape	Cross	0	Bar	-	-	-	-	-
			Circle	1						
			Bar	2						
	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Dimension Line (Pitch): Enabled	Input.Graphic.DimensionLine.Visible			True	-	-	-	-	-
	Dimension Line (Pitch): Line Thickness	Input.Graphic.DimensionLine.StrokeWidth			2	64	1	2	0	-
	Dimension Line (Pitch): Pass Color: Enabled	Input.Graphic.DimensionLine.ColorPass.Visible			True	-	-	-	-	-
Display Settings	Dimension Line (Pitch): Pass Color: Red	Input.Graphic.DimensionLine.ColorPass.Red			135	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
	Dimension Line (Pitch): Pass Color: Green	Input.Graphic.DimensionLine.ColorPass.Green			187	255	0	3	0	-
	Dimension Line (Pitch): Pass Color: Blue	Input.Graphic.DimensionLine.ColorPass.Blue			12	255	0	3	0	-
	Dimension Line (Pitch): Fail Color: Enabled	Input.Graphic.DimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Dimension Line (Pitch): Fail Color: Red	Input.Graphic.DimensionLine.ColorFail.Red			135	255	0	3	0	-
	Dimension Line (Pitch): Fail Color: Green	Input.Graphic.DimensionLine.ColorFail.Green			187	255	0	3	0	-
	Dimension Line (Pitch): Fail Color: Blue	Input.Graphic.DimensionLine.ColorFail.Blue			12	255	0	3	0	-

Edge Pairs

#O023

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Select Mode	Input.Mode	Gap Pitch	0	Gap Pitch	-	-	-	-	-
			Center Pitch	1						
	Scan Direction (1st Scan)	Input.Scan1.ScanDirection	→	0	Forward	-	-	-	-	✓
			←	1						
			↑	2						
			↓	3						
			Forward	4						
			Reverse	5						
			Clockwise	6						
			Counterclockwise	7						
	Edge Direction (1st Scan)	Input.Scan1.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Starting Angle (1st Scan)	Input.Scan1.StartingAngle			0.000	359.999	0.000	3	3	✓
	Skip Edges (1st Scan)	Input.Scan1.Skip			0	3600	0	4	0	✓
	Edge Sensitivity (%) (1st Scan)	Input.Scan1.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width (1st Scan)	Input.Scan1.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit (1st Scan)	Input.Scan1.Intensity.Max			255.000	255.000	0.000	3	3	✓
	Edge Intensity Lower Limit (1st Scan)	Input.Scan1.Intensity.Min			5.000	255.000	0.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Scan Direction (2nd Scan)	Input.Scan2.ScanDirection	→	0	Forward	-	-	-	-	✓
			←	1						
			↑	2						
			↓	3						
			Forward	4						
			Reverse	5						
			Clockwise	6						
			Counterclockwise	7						
	Edge Direction (2nd Scan)	Input.Scan2.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Starting Angle (2nd Scan)	Input.Scan2.StartingAngle			0.000	359.999	0.000	3	3	✓
	Skip Edges (2nd Scan)	Input.Scan2.Skip			0	3600	0	4	0	✓
	Edge Sensitivity (%) (2nd Scan)	Input.Scan2.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width (2nd Scan)	Input.Scan2.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit (2nd Scan)	Input.Scan2.Intensity.Max			255.000	255.000	0.000	3	3	✓
	Edge Intensity Lower Limit (2nd Scan)	Input.Scan2.Intensity.Min			5.000	255.000	0.000	3	3	✓
	Gap Pitch Upper Limit	Input.PairPitch.Max			99999.999	99999.999	0.000	5	3	✓
	Gap Pitch Lower Limit	Input.PairPitch.Min			5.000	99999.999	0.000	5	3	✓
	Judged Label Type	Input.PrimaryTargetType	All	0	All	-	-	-	-	-
			Specify	1						
	Maximum Pair Count	Input.Count.Max			30	3600	1	4	0	✓
	Angled Edge Detection	Input.AngledEdgeDetection			False	-	-	-	-	✓
Judgment Conditions	Pair Count: Upper Limit Enabled	Input.Limit.Count.Max.Enable			False	-	-	-	-	-
	Pair Count: Upper Limit	Input.Limit.Count.Max			Current Value	9999	0	4	0	✓
	Pair Count: Lower Limit Enabled	Input.Limit.Count.Min.Enable			False	-	-	-	-	-
	Pair Count: Lower Limit	Input.Limit.Count.Min			Current Value	9999	0	4	0	✓
	Pair Width: Upper Limit Enabled	Input.Limit.Width.Max.Enable			False	-	-	-	-	-
	Pair Width: Upper Limit	Input.Limit.Width.Max			99999.999	99999.999	0.000	5	3	✓
	Pair Width: Lower Limit Enabled	Input.Limit.Width.Min.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Pair Width: Lower Limit	Input.Limit.Width.Min			0.000	99999.999	0.000	5	3	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Detected Position: Shape	Input.Graphic.PrimaryTarget.Shape	Cross	0	Bar	-	-	-	-	-
			Circle	1						
			Bar	2						
	Detected Position: Size	Input.Graphic.PrimaryTarget.Size			16	1024	4	4	0	-
	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Detected Position (Excluding Judged Label): Enabled	Input.Graphic.ArrayTarget.Visible			False	-	-	-	-	-
	Detected Position (Excluding Judged Label): Shape	Input.Graphic.ArrayTarget.Shape	Cross	0	Bar	-	-	-	-	-
			Circle	1						
			Bar	2						
	Detected Position (Excluding Judged Label): Size	Input.Graphic.ArrayTarget.Size			16	1024	4	4	0	-
	Detected Position (Excluding Judged Label): Line Thickness	Input.Graphic.ArrayTarget.StrokeWidth			1	64	1	2	0	-
	Detected Position (Excluding Judged Label): Pass Color: Enabled	Input.Graphic.ArrayTarget.ColorPass.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position (Excluding Judged Label): Pass Color: Red	Input.Graphic.ArrayTarget.ColorPass.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Green	Input.Graphic.ArrayTarget.ColorPass.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Blue	Input.Graphic.ArrayTarget.ColorPass.Blue			14	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Enabled	Input.Graphic.ArrayTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Fail Color: Red	Input.Graphic.ArrayTarget.ColorFail.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Green	Input.Graphic.ArrayTarget.ColorFail.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Blue	Input.Graphic.ArrayTarget.ColorFail.Blue			14	255	0	3	0	-
	1st Scan Detected Position (Excluding Judged Label): Enabled	Input.Graphic.FirstScanTarget.Visible			True	-	-	-	-	-
	1st Scan Detected Position (Excluding Judged Label): Shape	Input.Graphic.FirstScanTarget.Shape	Cross		Bar	-	-	-	-	-
			Circle							
			Bar							
	1st Scan Detected Position (Excluding Judged Label): Size	Input.Graphic.FirstScanTarget.Size			16	1024	4	4	0	-
	1st Scan Detected Position (Excluding Judged Label): Line Thickness	Input.Graphic.FirstScanTarget.StrokeWidth			1	64	1	2	0	-
	1st Scan Detected Position (Excluding Judged Label): Pass Color: Enabled	Input.Graphic.FirstScanTarget.ColorPass.Visible			True	-	-	-	-	-
	1st Scan Detected Position (Excluding Judged Label): Pass Color: Red	Input.Graphic.FirstScanTarget.ColorPass.Red			179	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	1st Scan Detected Position (Excluding Judged Label): Pass Color: Green	Input.Graphic.FirstScanTarget.ColorPass.Green			36	255	0	3	0	-
	1st Scan Detected Position (Excluding Judged Label): Pass Color: Blue	Input.Graphic.FirstScanTarget.ColorPass.Blue			94	255	0	3	0	-
	1st Scan Detected Position (Excluding Judged Label): Fail Color: Enabled	Input.Graphic.FirstScanTarget.ColorFail.Visible			True	-	-	-	-	-
	1st Scan Detected Position (Excluding Judged Label): Fail Color: Red	Input.Graphic.FirstScanTarget.ColorFail.Red			179	255	0	3	0	-
	1st Scan Detected Position (Excluding Judged Label): Fail Color: Green	Input.Graphic.FirstScanTarget.ColorFail.Green			36	255	0	3	0	-
	1st Scan Detected Position (Excluding Judged Label): Fail Color: Blue	Input.Graphic.FirstScanTarget.ColorFail.Blue			94	255	0	3	0	-
	2nd Scan Detected Position (Excluding Judged Label): Enabled	Input.Graphic.SecondScanTarget.Visible			True	-	-	-	-	-
	2nd Scan Detected Position (Excluding Judged Label): Shape	Input.Graphic.SecondScanTarget.Shape	Cross		Bar	-	-	-	-	-
			Circle							
			Bar							
	2nd Scan Detected Position (Excluding Judged Label): Size	Input.Graphic.SecondScanTarget.Size			16	1024	4	4	0	-
	2nd Scan Detected Position (Excluding Judged Label): Line Thickness	Input.Graphic.SecondScanTarget.StrokeWidth			1	64	1	2	0	-
	2nd Scan Detected Position (Excluding Judged Label): Pass Color: Enabled	Input.Graphic.SecondScanTarget.ColorPass.Visible			True	-	-	-	-	-
	2nd Scan Detected Position (Excluding Judged Label): Pass Color: Red	Input.Graphic.SecondScanTarget.ColorPass.Red			9	255	0	3	0	-
	2nd Scan Detected Position (Excluding Judged Label): Pass Color: Green	Input.Graphic.SecondScanTarget.ColorPass.Green			139	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	2nd Scan Detected Position (Excluding Judged Label): Pass Color: Blue	Input.Graphic.SecondScanTarget.ColorPass.Blue			126	255	0	3	0	-
	2nd Scan Detected Position (Excluding Judged Label): Fail Color: Enabled	Input.Graphic.SecondScanTarget.ColorFail.Visible			True	-	-	-	-	-
	2nd Scan Detected Position (Excluding Judged Label): Fail Color: Red	Input.Graphic.SecondScanTarget.ColorFail.Red			9	255	0	3	0	-
	2nd Scan Detected Position (Excluding Judged Label): Fail Color: Green	Input.Graphic.SecondScanTarget.ColorFail.Green			139	255	0	3	0	-
	2nd Scan Detected Position (Excluding Judged Label): Fail Color: Blue	Input.Graphic.SecondScanTarget.ColorFail.Blue			126	255	0	3	0	-
	Dimension Line (Pitch): Enabled	Input.Graphic.DimensionLine.Visible			True	-	-	-	-	-
	Dimension Line (Pitch): Line Thickness	Input.Graphic.DimensionLine.StrokeWidth			1	64	1	2	0	-
	Dimension Line (Pitch): Pass Color: Enabled	Input.Graphic.DimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Dimension Line (Pitch): Pass Color: Red	Input.Graphic.DimensionLine.ColorPass.Red			135	255	0	3	0	-
	Dimension Line (Pitch): Pass Color: Green	Input.Graphic.DimensionLine.ColorPass.Green			187	255	0	3	0	-
	Dimension Line (Pitch): Pass Color: Blue	Input.Graphic.DimensionLine.ColorPass.Blue			12	255	0	3	0	-
	Dimension Line (Pitch): Fail Color: Enabled	Input.Graphic.DimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Dimension Line (Pitch): Fail Color: Red	Input.Graphic.DimensionLine.ColorFail.Red			135	255	0	3	0	-
	Dimension Line (Pitch): Fail Color: Green	Input.Graphic.DimensionLine.ColorFail.Green			187	255	0	3	0	-
	Dimension Line (Pitch): Fail Color: Blue	Input.Graphic.DimensionLine.ColorFail.Blue			12	255	0	3	0	-

Profile Position

#O024

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Trend Direction	Input.TrendDirection	↓ (Inspection region: Rectangle)	0	↓	-	-	-	-	-
			Clockwise (Inspection region: Ring/ Arc)	2	Clockwise	-	-	-	-	-
	Scan Direction	Input.ScanDirection	Forward (Inspection region: Rectangle)	4	Forward	-	-	-	-	✓
			Reverse (Inspection region: Rectangle)	5						
			Center to Outer (Inspection region: Ring/ Arc)	6	Center to Outer	-	-	-	-	✓
			Outer to Center (Inspection region: Ring/ Arc)	7						
	Edge Direction	Input.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Specified Edge	Input.SpecifiedEdge			0	3599	-3600	4	0	✓
	Edge Sensitivity (%)	Input.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width	Input.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit	Input.Intensity.Max			255.000	255.000	0.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Edge Intensity Lower Limit	Input.Intensity.Min			5.000	255.000	0.000	3	3	✓
	Segment Size	Input.SegmentSize			10 (Inspection region: Rectangle)	9999	1	4	0	✓
		Input.SegmentSizeAngle			10.00 (Inspection region: Ring/Arc)	359.99	0.01	3	2	✓
	Segment Shift	Input.SegmentShift			5.00 (Inspection region: Rectangle)	9999.99	0.01	4	2	✓
					5.00 (Inspection region: Ring/Arc)	359.99	0.01	3	2	✓
	Starting Offset	Input.StartingOffset			0 (Inspection region: Rectangle)	9999	0	4	0	✓
		Input.StartingOffsetAngle			0.00 (Inspection region: Arc)	359.99	0.00	3	2	✓
	Starting Angle	Input.StartingAngle			0.00 (Inspection region: Ring)	359.99	0.00	3	2	✓
	Judged Label Type	Input.PrimaryTargetType	Maximum	0	Maximum	-	-	-	-	-
			Minimum	1						
			Specified	2						
	Judged Label	Input.PrimaryTarget			0	29999	0	5	0	-
	Angled Edge Detection	Input.AngledEdgeDetection			False	-	-	-	-	✓
	Maximum Number of Segments	Input.MaxSegments			100	30000	1	5	0	-
	Best Fit Circle/Line	Input.BestFitCircleLine	Off	0	Off	-	-	-	-	✓
			Circle	1						
			Line	2						
	Deformation Correction	Input.Correction			False	-	-	-	-	-
	Abnormal Gap Size	Input.AbnormalGapSize			5.0	999.9	0.0	3	1	✓
	Abnormal Point Ratio Upper Limit	Input.AbnormalSensitivity			25	100	0	3	0	✓
Judgment Conditions	Number of Detected Segments: Upper Limit Enabled	Input.Limit.DetectedSegments.Max.Enable			False	-	-	-	-	-
	Number of Detected Segments: Upper Limit	Input.Limit.DetectedSegments.Max			Current Value	99999	0	5	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Number of Detected Segments: Lower Limit Enabled	Input.Limit.DetectedSegments.Min.Enable			False	-	-	-	-	-
	Number of Detected Segments: Lower Limit	Input.Limit.DetectedSegments.Min			Current Value	99999	0	5	0	✓
	Distance (Maximum): Upper Limit Enabled	Input.Limit.MaxDistance.Max.Enable			False	-	-	-	-	-
	Distance (Maximum): Upper Limit	Input.Limit.MaxDistance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance (Maximum): Lower Limit Enabled	Input.Limit.MaxDistance.Min.Enable			False	-	-	-	-	-
	Distance (Maximum): Lower Limit	Input.Limit.MaxDistance.Min			Current Value	99999.999	0.000	5	3	✓
	Distance (Minimum): Upper Limit Enabled	Input.Limit.MinDistance.Max.Enable			False	-	-	-	-	-
	Distance (Minimum): Upper Limit	Input.Limit.MinDistance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance (Minimum): Lower Limit Enabled	Input.Limit.MinDistance.Min.Enable			False	-	-	-	-	-
	Distance (Minimum): Lower Limit	Input.Limit.MinDistance.Min			Current Value	99999.999	0.000	5	3	✓
	Distance: Upper Limit Enabled	Input.Limit.Distance.Max.Enable			False	-	-	-	-	-
	Distance: Upper Limit	Input.Limit.Distance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance: Lower Limit Enabled	Input.Limit.Distance.Min.Enable			False	-	-	-	-	-
	Distance: Lower Limit	Input.Limit.Distance.Min			Current Value	99999.999	0.000	5	3	✓
	Radius (Maximum): Upper Limit Enabled	Input.Limit.MaxRadius.Max.Enable			False	-	-	-	-	-
	Radius (Maximum): Upper Limit	Input.Limit.MaxRadius.Max			Current Value	99999.999	0.000	5	3	✓
	Radius (Maximum): Lower Limit Enabled	Input.Limit.MaxRadius.Min.Enable			False	-	-	-	-	-
	Radius (Maximum): Lower Limit	Input.Limit.MaxRadius.Min			Current Value	99999.999	0.000	5	3	✓
	Radius (Minimum): Upper Limit Enabled	Input.Limit.MinRadius.Max.Enable			False	-	-	-	-	-
	Radius (Minimum): Upper Limit	Input.Limit.MinRadius.Max			Current Value	99999.999	0.000	5	3	✓
	Radius (Minimum): Lower Limit Enabled	Input.Limit.MinRadius.Min.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Radius (Minimum): Lower Limit	Input.Limit.MinRadius.Min			Current Value	99999.999	0.000	5	3	✓
	Radius: Upper Limit Enabled	Input.Limit.Radius.Max.Enable			False	-	-	-	-	-
	Radius: Upper Limit	Input.Limit.Radius.Max			Current Value	99999.999	0.000	5	3	✓
	Radius: Lower Limit Enabled	Input.Limit.Radius.Min.Enable			False	-	-	-	-	-
	Radius: Lower Limit	Input.Limit.Radius.Min			Current Value	99999.999	0.000	5	3	✓
	Detected Line Angle (+/-180°): Upper Limit Enabled	Input.Limit.DetectedLine.Angle.Max.Enable			False	-	-	-	-	-
	Detected Line Angle (+/-180°): Upper Limit	Input.Limit.DetectedLine.Angle.Max			Current Value	180.000	-180.000	3	3	✓
	Detected Line Angle (+/-180°): Lower Limit Enabled	Input.Limit.DetectedLine.Angle.Min.Enable			False	-	-	-	-	-
	Detected Line Angle (+/-180°): Lower Limit	Input.Limit.DetectedLine.Angle.Min			Current Value	180.000	-180.000	3	3	✓
	Detected Line Angle: Upper Limit Enabled	Input.Limit.DetectionLine.Position.Angle.Max.Enable			False	-	-	-	-	-
	Detected Line Angle: Upper Limit	Input.Limit.DetectionLine.Position.Angle.Max			Current Value	90.000	-90.000	2	3	✓
	Detected Line Angle: Lower Limit Enabled	Input.Limit.DetectionLine.Position.Angle.Min.Enable			False	-	-	-	-	-
	Detected Line Angle: Lower Limit	Input.Limit.DetectionLine.Position.Angle.Min			Current Value	90.000	-90.000	2	3	✓
	Detected Line Count: Upper Limit Enabled	Input.Limit.DetectedLine.Count.Max.Enable			False	-	-	-	-	-
	Detected Line Count: Upper Limit	Input.Limit.DetectedLine.Count.Max			Current Value	1	0	1	0	✓
	Detected Line Count: Lower Limit Enabled	Input.Limit.DetectedLine.Count.Min.Enable			False	-	-	-	-	-
	Detected Line Count: Lower Limit	Input.Limit.DetectedLine.Count.Min			Current Value	1	0	1	0	✓
	Detected Circle Center X: Upper Limit Enabled	Input.Limit.DetectedCircle.CenterX.Max.Enable			False	-	-	-	-	-
	Detected Circle Center X: Upper Limit	Input.Limit.DetectedCircle.CenterX.Max			Current Value	99999.999	-99999.999	5	3	✓
	Detected Circle Center X: Lower Limit Enabled	Input.Limit.DetectedCircle.CenterX.Min.Enable			False	-	-	-	-	-
	Detected Circle Center X: Lower Limit	Input.Limit.DetectedCircle.CenterX.Min			Current Value	99999.999	-99999.999	5	3	✓
	Detected Circle Center Y: Upper Limit Enabled	Input.Limit.DetectedCircle.CenterY.Max.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Detected Circle Center Y: Upper Limit	Input.Limit.DetectedCircle.CenterY.Max			Current Value	99999.999	-99999.999	5	3	✓
	Detected Circle Center Y: Lower Limit Enabled	Input.Limit.DetectedCircle.CenterY.Min.Enable			False	-	-	-	-	-
	Detected Circle Center Y: Lower Limit	Input.Limit.DetectedCircle.CenterY.Min			Current Value	99999.999	-99999.999	5	3	✓
	Detected Circle Radius: Upper Limit Enabled	Input.Limit.DetectedCircle.Radius.Max.Enable			False	-	-	-	-	-
	Detected Circle Radius: Upper Limit	Input.Limit.DetectedCircle.Radius.Max			Current Value	99999.999	0.000	5	3	✓
	Detected Circle Radius: Lower Limit Enabled	Input.Limit.DetectedCircle.Radius.Min.Enable			False	-	-	-	-	-
	Detected Circle Radius: Lower Limit	Input.Limit.DetectedCircle.Radius.Min			Current Value	99999.999	0.000	5	3	✓
	Detected Circle Diameter: Upper Limit Enabled	Input.Limit.DetectedCircle.Diameter.Max.Enable			False	-	-	-	-	-
	Detected Circle Diameter: Upper Limit	Input.Limit.DetectedCircle.Diameter.Max			Current Value	99999.999	0.000	5	3	✓
	Detected Circle Diameter: Lower Limit Enabled	Input.Limit.DetectedCircle.Diameter.Min.Enable			False	-	-	-	-	-
	Detected Circle Diameter: Lower Limit	Input.Limit.DetectedCircle.Diameter.Min			Current Value	99999.999	0.000	5	3	✓
	Detected Circle Count: Upper Limit Enabled	Input.Limit.DetectedCircle.Count.Max.Enable			False	-	-	-	-	-
	Detected Circle Count: Upper Limit	Input.Limit.DetectedCircle.Count.Max			Current Value	1	0	1	0	✓
	Detected Circle Count: Lower Limit Enabled	Input.Limit.DetectedCircle.Count.Min.Enable			False	-	-	-	-	-
	Detected Circle Count: Lower Limit	Input.Limit.DetectedCircle.Count.Min			Current Value	1	0	1	0	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Judged Label: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.Visible			True	-	-	-	-	-
	Judged Label: Shape	Input.Graphic.TrendEdge.PrimaryTarget.Shape	Cross	1	Bar	-	-	-	-	-
			Circle	4						
			Bar	7						
	Judged Label: Size	Input.Graphic.TrendEdge.PrimaryTarget.Size			16	1024	4	4	0	-
	Judged Label: Line Thickness	Input.Graphic.TrendEdge.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Judged Label: Pass Color: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Judged Label: Pass Color: Red	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Judged Label: Pass Color: Green	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Judged Label: Pass Color: Blue	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Judged Label: Fail Color: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Judged Label: Fail Color: Red	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Judged Label: Fail Color: Green	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Judged Label: Fail Color: Blue	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Maximum Label: Enabled	Input.Graphic.TrendEdge.MaximumTarget.Visible			True	-	-	-	-	-
	Maximum Label: Shape	Input.Graphic.TrendEdge.MaximumTarget.Shape	Cross	1	Bar	-	-	-	-	-
			Circle	4						
			Bar	7						
	Maximum Label: Size	Input.Graphic.TrendEdge.MaximumTarget.Size			16	1024	4	4	0	-
	Maximum Label: Line Thickness	Input.Graphic.TrendEdge.MaximumTarget.StrokeWidth			1	64	1	2	0	-
	Maximum Label: Pass Color: Enabled	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Visible			True	-	-	-	-	-
	Maximum Label: Pass Color: Red	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Red			221	255	0	3	0	-
	Maximum Label: Pass Color: Green	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Green			182	255	0	3	0	-
	Maximum Label: Pass Color: Blue	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Blue			14	255	0	3	0	-
	Maximum Label: Fail Color: Enabled	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Visible			True	-	-	-	-	-
	Maximum Label: Fail Color: Red	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Red			221	255	0	3	0	-
	Maximum Label: Fail Color: Green	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Green			182	255	0	3	0	-
	Maximum Label: Fail Color: Blue	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Blue			14	255	0	3	0	-
	Minimum Label: Enabled	Input.Graphic.TrendEdge.MinimumTarget.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Minimum Label: Shape	Input.Graphic.TrendEdge.MinimumTarget.Shape	Cross	1	Bar	-	-	-	-	-
			Circle	4						
			Bar	7						
	Minimum Label: Size	Input.Graphic.TrendEdge.MinimumTarget.Size			16	1024	4	4	0	-
	Minimum Label: Line Thickness	Input.Graphic.TrendEdge.MinimumTarget.StrokeWidth			1	64	1	2	0	-
	Minimum Label: Pass Color: Enabled	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Visible			True	-	-	-	-	-
	Minimum Label: Pass Color: Red	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Red			221	255	0	3	0	-
	Minimum Label: Pass Color: Green	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Green			182	255	0	3	0	-
	Minimum Label: Pass Color: Blue	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Blue			14	255	0	3	0	-
	Minimum Label: Fail Color: Enabled	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Visible			True	-	-	-	-	-
	Minimum Label: Fail Color: Red	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Red			221	255	0	3	0	-
	Minimum Label: Fail Color: Green	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Green			182	255	0	3	0	-
	Minimum Label: Fail Color: Blue	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Blue			14	255	0	3	0	-
	Display Profile: Enabled	Input.Graphic.TrendEdge.Profile.Visible			True	-	-	-	-	-
	Display Profile: Line Thickness	Input.Graphic.TrendEdge.Profile.StrokeWidth			1	64	1	2	0	-
	Display Profile: Pass Color: Enabled	Input.Graphic.TrendEdge.Profile.ColorPass.Visible			True	-	-	-	-	-
	Display Profile: Pass Color: Red	Input.Graphic.TrendEdge.Profile.ColorPass.Red			221	255	0	3	0	-
	Display Profile: Pass Color: Green	Input.Graphic.TrendEdge.Profile.ColorPass.Green			182	255	0	3	0	-
	Display Profile: Pass Color: Blue	Input.Graphic.TrendEdge.Profile.ColorPass.Blue			14	255	0	3	0	-
	Display Profile: Fail Color: Enabled	Input.Graphic.TrendEdge.Profile.ColorFail.Visible			True	-	-	-	-	-
	Display Profile: Fail Color: Red	Input.Graphic.TrendEdge.Profile.ColorFail.Red			221	255	0	3	0	-
	Display Profile: Fail Color: Green	Input.Graphic.TrendEdge.Profile.ColorFail.Green			182	255	0	3	0	-
	Display Profile: Fail Color: Blue	Input.Graphic.TrendEdge.Profile.ColorFail.Blue			14	255	0	3	0	-
	Display Segments: Enabled	Input.Graphic.TrendEdge.Segment.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Display Segments: Line Thickness	Input.Graphic.TrendEdge.Segment.StrokeWidth			1	64	1	2	0	-
	Display Segments: Pass Color: Enabled	Input.Graphic.TrendEdge.Segment.ColorPass.Visible			True	-	-	-	-	-
	Display Segments: Pass Color: Red	Input.Graphic.TrendEdge.Segment.ColorPass.Red			221	255	0	3	0	-
	Display Segments: Pass Color: Green	Input.Graphic.TrendEdge.Segment.ColorPass.Green			182	255	0	3	0	-
	Display Segments: Pass Color: Blue	Input.Graphic.TrendEdge.Segment.ColorPass.Blue			14	255	0	3	0	-
	Display Segments: Fail Color: Enabled	Input.Graphic.TrendEdge.Segment.ColorFail.Visible			True	-	-	-	-	-
	Display Segments: Fail Color: Red	Input.Graphic.TrendEdge.Segment.ColorFail.Red			221	255	0	3	0	-
	Display Segments: Fail Color: Green	Input.Graphic.TrendEdge.Segment.ColorFail.Green			182	255	0	3	0	-
	Display Segments: Fail Color: Blue	Input.Graphic.TrendEdge.Segment.ColorFail.Blue			14	255	0	3	0	-
	Display Detected Circle/Line: Line Thickness	Input.Graphic.DetectedShape.StrokeWidth			2	64	1	2	0	-
	Display Detected Circle/Line: Color: Enabled	Input.Graphic.DetectedShape.Color.Visible			True	-	-	-	-	-
	Display Detected Circle/Line: Color: Red	Input.Graphic.DetectedShape.Color.Red			135	255	0	3	0	-
	Display Detected Circle/Line: Color: Green	Input.Graphic.DetectedShape.Color.Green			187	255	0	3	0	-
	Display Detected Circle/Line: Color: Blue	Input.Graphic.DetectedShape.Color.Blue			12	255	0	3	0	-

Profile Width

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Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Select Mode	Input.Mode	Outer Gap	0	Outer Gap	-	-	-	-	-
			Inner Gap	1						
			Outer Diameter (Inspection region: Ring)	2						
			Inner Diameter (Inspection region: Ring)	3						
			1st/2nd Edges	4						
	Trend Direction (1st Scan)	Input.Scan1.TrendDirection	↓ (Inspection region: Rectangle)	0	↓	-	-	-	-	-
			Clockwise (Inspection region: Ring/Arc)	2	Clockwise	-	-	-	-	-
	Scan Direction (1st Scan)	Input.Scan1.ScanDirection	Forward	4	Forward (Inspection region: Rectangle)	-	-	-	-	✓
			Reverse	5						
			Center to Outer	6	Center to Outer (Inspection region: Ring/Arc)	-	-	-	-	✓
			Outer to Center	7						
	Edge Direction (1st Scan)	Input.Scan1.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Specified Edge (1st Scan)	Input.Scan1.SpecifiedEdge			0	3599	-3600	4	0	✓
	Edge Sensitivity (%) (1st Scan)	Input.Scan1.Sensitivity			30	100	0	3	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
	Edge Filter Width (1st Scan)	Input.Scan1.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit (1st Scan)	Input.Scan1.Intensity.Max			255.000	255.000	0.000	3	3	✓
Detection Conditions	Edge Intensity Lower Limit (1st Scan)	Input.Scan1.Intensity.Min			5.000	255.000	0.000	3	3	✓
	Trend Direction (2nd Scan)	Input.Scan2.TrendDirection	↓ (Inspection region: Rectangle)	0	↓	-	-	-	-	-
			Clockwise (Inspection region: Ring/Arc)	2	Clockwise	-	-	-	-	-
	Scan Direction (2nd Scan)	Input.Scan2.ScanDirection	Forward	4	Forward (Inspection region: Rectangle)	-	-	-	-	✓
			Reverse	5						
			Center to Outer	6	Center to Outer (Inspection region: Ring/Arc)	-	-	-	-	✓
			Outer to Center	7						
	Edge Direction (2nd Scan)	Input.Scan2.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Specified Edge (2nd Scan)	Input.Scan2.SpecifiedEdge			0	3599	-3600	4	0	✓
	Edge Sensitivity (%) (2nd Scan)	Input.Scan2.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width (2nd Scan)	Input.Scan2.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit (2nd Scan)	Input.Scan2.Intensity.Max			255.000	255.000	0.000	3	3	✓
	Edge Intensity Lower Limit (2nd Scan)	Input.Scan2.Intensity.Min			5.000	255.000	0.000	3	3	✓
	Edge Width Upper Limit	Input.Width.Max			99999.999	99999.999	0.000	5	3	✓
	Edge Width Lower Limit	Input.Width.Min			1.000	99999.999	0.000	5	3	✓
	Segment Size	Input.SegmentSize			10 (Inspection region: Rectangle)	9999	1	4	0	✓
		Input.SegmentSizeAngle			10.00 (Inspection region: Ring/Arc)	359.99	0.01	3	2	✓
	Segment Shift	Input.SegmentShift			5.00 (Inspection region: Rectangle)	9999.99	0.01	4	2	✓
					5.00 (Inspection region: Ring/Arc)	359.99	0.01	3	2	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Starting Offset	Input.StartingOffset			0 (Inspection region: Rectangle)	9999	0	4	0	✓
		Input.StartingOffsetAngle			0.00 (Inspection region: Ring)	359.99	0.00	3	2	✓
	Starting Angle	Input.StartingAngle			0.00 (Inspection region: Arc)	359.99	0.00	3	2	✓
	Judged Label Type	Input.PrimaryTargetType	Maximum	0	Maximum	-	-	-	-	-
			Minimum	1						
			Specified	2						
	Judged Label	Input.PrimaryTarget			0	29999	0	5	0	-
	Angled Edge Detection	Input.AngledEdgeDetection			False	-	-	-	-	✓
	Maximum Number of Segments	Input.MaxSegments			100	30000	1	5	0	-
Judgment Conditions	Number of Detected Segments: Upper Limit Enabled	Input.Limit.DetectedSegments.Max.Enable			False	-	-	-	-	-
	Number of Detected Segments: Upper Limit	Input.Limit.DetectedSegments.Max			Current Value	99999	0	5	0	✓
	Number of Detected Segments: Lower Limit Enabled	Input.Limit.DetectedSegments.Min.Enable			False	-	-	-	-	-
	Number of Detected Segments: Lower Limit	Input.Limit.DetectedSegments.Min			Current Value	99999	0	5	0	✓
	Edge Width (Maximum): Upper Limit Enabled	Input.Limit.MaxWidth.Max.Enable			False	-	-	-	-	-
	Edge Width (Maximum): Upper Limit	Input.Limit.MaxWidth.Max			Current Value	99999.999	0.000	5	3	✓
	Edge Width (Maximum): Lower Limit Enabled	Input.Limit.MaxWidth.Min.Enable			False	-	-	-	-	-
	Edge Width (Maximum): Lower Limit	Input.Limit.MaxWidth.Min			Current Value	99999.999	0.000	5	3	✓
	Edge Width (Minimum): Upper Limit Enabled	Input.Limit.MinWidth.Max.Enable			False	-	-	-	-	-
	Edge Width (Minimum): Upper Limit	Input.Limit.MinWidth.Max			Current Value	99999.999	0.000	5	3	✓
	Edge Width (Minimum): Lower Limit Enabled	Input.Limit.MinWidth.Min.Enable			False	-	-	-	-	-
	Edge Width (Minimum): Lower Limit	Input.Limit.MinWidth.Min			Current Value	99999.999	0.000	5	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Edge Width: Upper Limit Enabled	Input.Limit.Width.Max.Enable			False	-	-	-	-	-
	Edge Width: Upper Limit	Input.Limit.Width.Max			Current Value	99999.999	0.000	5	3	✓
	Edge Width: Lower Limit Enabled	Input.Limit.Width.Min.Enable			False	-	-	-	-	-
	Edge Width: Lower Limit	Input.Limit.Width.Min			Current Value	99999.999	0.000	5	3	✓
	Peak-to-Peak Width (Maximum): Upper Limit Enabled	Input.Limit.MaxPeakToPeakWidth.Max.Enable			False	-	-	-	-	-
	Peak-to-Peak Width (Maximum): Upper Limit	Input.Limit.MaxPeakToPeakWidth.Max			Current Value	99999.999	-99999.999	5	3	✓
	Peak-to-Peak Width (Maximum): Lower Limit Enabled	Input.Limit.MaxPeakToPeakWidth.Min.Enable			False	-	-	-	-	-
	Peak-to-Peak Width (Maximum): Lower Limit	Input.Limit.MaxPeakToPeakWidth.Min			Current Value	99999.999	-99999.999	5	3	✓
	Peak-to-Peak Width (Minimum): Upper Limit Enabled	Input.Limit.MinPeakToPeakWidth.Max.Enable			False	-	-	-	-	-
	Peak-to-Peak Width (Minimum): Upper Limit	Input.Limit.MinPeakToPeakWidth.Max			Current Value	99999.999	-99999.999	5	3	✓
	Peak-to-Peak Width (Minimum): Lower Limit Enabled	Input.Limit.MinPeakToPeakWidth.Min.Enable			False	-	-	-	-	-
	Peak-to-Peak Width (Minimum): Lower Limit	Input.Limit.MinPeakToPeakWidth.Min			Current Value	99999.999	-99999.999	5	3	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Judged Label: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.Visible			True	-	-	-	-	-
	Judged Label: Shape	Input.Graphic.TrendEdge.PrimaryTarget.Shape	Cross	1	Bar	-	-	-	-	-
			Circle	4						
			Bar	7						
	Judged Label: Size	Input.Graphic.TrendEdge.PrimaryTarget.Size			16	1024	4	4	0	-
	Judged Label: Line Thickness	Input.Graphic.TrendEdge.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Judged Label: Pass Color: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Judged Label: Pass Color: Red	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Judged Label: Pass Color: Green	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Judged Label: Pass Color: Blue	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Judged Label: Fail Color: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Judged Label: Fail Color: Red	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Judged Label: Fail Color: Green	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Judged Label: Fail Color: Blue	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Maximum Label: Enabled	Input.Graphic.TrendEdge.MaximumTarget.Visible			True	-	-	-	-	-
	Maximum Label: Shape	Input.Graphic.TrendEdge.MaximumTarget.Shape	Cross	1	Horizontal Line	-	-	-	-	-
			Circle	4						
			Horizontal Line	7						
	Maximum Label: Size	Input.Graphic.TrendEdge.MaximumTarget.Size			16	1024	4	4	0	-
	Maximum Label: Line Thickness	Input.Graphic.TrendEdge.MaximumTarget.StrokeWidth			1	64	1	2	0	-
	Maximum Label: Pass Color: Enabled	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Visible			True	-	-	-	-	-
	Maximum Label: Pass Color: Red	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Red			221	255	0	3	0	-
	Maximum Label: Pass Color: Green	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Green			182	255	0	3	0	-
	Maximum Label: Pass Color: Blue	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Blue			14	255	0	3	0	-
	Maximum Label: Fail Color: Enabled	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Visible			True	-	-	-	-	-
	Maximum Label: Fail Color: Red	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Red			221	255	0	3	0	-
	Maximum Label: Fail Color: Green	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Green			182	255	0	3	0	-
	Maximum Label: Fail Color: Blue	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Blue			14	255	0	3	0	-
	Minimum Label: Enabled	Input.Graphic.TrendEdge.MinimumTarget.Visible			True	-	-	-	-	-
	Minimum Label: Shape	Input.Graphic.TrendEdge.MinimumTarget.Shape	Cross	1	Horizontal Line	-	-	-	-	-
			Circle	4						
			Horizontal Line	7						
	Minimum Label: Size	Input.Graphic.TrendEdge.MinimumTarget.Size			16	1024	4	4	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Minimum Label: Line Thickness	Input.Graphic.TrendEdge.MinimumTarget.StrokeWidth			1	64	1	2	0	-
	Minimum Label: Pass Color: Enabled	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Visible			True	-	-	-	-	-
	Minimum Label: Pass Color: Red	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Red			221	255	0	3	0	-
	Minimum Label: Pass Color: Green	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Green			182	255	0	3	0	-
	Minimum Label: Pass Color: Blue	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Blue			14	255	0	3	0	-
	Minimum Label: Fail Color: Enabled	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Visible			True	-	-	-	-	-
	Minimum Label: Fail Color: Red	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Red			221	255	0	3	0	-
	Minimum Label: Fail Color: Green	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Green			182	255	0	3	0	-
	Minimum Label: Fail Color: Blue	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Blue			14	255	0	3	0	-
	Peak-to-Peak Width (Maximum): Enabled	Input.Graphic.MaxPeakToPeakWidth.Visible			True	-	-	-	-	-
	Peak-to-Peak Width (Maximum): Line Thickness	Input.Graphic.MaxPeakToPeakWidth.StrokeWidth			2	64	1	2	0	-
	Peak-to-Peak Width (Maximum): Pass Color: Enabled	Input.Graphic.MaxPeakToPeakWidth.ColorPass.Visible			True	-	-	-	-	-
	Peak-to-Peak Width (Maximum): Pass Color: Red	Input.Graphic.MaxPeakToPeakWidth.ColorPass.Red			9	255	0	3	0	-
	Peak-to-Peak Width (Maximum): Pass Color: Green	Input.Graphic.MaxPeakToPeakWidth.ColorPass.Green			139	255	0	3	0	-
	Peak-to-Peak Width (Maximum): Pass Color: Blue	Input.Graphic.MaxPeakToPeakWidth.ColorPass.Blue			126	255	0	3	0	-
	Peak-to-Peak Width (Maximum): Fail Color: Enabled	Input.Graphic.MaxPeakToPeakWidth.ColorFail.Visible			True	-	-	-	-	-
	Peak-to-Peak Width (Maximum): Fail Color: Red	Input.Graphic.MaxPeakToPeakWidth.ColorFail.Red			9	255	0	3	0	-
	Peak-to-Peak Width (Maximum): Fail Color: Green	Input.Graphic.MaxPeakToPeakWidth.ColorFail.Green			139	255	0	3	0	-
	Peak-to-Peak Width (Maximum): Fail Color: Blue	Input.Graphic.MaxPeakToPeakWidth.ColorFail.Blue			126	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Peak-to-Peak Width (Minimum): Enabled	Input.Graphic.MinPeakToPeakWidth.Visible			True	-	-	-	-	-
	Peak-to-Peak Width (Minimum): Line Thickness	Input.Graphic.MinPeakToPeakWidth.StrokeWidth			1	64	1	2	0	-
	Peak-to-Peak Width (Minimum): Pass Color: Enabled	Input.Graphic.MinPeakToPeakWidth.ColorPass.Visible			True	-	-	-	-	-
	Peak-to-Peak Width (Minimum): Pass Color: Red	Input.Graphic.MinPeakToPeakWidth.ColorPass.Red			179	255	0	3	0	-
	Peak-to-Peak Width (Minimum): Pass Color: Green	Input.Graphic.MinPeakToPeakWidth.ColorPass.Green			36	255	0	3	0	-
	Peak-to-Peak Width (Minimum): Pass Color: Blue	Input.Graphic.MinPeakToPeakWidth.ColorPass.Blue			94	255	0	3	0	-
	Peak-to-Peak Width (Minimum): Fail Color: Enabled	Input.Graphic.MinPeakToPeakWidth.ColorFail.Visible			True	-	-	-	-	-
	Peak-to-Peak Width (Minimum): Fail Color: Red	Input.Graphic.MinPeakToPeakWidth.ColorFail.Red			179	255	0	3	0	-
	Peak-to-Peak Width (Minimum): Fail Color: Green	Input.Graphic.MinPeakToPeakWidth.ColorFail.Green			36	255	0	3	0	-
	Peak-to-Peak Width (Minimum): Fail Color: Blue	Input.Graphic.MinPeakToPeakWidth.ColorFail.Blue			94	255	0	3	0	-
	Display Profile: Enabled	Input.Graphic.TrendEdge.Profile.Visible			True	-	-	-	-	-
	Display Profile: Line Thickness	Input.Graphic.TrendEdge.Profile.StrokeWidth			1	64	1	2	0	-
	Display Profile: Pass Color: Enabled	Input.Graphic.TrendEdge.Profile.ColorPass.Visible			True	-	-	-	-	-
	Display Profile: Pass Color: Red	Input.Graphic.TrendEdge.Profile.ColorPass.Red			221	255	0	3	0	-
	Display Profile: Pass Color: Green	Input.Graphic.TrendEdge.Profile.ColorPass.Green			182	255	0	3	0	-
	Display Profile: Pass Color: Blue	Input.Graphic.TrendEdge.Profile.ColorPass.Blue			14	255	0	3	0	-
	Display Profile: Fail Color: Enabled	Input.Graphic.TrendEdge.Profile.ColorFail.Visible			True	-	-	-	-	-
	Display Profile: Fail Color: Red	Input.Graphic.TrendEdge.Profile.ColorFail.Red			221	255	0	3	0	-
	Display Profile: Fail Color: Green	Input.Graphic.TrendEdge.Profile.ColorFail.Green			182	255	0	3	0	-
	Display Profile: Fail Color: Blue	Input.Graphic.TrendEdge.Profile.ColorFail.Blue			14	255	0	3	0	-
	Display Segments: Enabled	Input.Graphic.TrendEdge.Segment.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Display Segments: Line Thickness	Input.Graphic.TrendEdge.Segment.StrokeWidth			1	64	1	2	0	-
	Display Segments: Pass Color: Enabled	Input.Graphic.TrendEdge.Segment.ColorPass.Visible			True	-	-	-	-	-
	Display Segments: Pass Color: Red	Input.Graphic.TrendEdge.Segment.ColorPass.Red			221	255	0	3	0	-
	Display Segments: Pass Color: Green	Input.Graphic.TrendEdge.Segment.ColorPass.Green			182	255	0	3	0	-
	Display Segments: Pass Color: Blue	Input.Graphic.TrendEdge.Segment.ColorPass.Blue			14	255	0	3	0	-
	Display Segments: Fail Color: Enabled	Input.Graphic.TrendEdge.Segment.ColorFail.Visible			True	-	-	-	-	-
	Display Segments: Fail Color: Red	Input.Graphic.TrendEdge.Segment.ColorFail.Red			221	255	0	3	0	-
	Display Segments: Fail Color: Green	Input.Graphic.TrendEdge.Segment.ColorFail.Green			182	255	0	3	0	-
	Display Segments: Fail Color: Blue	Input.Graphic.TrendEdge.Segment.ColorFail.Blue			14	255	0	3	0	-

Profile Defect

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Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Trend Direction	Input.TrendDirection	↓ (Inspection region: Rectangle)	0	↓	-	-	-	-	-
			Clockwise (Inspection region: Ring/Arc)	1	Clockwise	-	-	-	-	-
	Scan Direction	Input.ScanDirection	Forward	0	Forward (Inspection region: Rectangle)	-	-	-	-	✓
			Reverse	1						
			Center to Outer	2	Center to Outer (Inspection region: Ring/Arc)	-	-	-	-	✓
			Outer to Center	3						
	Edge Direction	Input.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Specified Edge	Input.SpecifiedEdge			0	3599	-3600	4	0	✓
	Edge Sensitivity (%)	Input.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width	Input.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit	Input.Intensity.Max			255.000	255.000	0.000	3	3	✓
	Edge Intensity Lower Limit	Input.Intensity.Min			5.000	255.000	0.000	3	3	✓
	Segment Size	Input.SegmentSize			5 (Inspection region: Rectangle)	9999	1	4	0	✓
		Input.SegmentSizeAngle			5.00 (Inspection region: Ring/Arc)	359.99	0.01	3	2	✓
	Segment Shift	Input.SegmentShift			3.00 (Inspection region: Rectangle)	9999.99	0.01	4	2	✓
					3.00 (Inspection region: Ring/Arc)	359.99	0.01	3	2	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Starting Offset	Input.StartingOffset			0 (Inspection region: Rectangle)	9999	0	4	0	✓
		Input.StartingOffsetAngle			0.00 (Inspection region: Arc)	359.99	0.00	3	2	✓
	Starting Angle	Input.StartingAngle			0.00 (Inspection region: Ring)	359.99	0.00	3	2	-
	Angled Edge Detection	Input.AngledEdgeDetection			False	-	-	-	-	✓
	Maximum Number of Segments	Input.MaxSegments			200	30000	1	5	0	-
Defect Detection Conditions	Reference Line	Input.ModelShape	Line (Inspection region: Rectangle)	0	Line (Inspection region: Rectangle) Circle (Inspection region: Ring/Arc)	-	-	-	-	-
			Circle	1						
			Oval (Inspection region: Ring/ Arc)	2						
			Free Curve	3						
	Smoothing Range (%)	Input.SmoothingRange			15	100	1	3	0	✓
	Defect Scan Direction	Input.DefectDetectionDirection	+	0	+/-	-	-	-	-	✓
			-	1						
			+/-	2						
			+/- (Individual)	3						
	Detection Threshold	Input.DefectDetectionThresh			3.00	9999.99	0.00	4	2	✓
	(Detection Threshold) + Range	Input.DefectDetectionThresh.Positive			3.00	9999.99	0.00	4	2	✓
	(Detection Threshold) - Range	Input.DefectDetectionThresh.Negative			3.00	9999.99	0.00	4	2	✓
	Defect Level Filter Upper Limit	Input.DefectLevelFilter.Max			9999.99	9999.99	0.00	4	2	✓
	(Defect Level Filter) + Range Upper Limit	Input.DefectLevelFilter.Positive.Max			9999.99	9999.99	0.00	4	2	✓
	(Defect Level Filter) + Range Lower Limit	Input.DefectLevelFilter.Positive.Min			0.00	9999.99	0.00	4	2	✓
	Defect Level Filter Lower Limit	Input.DefectLevelFilter.Min			0.00	9999.99	0.00	4	2	✓
	(Defect Level Filter) - Range Upper Limit	Input.DefectLevelFilter.Negative.Max			9999.99	9999.99	0.00	4	2	✓
	(Defect Level Filter) - Range Lower Limit	Input.DefectLevelFilter.Negative.Min			0.00	9999.99	0.00	4	2	✓
	Defect Width Filter Upper Limit	Input.DefectWidthFilter.Max			99999	99999	0	5	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Defect Detection Conditions	(Defect Width Filter) + Range Upper Limit	Input.DefectWidthFilter.Positive.Max			99999	99999	0	5	0	✓
	(Defect Width Filter) + Range Lower Limit	Input.DefectWidthFilter.Positive.Min			0	99999	0	5	0	✓
	Defect Width Filter Lower Limit	Input.DefectWidthFilter.Min			0	99999	0	5	0	✓
	(Defect Width Filter) - Range Upper Limit	Input.DefectWidthFilter.Negative.Max			99999	99999	0	5	0	✓
	(Defect Width Filter) - Range Lower Limit	Input.DefectWidthFilter.Negative.Min			0	99999	0	5	0	✓
	Defect Size Filter Upper Limit	Input.DefectSizeFilter.Max			9999999.99	9999999.99	0.00	7	2	✓
	(Defect Size Filter) + Range Upper Limit	Input.DefectSizeFilter.Positive.Max			9999999.99	9999999.99	0.00	7	2	✓
	(Defect Size Filter) + Range Lower Limit	Input.DefectSizeFilter.Positive.Min			0.00	9999999.99	0.00	7	2	✓
	Defect Size Filter Lower Limit	Input.DefectSizeFilter.Min			0.00	9999999.99	0.00	7	2	✓
	(Defect Size Filter) - Range Upper Limit	Input.DefectSizeFilter.Negative.Max			9999999.99	9999999.99	0.00	7	2	✓
	(Defect Size Filter) - Range Lower Limit	Input.DefectSizeFilter.Negative.Min			0.00	9999999.99	0.00	7	2	✓
	Detection Count	Input.Count			30	30000	1	5	0	✓
	Detection Order	Input.Order	Segment: Ascending	0	Defect Size: Descending	-	-	-	-	✓
			Segment: Descending	1						
			X: Ascending	2						
			X: Descending	3						
			Y: Ascending	4						
			Y: Descending	5						
			Defect Level: Ascending	6						
			Defect Level: Descending	7						
			Defect Width: Ascending	8						
			Defect Width: Descending	9						
			Defect Size: Ascending	10						
			Defect Size: Descending	11						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Defect Detection Conditions	Judged Label Type	Input.PrimaryTargetType	All	0	Specified	-	-	-	-	-
			Specified	1						
	Judged Label	Input.PrimaryTarget			0	29999	0	5	0	-
	Handling of Undetected Point	Input.UndetectedPoints	Ignore	0	Ignore	-	-	-	-	✓
			Maximize	1						
			Minimize	2						
			Interpolate	3						
	Defect Size Calculation	Input.SelectionRate	Total Difference from Reference Line	0	Total Difference from Reference Line	-	-	-	-	✓
			Total Difference from Threshold	1						
	Selection Method	Input.Selection.Type	Auto	0	Auto	-	-	-	-	✓
			Manual	1						
	Edge Selection (%) Auto	Input.Selection.Auto			-	99.99	0.00	2	2	-
	Edge Selection (%) Manual	Input.Selection.Manual			50.00	99.99	0.00	2	2	✓
Judgment Conditions	Number of Detected Segments: Upper Limit Enabled	Input.Limit.DetectedSegments.Max.Enable			False	-	-	-	-	-
	Number of Detected Segments: Upper Limit	Input.Limit.DetectedSegments.Max			Current Value	99999	0	5	0	✓
	Number of Detected Segments: Lower Limit Enabled	Input.Limit.DetectedSegments.Min.Enable			False	-	-	-	-	-
	Number of Detected Segments: Lower Limit	Input.Limit.DetectedSegments.Min			Current Value	99999	0	5	0	✓
	Defect Count: Upper Limit Enabled	Input.Limit.Count.Max.Enable			False	-	-	-	-	-
	Defect Count: Upper Limit	Input.Limit.Count.Max			Current Value	99999	0	5	0	✓
	Defect Count: Lower Limit Enabled	Input.Limit.Count.Min.Enable			False	-	-	-	-	-
	Defect Count: Lower Limit	Input.Limit.Count.Min			Current Value	99999	0	5	0	✓
	Defect Count (+): Upper Limit Enabled	Input.Limit.Count.Positive.Max.Enable			False	-	-	-	-	-
	Defect Count (+): Upper Limit	Input.Limit.Count.Positive.Max			Current Value	99999	0	5	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Defect Count (+): Lower Limit Enabled	Input.Limit.Count.Positive.Min.Enable			False	-	-	-	-	-
	Defect Count (+): Lower Limit	Input.Limit.Count.Positive.Min			Current Value	99999	0	5	0	✓
	Defect Count (-): Upper Limit Enabled	Input.Limit.Count.Negative.Max.Enable			False	-	-	-	-	-
	Defect Count (-): Upper Limit	Input.Limit.Count.Negative.Max			Current Value	99999	0	5	0	✓
	Defect Count (-): Lower Limit Enabled	Input.Limit.Count.Negative.Min.Enable			False	-	-	-	-	-
	Defect Count (-): Lower Limit	Input.Limit.Count.Negative.Min			Current Value	99999	0	5	0	✓
	Total Defect Size: Upper Limit Enabled	Input.Limit.TotalDefectSize.Max.Enable			False	-	-	-	-	-
	Total Defect Size: Upper Limit	Input.Limit.TotalDefectSize.Max			Current Value	9999999.999	0.000	7	3	✓
	Total Defect Size: Lower Limit Enabled	Input.Limit.TotalDefectSize.Min.Enable			False	-	-	-	-	-
	Total Defect Size: Lower Limit	Input.Limit.TotalDefectSize.Min			Current Value	9999999.999	0.000	7	3	✓
	Defect Size: Upper Limit Enabled	Input.Limit.DefectSize.Max.Enable			False	-	-	-	-	-
	Defect Size: Upper Limit	Input.Limit.DefectSize.Max			Current Value (Judged label type is [Specified])	9999999.999	0.000	7	3	✓
					Maximum Value (Judged label type is [All])	9999999.999	0.000	7	3	✓
	Defect Size: Lower Limit Enabled	Input.Limit.DefectSize.Min.Enable			False	-	-	-	-	-
	Defect Size: Lower Limit	Input.Limit.DefectSize.Min			Current Value (Judged label type is [Specified])	9999999.999	0.000	7	3	✓
					Minimum Value (Judged label type is [All])	9999999.999	0.000	7	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Defect Position X: Upper Limit Enabled	Input.Limit.DefectPosition.X.Max.Enable			False	-	-	-	-	-
	Defect Position X: Upper Limit	Input.Limit.DefectPosition.X.Max			Current Value (Judged label type is [Specified])	99999.999	-99999.999	5	3	✓
					Maximum Value (Judged label type is [All])	99999.999	-99999.999	5	3	✓
	Defect Position X: Lower Limit Enabled	Input.Limit.DefectPosition.X.Min.Enable			False	-	-	-	-	-
	Defect Position X: Lower Limit	Input.Limit.DefectPosition.X.Min			Current Value (Judged label type is [Specified])	99999.999	-99999.999	5	3	✓
					Minimum Value (Judged label type is [All])	99999.999	-99999.999	5	3	✓
	Defect Position Y: Upper Limit Enabled	Input.Limit.DefectPosition.Y.Max.Enable			False	-	-	-	-	-
	Defect Position Y: Upper Limit	Input.Limit.DefectPosition.Y.Max			Current Value (Judged label type is [Specified])	99999.999	-99999.999	5	3	✓
					Maximum Value (Judged label type is [All])	99999.999	-99999.999	5	3	✓
	Defect Position Y: Lower Limit Enabled	Input.Limit.DefectPosition.Y.Min.Enable			False	-	-	-	-	-
	Defect Position Y: Lower Limit	Input.Limit.DefectPosition.Y.Min			Current Value (Judged label type is [Specified])	99999.999	-99999.999	5	3	✓
					Minimum Value (Judged label type is [All])	99999.999	-99999.999	5	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Defect Position: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.Visible			True	-	-	-	-	-
	Detected Defect Position: Shape	Input.Graphic.TrendEdge.PrimaryTarget.Shape	Circle	4	Plus/Minus	-	-	-	-	-
			Plus/Minus	14						
	Detected Defect Position: Size	Input.Graphic.TrendEdge.PrimaryTarget.Size			16	1024	4	4	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Defect Position: Line Thickness	Input.Graphic.TrendEdge.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Defect Position: Pass Color: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Defect Position: Pass Color: Red	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Defect Position: Pass Color: Green	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Defect Position: Pass Color: Blue	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Defect Position: Fail Color: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Defect Position: Fail Color: Red	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Defect Position: Fail Color: Green	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Defect Position: Fail Color: Blue	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Detected Defect Position (Excluding Judged Label): Enabled	Input.Graphic.TrendEdge.ArrayTarget.Visible			True	-	-	-	-	-
	Detected Defect Position (Excluding Judged Label): Shape	Input.Graphic.TrendEdge.ArrayTarget.Shape	Circle	4	Plus/Minus	-	-	-	-	-
			Plus/Minus	14						
	Detected Defect Position (Excluding Judged Label): Size	Input.Graphic.TrendEdge.ArrayTarget.Size			16	1024	4	4	0	-
	Detected Defect Position (Excluding Judged Label): Line Thickness	Input.Graphic.TrendEdge.ArrayTarget.StrokeWidth			1	64	1	2	0	-
	Detected Defect Position (Excluding Judged Label): Pass Color: Enabled	Input.Graphic.TrendEdge.ArrayTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Defect Position (Excluding Judged Label): Pass Color: Red	Input.Graphic.TrendEdge.ArrayTarget.ColorPass.Red			221	255	0	3	0	-
	Detected Defect Position (Excluding Judged Label): Pass Color: Green	Input.Graphic.TrendEdge.ArrayTarget.ColorPass.Green			182	255	0	3	0	-
	Detected Defect Position (Excluding Judged Label): Pass Color: Blue	Input.Graphic.TrendEdge.ArrayTarget.ColorPass.Blue			14	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Defect Position (Excluding Judged Label): Fail Color: Enabled	Input.Graphic.TrendEdge.ArrayTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Defect Position (Excluding Judged Label): Fail Color: Red	Input.Graphic.TrendEdge.ArrayTarget.ColorFail.Red			221	255	0	3	0	-
	Detected Defect Position (Excluding Judged Label): Fail Color: Green	Input.Graphic.TrendEdge.ArrayTarget.ColorFail.Green			182	255	0	3	0	-
	Detected Defect Position (Excluding Judged Label): Fail Color: Blue	Input.Graphic.TrendEdge.ArrayTarget.ColorFail.Blue			14	255	0	3	0	-
	Detected Edge Position: Enabled	Input.Graphic.TrendEdge.EdgePrimaryTarget.Visible			True	-	-	-	-	-
	Detected Edge Position: Line Thickness	Input.Graphic.TrendEdge.EdgePrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Edge Position: Pass Color: Enabled	Input.Graphic.TrendEdge.EdgePrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Edge Position: Pass Color: Red	Input.Graphic.TrendEdge.EdgePrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Edge Position: Pass Color: Green	Input.Graphic.TrendEdge.EdgePrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Edge Position: Pass Color: Blue	Input.Graphic.TrendEdge.EdgePrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Edge Position: Fail Color: Enabled	Input.Graphic.TrendEdge.EdgePrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Edge Position: Fail Color: Red	Input.Graphic.TrendEdge.EdgePrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Edge Position: Fail Color: Green	Input.Graphic.TrendEdge.EdgePrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Edge Position: Fail Color: Blue	Input.Graphic.TrendEdge.EdgePrimaryTarget.ColorFail.Blue			12	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Edge Position (+ Range Maximum): Enabled	Input.Graphic.TrendEdge.EdgePlusMaximumTarget.Visible			True	-	-	-	-	-
	Detected Edge Position (+ Range Maximum): Line Thickness	Input.Graphic.TrendEdge.EdgePlusMaximumTarget.StrokeWidth			1	64	1	2	0	-
	Detected Edge Position (+ Range Maximum): Pass Color: Enabled	Input.Graphic.TrendEdge.EdgePlusMaximumTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Edge Position (+ Range Maximum): Pass Color: Red	Input.Graphic.TrendEdge.EdgePlusMaximumTarget.ColorPass.Red			221	255	0	3	0	-
	Detected Edge Position (+ Range Maximum): Pass Color: Green	Input.Graphic.TrendEdge.EdgePlusMaximumTarget.ColorPass.Green			182	255	0	3	0	-
	Detected Edge Position (+ Range Maximum): Pass Color: Blue	Input.Graphic.TrendEdge.EdgePlusMaximumTarget.ColorPass.Blue			14	255	0	3	0	-
	Detected Edge Position (+ Range Maximum): Fail Color: Enabled	Input.Graphic.TrendEdge.EdgePlusMaximumTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Edge Position (+ Range Maximum): Fail Color: Red	Input.Graphic.TrendEdge.EdgePlusMaximumTarget.ColorFail.Red			221	255	0	3	0	-
	Detected Edge Position (+ Range Maximum): Fail Color: Green	Input.Graphic.TrendEdge.EdgePlusMaximumTarget.ColorFail.Green			182	255	0	3	0	-
	Detected Edge Position (+ Range Maximum): Fail Color: Blue	Input.Graphic.TrendEdge.EdgePlusMaximumTarget.ColorFail.Blue			14	255	0	3	0	-
	Detected Edge Position (- Range Maximum): Enabled	Input.Graphic.TrendEdge.EdgeMinusMaximumTarget.Visible			True	-	-	-	-	-
	Detected Edge Position (- Range Maximum): Line Thickness	Input.Graphic.TrendEdge.EdgeMinusMaximumTarget.StrokeWidth			1	64	1	2	0	-
	Detected Edge Position (- Range Maximum): Pass Color: Enabled	Input.Graphic.TrendEdge.EdgeMinusMaximumTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Edge Position (- Range Maximum): Pass Color: Red	Input.Graphic.TrendEdge.EdgeMinusMaximumTarget.ColorPass.Red			221	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Edge Position (-Range Maximum): Pass Color: Green	Input.Graphic.TrendEdge.EdgeMinusMaximumTarget.ColorPass.Green			182	255	0	3	0	-
	Detected Edge Position (-Range Maximum): Pass Color: Blue	Input.Graphic.TrendEdge.EdgeMinusMaximumTarget.ColorPass.Blue			14	255	0	3	0	-
	Detected Edge Position (-Range Maximum): Fail Color: Enabled	Input.Graphic.TrendEdge.EdgeMinusMaximumTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Edge Position (-Range Maximum): Fail Color: Red	Input.Graphic.TrendEdge.EdgeMinusMaximumTarget.ColorFail.Red			221	255	0	3	0	-
	Detected Edge Position (-Range Maximum): Fail Color: Green	Input.Graphic.TrendEdge.EdgeMinusMaximumTarget.ColorFail.Green			182	255	0	3	0	-
	Detected Edge Position (-Range Maximum): Fail Color: Blue	Input.Graphic.TrendEdge.EdgeMinusMaximumTarget.ColorFail.Blue			14	255	0	3	0	-
	Display Profile: Enabled	Input.Graphic.TrendEdge.Profile.Visible			True	-	-	-	-	-
	Display Profile: Line Thickness	Input.Graphic.TrendEdge.Profile.StrokeWidth			1	64	1	2	0	-
	Display Profile: Pass Color: Enabled	Input.Graphic.TrendEdge.Profile.ColorPass.Visible			True	-	-	-	-	-
	Display Profile: Pass Color: Red	Input.Graphic.TrendEdge.Profile.ColorPass.Red			221	255	0	3	0	-
	Display Profile: Pass Color: Green	Input.Graphic.TrendEdge.Profile.ColorPass.Green			182	255	0	3	0	-
	Display Profile: Pass Color: Blue	Input.Graphic.TrendEdge.Profile.ColorPass.Blue			14	255	0	3	0	-
	Display Profile: Fail Color: Enabled	Input.Graphic.TrendEdge.Profile.ColorFail.Visible			True	-	-	-	-	-
	Display Profile: Fail Color: Red	Input.Graphic.TrendEdge.Profile.ColorFail.Red			221	255	0	3	0	-
	Display Profile: Fail Color: Green	Input.Graphic.TrendEdge.Profile.ColorFail.Green			182	255	0	3	0	-
	Display Profile: Fail Color: Blue	Input.Graphic.TrendEdge.Profile.ColorFail.Blue			14	255	0	3	0	-
	Display Segments: Enabled	Input.Graphic.TrendEdge.Segment.Visible			True	-	-	-	-	-
	Display Segments: Line Thickness	Input.Graphic.TrendEdge.Segment.StrokeWidth			1	64	1	2	0	-
	Display Segments: Pass Color: Enabled	Input.Graphic.TrendEdge.Segment.ColorPass.Visible			True	-	-	-	-	-
	Display Segments: Pass Color: Red	Input.Graphic.TrendEdge.Segment.ColorPass.Red			221	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Display Segments: Pass Color: Green	Input.Graphic.TrendEdge.Segment.ColorPass.Green			182	255	0	3	0	-
	Display Segments: Pass Color: Blue	Input.Graphic.TrendEdge.Segment.ColorPass.Blue			14	255	0	3	0	-
	Display Segments: Fail Color: Enabled	Input.Graphic.TrendEdge.Segment.ColorFail.Visible			True	-	-	-	-	-
	Display Segments: Fail Color: Red	Input.Graphic.TrendEdge.Segment.ColorFail.Red			221	255	0	3	0	-
	Display Segments: Fail Color: Green	Input.Graphic.TrendEdge.Segment.ColorFail.Green			182	255	0	3	0	-
	Display Segments: Fail Color: Blue	Input.Graphic.TrendEdge.Segment.ColorFail.Blue			14	255	0	3	0	-
	Reference Line Display: Line Thickness	Input.Graphic.TrendEdge.BaseModelLine.StrokeWidth			2	64	1	2	0	-
	Reference Line Display: Color: Enabled	Input.Graphic.TrendEdge.BaseModelLine.Color.Visible			True	-	-	-	-	-
	Reference Line Display: Color: Red	Input.Graphic.TrendEdge.BaseModelLine.Color.Red			135	255	0	3	0	-
	Reference Line Display: Color: Green	Input.Graphic.TrendEdge.BaseModelLine.Color.Green			187	255	0	3	0	-
	Reference Line Display: Color: Blue	Input.Graphic.TrendEdge.BaseModelLine.Color.Blue			12	255	0	3	0	-

Defect

#O027

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							-
Region	Region	Input.Region	See "Region"							-
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							-
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							-
Detection Conditions	Scan Direction	Input.ScanDirection	X	0	XY	-	-	-	-	-
			Y	1						
			XY	2						
			Circumference	3						
			Radius	4						
	Set by Direction	Input.ElementSpecifications			False	-	-	-	-	-
	High Speed Mode	Input.HighSpeedMode			True	-	-	-	-	-
	Defect Level	Input.DefectLevel			10	254	0	3	0	✓
	Segment Size: X/Y Common	Input.ElementSize.Size			16	256	1	3	0	✓
	Segment Size: X	Input.ElementSize.X			16	256	1	3	0	✓
	Segment Size: Y	Input.ElementSize.Y			16	256	1	3	0	✓
	Segment Size: Radius/ Circumference Common	Input.ElementSize.Size			16	256	1	3	0	✓
	Segment Size: Radius	Input.ElementSize.Radius			16	256	1	3	0	✓
	Segment Size: Ring	Input.ElementSize.Circumference			16	256	1	3	0	✓
	Comparison Interval Setting	Input.CompareElementInterval	Auto	0	Auto	-	-	-	-	-
			Manual	1						
	Segment Shift: X/Y Common	Input.ElementShift.Shift			4	2432	1	4	0	✓
	Segment Shift: X	Input.ElementShift.X			4	2432	1	4	0	✓
	Segment Shift: Y	Input.ElementShift.Y			4	2432	1	4	0	✓
	Segment Shift: Radius/ Circumference Common	Input.ElementShift.Shift			4	2432	1	4	0	✓
	Segment Shift: Radius	Input.ElementShift.Radius			4	2432	1	4	0	✓
	Segment Shift: Ring	Input.ElementShift.Circumference			4	2432	1	4	0	✓
	Compare Segments: X/Y Common	Input.CompareElement.Interval			1	2432	1	4	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Compare Segments: X	Input.CompareElement.X			1	2432	1	4	0	✓
	Compare Segments: Y	Input.CompareElement.Y			1	2432	1	4	0	✓
	Compare Segments: Radius/ Circumference Common	Input.CompareElement.Interval			1	2432	1	4	0	✓
	Compare Segments: Radius	Input.CompareElement.Radius			1	2432	1	4	0	✓
	Compare Segments: Ring	Input.CompareElement.Circumference			1	2432	1	4	0	✓
	Enable Gain Setting	Input.Gain.Enable			False	-	-	-	-	-
	Gain	Input.Gain			1.0	99.0	1.0	2	1	✓
	Ignore Intensity	Input.IgnoreIntensity			False	-	-	-	-	-
	Grouping	Input.Grouping			False	-	-	-	-	-
	Detection Count	Input.Count			10	99	1	2	0	-
	Fill Holes	Input.FillHoles			False	-	-	-	-	✓
	Active Border	Input.ActiveBorder			False	-	-	-	-	✓
	Judged Label	Input.PrimaryTarget			0	98	0	2	0	-
	Detection Order	Input.Order	Y > X: Ascending	0	Defect Area: Descending	-	-	-	-	✓
			X > Y: Ascending	1						
			X: Ascending	2						
			X: Descending	3						
			Y: Ascending	4						
			Y: Descending	5						
			Clockwise	6						
			Counterclockwise	7						
			Outer to Center	8						
			Center to Outer	9						
			Defect Area: Ascending	10						
			Defect Area: Descending	11						
	Defect Area (Upper Limit)	Input.DefectArea.Max			99999999	99999999	1	8	0	✓
	Defect Area (Lower Limit)	Input.DefectArea.Min			1	99999999	1	8	0	✓
	Roundness Enabled	Input.RoundnessFilter			False	-	-	-	-	✓
	Roundness: Upper Limit	Input.Roundness.Max			1.000	1.000	0.000	1	3	✓
	Roundness: Lower Limit	Input.Roundness.Min			0.000	1.000	0.000	1	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Major Axis Enabled	Input.MajorAxisFilter			False	-	-	-	-	✓
	Major Axis: Upper Limit	Input.MajorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Major Axis: Lower Limit	Input.MajorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Axes Ratio Enabled	Input.AxesRatioFilter			False	-	-	-	-	✓
	Axes Ratio: Upper Limit	Input.AxesRatio.Max			99999.999	99999.999	0.000	5	3	✓
	Axes Ratio: Lower Limit	Input.AxesRatio.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis Enabled	Input.DistOvalMajorAxisFilter			False	-	-	-	-	✓
	Equivalent Oval Major Axis: Upper Limit	Input.DistOvalMajorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis: Lower Limit	Input.DistOvalMajorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio Enabled	Input.AspectRatioFilter			False	-	-	-	-	✓
	Equivalent Oval Aspect Ratio: Upper Limit	Input.AspectRatio.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio: Lower Limit	Input.AspectRatio.Min			0.000	99999.999	0.000	5	3	✓
Judgment Conditions	Total Defect Area: Upper Limit Enabled	Input.Limit.TotalDefectArea.Max.Enable			False	-	-	-	-	-
	Total Defect Area: Upper Limit	Input.Limit.TotalDefectArea.Max			Current Value	99999999	0	8	0	✓
	Total Defect Area: Lower Limit Enabled	Input.Limit.TotalDefectArea.Min.Enable			False	-	-	-	-	-
	Total Defect Area: Lower Limit	Input.Limit.TotalDefectArea.Min			Current Value	99999999	0	8	0	✓
	Groups: Upper Limit Enabled	Input.Limit.Count.Max.Enable			False	-	-	-	-	-
	Groups: Upper Limit	Input.Limit.Count.Max			Current Value	99	0	2	0	✓
	Groups: Lower Limit Enabled	Input.Limit.Count.Min.Enable			False	-	-	-	-	-
	Groups: Lower Limit	Input.Limit.Count.Min			Current Value	99	0	2	0	✓
	Defect Area: Upper Limit Enabled	Input.Limit.DefectArea.Max.Enable			False	-	-	-	-	-
	Defect Area: Upper Limit	Input.Limit.DefectArea.Max			Current Value	99999999	0	8	0	✓
	Defect Area: Lower Limit Enabled	Input.Limit.DefectArea.Min.Enable			False	-	-	-	-	-
	Defect Area: Lower Limit	Input.Limit.DefectArea.Min			Current Value	99999999	0	8	0	✓
	Center of Gravity X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Center of Gravity X: Upper Limit	Input.Limit.Position.X.Max			Current Value	99999.999	-99999.999	5	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Center of Gravity X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Center of Gravity X: Lower Limit	Input.Limit.Position.X.Min			Current Value	99999.999	-99999.999	5	3	✓
	Center of Gravity Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Center of Gravity Y: Upper Limit	Input.Limit.Position.Y.Max			Current Value	99999.999	-99999.999	5	3	✓
	Center of Gravity Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-
	Center of Gravity Y: Lower Limit	Input.Limit.Position.Y.Min			Current Value	99999.999	-99999.999	5	3	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Detected Position: Detected Position Shape	Input.Graphic.PrimaryTarget.Shape	Cross	1	Cross	-	-	-	-	-
			Circle	2						
	Detected Position: Size	Input.Graphic.PrimaryTarget.Size			16	1024	4	4	0	-
	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Display Label Number: Enabled	Input.Graphic.PrimaryTarget.Index.Visible			True	-	-	-	-	-
	Display Defect Area: Enabled	Input.Graphic.PrimaryTarget.Defect.Visible			False	-	-	-	-	-
	Display Center of Gravity X: Enabled	Input.Graphic.PrimaryTarget.Position.X.Visible			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Display Center of Gravity Y: Enabled	Input.Graphic.PrimaryTarget.Position.Y.Visible			False	-	-	-	-	-
	Font: Size	Input.Graphic.PrimaryTarget.Font.Size			12	256	6	3	0	-
	Detected Position (Excluding Judged Label): Enabled	Input.Graphic.ArrayTarget.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Detected Position Shape	Input.Graphic.ArrayTarget.Shape	Cross	1	Cross	-	-	-	-	-
			Circle	2						
	Detected Position (Excluding Judged Label): Size	Input.Graphic.ArrayTarget.Size			16	1024	4	4	0	-
	Detected Position (Excluding Judged Label): Line Thickness	Input.Graphic.ArrayTarget.StrokeWidth			1	64	1	2	0	-
	Detected Position (Excluding Judged Label): Pass Color: Enabled	Input.Graphic.ArrayTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Pass Color: Red	Input.Graphic.ArrayTarget.ColorPass.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Green	Input.Graphic.ArrayTarget.ColorPass.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Blue	Input.Graphic.ArrayTarget.ColorPass.Blue			14	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Enabled	Input.Graphic.ArrayTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Fail Color: Red	Input.Graphic.ArrayTarget.ColorFail.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Green	Input.Graphic.ArrayTarget.ColorFail.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Blue	Input.Graphic.ArrayTarget.ColorFail.Blue			14	255	0	3	0	-

Blob

#O028

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Detection Color	Input.DetectionColor	Black	0	White	-	-	-	-	✓
			White	1						
	Detection Count	Input.Count			30	30000	1	5	0	-
	Fill Holes	Input.FillHoles			True	-	-	-	-	✓
	Active Border	Input.ActiveBorder			False	-	-	-	-	✓
	Angle Range	Input.AngleRange	180°	0	180°	-	-	-	-	✓
			360°	1						
			None	2						
	Major Axis Bounding Rectangle Enabled	Input.EnableMajorAxis			False	-	-	-	-	-
	Minimum Bounding Rectangle Enabled	Input.EnableMinimumBoundingRectangle			False	-	-	-	-	-
	Equivalent Oval Enabled	Input.EnableDistOval			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Detection Order	Input.Order	Y > X: Ascending	0	Area: Descending	-	-	-	-	✓
			X > Y: Ascending	1						
			X: Ascending	2						
			X: Descending	3						
			Y: Ascending	4						
			Y: Descending	5						
			Area: Ascending	6						
			Area: Descending	7						
			Roundness: Ascending	8						
			Roundness: Descending	9						
			Clockwise	10						
			Counterclockwise	11						
	Starting Angle	Input.StartingAngle			0.000	359.999	0.000	3	3	✓
	Judged Label Type	Input.PrimaryTargetType	All	0	Specified	-	-	-	-	-
			Specified	1						
	Judged Label	Input.PrimaryTarget			0	29999	0	5	0	-
	Area: Upper Limit	Input.Area.Max			99999999	99999999	0	8	0	✓
	Area: Lower Limit	Input.Area.Min			100	99999999	0	8	0	✓
	Roundness: Upper Limit	Input.Roundness.Max			1.000	1.000	0.000	1	3	✓
	Roundness: Lower Limit	Input.Roundness.Min			0.000	1.000	0.000	1	3	✓
	Major Axis: Upper Limit	Input.MajorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Major Axis: Lower Limit	Input.MajorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Axes Ratio: Upper Limit	Input.AxesRatio.Max			99999.999	99999.999	0.000	5	3	✓
	Axes Ratio: Lower Limit	Input.AxesRatio.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis: Upper Limit	Input.DistOvalMajorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis: Lower Limit	Input.DistOvalMajorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio: Upper Limit	Input.AspectRatio.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio: Lower Limit	Input.AspectRatio.Min			0.000	99999.999	0.000	5	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Total Area: Upper Limit Enabled	Input.Limit.TotalArea.Max.Enable			False	-	-	-	-	-
	Total Area: Upper Limit	Input.Limit.TotalArea.Max			0	99999999	0	8	0	✓
	Total Area: Lower Limit Enabled	Input.Limit.TotalArea.Min.Enable			False	-	-	-	-	-
	Total Area: Lower Limit	Input.Limit.TotalArea.Min			0	99999999	0	8	0	✓
	Label Count: Upper Limit Enabled	Input.Limit.Count.Max.Enable			False	-	-	-	-	-
	Label Count: Upper Limit	Input.Limit.Count.Max			30000	30000	0	5	0	✓
	Label Count: Lower Limit Enabled	Input.Limit.Count.Min.Enable			False	-	-	-	-	-
	Label Count: Lower Limit	Input.Limit.Count.Min			0	30000	0	5	0	✓
	Center of Gravity X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Center of Gravity X: Upper Limit	Input.Limit.Position.X.Max			99999.999	99999.999	-99999.999	5	3	✓
	Center of Gravity X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Center of Gravity X: Lower Limit	Input.Limit.Position.X.Min			-99999.999	99999.999	-99999.999	5	3	✓
	Center of Gravity Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Center of Gravity Y: Upper Limit	Input.Limit.Position.Y.Max			99999.999	99999.999	-99999.999	5	3	✓
	Center of Gravity Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-
	Center of Gravity Y: Lower Limit	Input.Limit.Position.Y.Min			-99999.999	99999.999	-99999.999	5	3	✓
	Major Axis Angle: Upper Limit Enabled	Input.Limit.Position.Angle.Max.Enable			False	-	-	-	-	-
	Major Axis Angle: Upper Limit	Input.Limit.Position.Angle.Max			180.000	180.000	-180.000	3	3	✓
	Major Axis Angle: Lower Limit Enabled	Input.Limit.Position.Angle.Min.Enable			False	-	-	-	-	-
	Major Axis Angle: Lower Limit	Input.Limit.Position.Angle.Min			-180.000	180.000	-180.000	3	3	✓
	Area: Upper Limit Enabled	Input.Limit.Area.Max.Enable			False	-	-	-	-	-
	Area: Upper Limit	Input.Limit.Area.Max			99999999	99999999	0	8	0	✓
	Area: Lower Limit Enabled	Input.Limit.Area.Min.Enable			False	-	-	-	-	-
	Area: Lower Limit	Input.Limit.Area.Min			0	99999999	0	8	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Feret Diameter X: Upper Limit Enabled	Input.Limit.FeretDiameter.X.Max.Enable			False	-	-	-	-	-
	Feret Diameter X: Upper Limit	Input.Limit.FeretDiameter.X.Max			99999.999	99999.999	0.000	5	3	✓
	Feret Diameter X: Lower Limit Enabled	Input.Limit.FeretDiameter.X.Min.Enable			False	-	-	-	-	-
	Feret Diameter X: Lower Limit	Input.Limit.FeretDiameter.X.Min			0.000	99999.999	0.000	5	3	✓
	Feret Diameter Y: Upper Limit Enabled	Input.Limit.FeretDiameter.Y.Max.Enable			False	-	-	-	-	-
	Feret Diameter Y: Upper Limit	Input.Limit.FeretDiameter.Y.Max			99999.999	99999.999	0.000	5	3	✓
	Feret Diameter Y: Lower Limit Enabled	Input.Limit.FeretDiameter.Y.Min.Enable			False	-	-	-	-	-
	Feret Diameter Y: Lower Limit	Input.Limit.FeretDiameter.Y.Min			0.000	99999.999	0.000	5	3	✓
	Perimeter: Upper Limit Enabled	Input.Limit.Perimeter.Max.Enable			False	-	-	-	-	-
	Perimeter: Upper Limit	Input.Limit.Perimeter.Max			99999999	99999999	0	8	0	✓
	Perimeter: Lower Limit Enabled	Input.Limit.Perimeter.Min.Enable			False	-	-	-	-	-
	Perimeter: Lower Limit	Input.Limit.Perimeter.Min			0	99999999	0	8	0	✓
	Roundness: Upper Limit Enabled	Input.Limit.Roundness.Max.Enable			False	-	-	-	-	-
	Roundness: Upper Limit	Input.Limit.Roundness.Max			9.999	9.999	0.000	1	3	✓
	Roundness: Lower Limit Enabled	Input.Limit.Roundness.Min.Enable			False	-	-	-	-	-
	Roundness: Lower Limit	Input.Limit.Roundness.Min			0.000	9.999	0.000	1	3	✓
	Major Axis: Upper Limit Enabled	Input.Limit.MajorAxis.Max.Enable			False	-	-	-	-	-
	Major Axis: Upper Limit	Input.Limit.MajorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Major Axis: Lower Limit Enabled	Input.Limit.MajorAxis.Min.Enable			False	-	-	-	-	-
	Major Axis: Lower Limit	Input.Limit.MajorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Minor Axis: Upper Limit Enabled	Input.Limit.MinorAxis.Max.Enable			False	-	-	-	-	-
	Minor Axis: Upper Limit	Input.Limit.MinorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Minor Axis: Lower Limit Enabled	Input.Limit.MinorAxis.Min.Enable			False	-	-	-	-	-
	Minor Axis: Lower Limit	Input.Limit.MinorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Axes Ratio: Upper Limit Enabled	Input.Limit.AxesRatio.Max.Enable			False	-	-	-	-	-
	Axes Ratio: Upper Limit	Input.Limit.AxesRatio.Max			99999.999	99999.999	0.000	5	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Axes Ratio: Lower Limit Enabled	Input.Limit.AxesRatio.Min.Enable			False	-	-	-	-	-
	Axes Ratio: Lower Limit	Input.Limit.AxesRatio.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis: Upper Limit Enabled	Input.Limit.DistOvalMajorAxis.Max.Enable			False	-	-	-	-	-
	Equivalent Oval Major Axis: Upper Limit	Input.Limit.DistOvalMajorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis: Lower Limit Enabled	Input.Limit.DistOvalMajorAxis.Min.Enable			False	-	-	-	-	-
	Equivalent Oval Major Axis: Lower Limit	Input.Limit.DistOvalMajorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Minor Axis: Upper Limit Enabled	Input.Limit.DistOvalMinorAxis.Max.Enable			False	-	-	-	-	-
	Equivalent Oval Minor Axis: Upper Limit	Input.Limit.DistOvalMinorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Minor Axis: Lower Limit Enabled	Input.Limit.DistOvalMinorAxis.Min.Enable			False	-	-	-	-	-
	Equivalent Oval Minor Axis: Lower Limit	Input.Limit.DistOvalMinorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio: Upper Limit Enabled	Input.Limit.AspectRatio.Max.Enable			False	-	-	-	-	-
	Equivalent Oval Aspect Ratio: Upper Limit	Input.Limit.AspectRatio.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio: Lower Limit Enabled	Input.Limit.AspectRatio.Min.Enable			False	-	-	-	-	-
	Equivalent Oval Aspect Ratio: Lower Limit	Input.Limit.AspectRatio.Min			0.000	99999.999	0.000	5	3	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Detected Position: Shape	Input.Graphic.PrimaryTarget.Shape	Cross with Arrow	0	Cross with Arrow	-	-	-	-	-
			Circle	1						
			Cross	2						
	Detected Position: Size	Input.Graphic.PrimaryTarget.Size			16	1024	4	4	0	-
	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Detected Position: Display Label Number: Enabled	Input.Graphic.PrimaryTarget.Index.Visible			True	-	-	-	-	-
	Detected Position: Display Center of Gravity X: Enabled	Input.Graphic.PrimaryTarget.Position.X.Visible			False	-	-	-	-	-
	Detected Position: Display Center of Gravity Y: Enabled	Input.Graphic.PrimaryTarget.Position.Y.Visible			False	-	-	-	-	-
	Detected Position: Display Major Axis Angle: Enabled	Input.Graphic.PrimaryTarget.Position.Angle.Visible			False	-	-	-	-	-
	Detected Position: Display Area: Enabled	Input.Graphic.PrimaryTarget.Area.Visible			False	-	-	-	-	-
	Detected Position: Display Feret Diameter X: Enabled	Input.Graphic.PrimaryTarget.FeretDiameter.X.Visible			False	-	-	-	-	-
	Detected Position: Display Feret Diameter Y: Enabled	Input.Graphic.PrimaryTarget.FeretDiameter.Y.Visible			False	-	-	-	-	-
	Detected Position: Display Perimeter: Enabled	Input.Graphic.PrimaryTarget.Perimeter.Visible			False	-	-	-	-	-
	Detected Position: Display Roundness: Enabled	Input.Graphic.PrimaryTarget.Roundness.Visible			False	-	-	-	-	-
	Detected Position: Display Major Axis: Enabled	Input.Graphic.PrimaryTarget.MajorAxis.Visible			False	-	-	-	-	-
	Detected Position: Display Minor Axis: Enabled	Input.Graphic.PrimaryTarget.MinorAxis.Visible			False	-	-	-	-	-
	Detected Position: Display Axes Ratio: Enabled	Input.Graphic.PrimaryTarget.AxesRatio.Visible			False	-	-	-	-	-
	Detected Position: Display Oval Major Axis: Enabled	Input.Graphic.PrimaryTarget.DistOvalMajorAxis.Visible			False	-	-	-	-	-
	Detected Position: Display Oval Minor Axis: Enabled	Input.Graphic.PrimaryTarget.DistOvalMinorAxis.Visible			False	-	-	-	-	-
	Detected Position: Display Oval Ratio: Enabled	Input.Graphic.PrimaryTarget.AspectRatio.Visible			False	-	-	-	-	-
	Detected Position: Font: Size	Input.Graphic.PrimaryTarget.Font.Size			12	256	6	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position (Excluding Judged Label): Enabled	Input.Graphic.ArrayTarget.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Shape	Input.Graphic.ArrayTarget.Shape	Cross with Arrow	0	Cross with Arrow	-	-	-	-	-
			Circle	1						
			Cross	2						
	Detected Position (Excluding Judged Label): Size	Input.Graphic.ArrayTarget.Size			16	1024	4	4	0	-
	Detected Position (Excluding Judged Label): Line Thickness	Input.Graphic.ArrayTarget.StrokeWidth			1	64	1	2	0	-
	Detected Position (Excluding Judged Label): Pass Color: Enabled	Input.Graphic.ArrayTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Pass Color: Red	Input.Graphic.ArrayTarget.ColorPass.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Green	Input.Graphic.ArrayTarget.ColorPass.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Blue	Input.Graphic.ArrayTarget.ColorPass.Blue			14	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Enabled	Input.Graphic.ArrayTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Fail Color: Red	Input.Graphic.ArrayTarget.ColorFail.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Green	Input.Graphic.ArrayTarget.ColorFail.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Blue	Input.Graphic.ArrayTarget.ColorFail.Blue			14	255	0	3	0	-

Grayscale Blob

#O029

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Detection Target	Input.BrightOrDarkDetection	Bright	0	Bright/Dark	-	-	-	-	-
			Dark	1						
			Bright/Dark	2						
			Individual	3						
	Reference Intensity	Input.BaseIntensity	Average	0	Median	-	-	-	-	-
			Median	1						
			Mode	2						
			Specified	3						
	Intensity	Input.BaseIntensityLevel			128	255	0	3	0	✓
	Detection Threshold: Bright/Dark	Input.TargetDetectionThresh.Offset			10	254	0	3	0	✓
	Detection Threshold: Bright	Input.TargetDetectionThresh.Bright			10	254	0	3	0	✓
	Detection Threshold: Dark	Input.TargetDetectionThresh.Dark			10	254	0	3	0	✓
	Set by Direction	Input.ElementSpecifications			False	-	-	-	-	-
	High Speed Mode	Input.HighSpeedMode			True	-	-	-	-	-
	Segment Size: X/Y Common	Input.ElementSize.Size			16	256	1	3	0	✓
	Segment Size: X	Input.ElementSize.X			16	256	1	3	0	✓
	Segment Size: Y	Input.ElementSize.Y			16	256	1	3	0	✓
	Segment Interval Setting	Input.CompareElementInterval	Auto	0	Auto	-	-	-	-	-
			Manual	1						
	Segment Shift: X/Y Common	Input.ElementShift.Shift			4	2432	1	4	0	✓
	Segment Shift: X	Input.ElementShift.X			4	2432	1	4	0	✓
	Segment Shift: Y	Input.ElementShift.Y			4	2432	1	4	0	✓
	Detection Count	Input.Count			10	30000	1	5	0	-
	Fill Holes	Input.FillHoles			True	-	-	-	-	✓
	Active Border	Input.ActiveBorder			False	-	-	-	-	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Angle Range	Input.AngleRange	180°	0	None	-	-	-	-	✓
			360°	1						
			None	2						
	Grayscale Information (Volume/Intensity Difference)	Input.EnableVolume			True	-	-	-	-	-
	Major Axis Bounding Rectangle (Major/Minor Axis)	Input.EnableMajorAxis			False	-	-	-	-	-
	Equivalent Oval	Input.EnableDistOval			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Detection Order	Input.Order	Y > X: Ascending	0	Area: Descending	-	-	-	-	✓
			X > Y: Ascending	1						
			X: Ascending	2						
			X: Descending	3						
			Y: Ascending	4						
			Y: Descending	5						
			Area: Ascending	6						
			Area: Descending	7						
			Roundness: Ascending	8						
			Roundness: Descending	9						
			Clockwise	10						
			Counterclockwise	11						
			Volume: Ascending	12						
			Volume: Descending	13						
			Average Intensity Difference: Ascending	14						
			Average Intensity Difference: Descending	15						
			Maximum Intensity Difference: Ascending	16						
			Maximum Intensity Difference: Descending	17						
	Starting Angle	Input.StartingAngle			0.000	359.999	0.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Judged Label Type	Input.PrimaryTargetType	All	0	Specified	-	-	-	-	-
			Specified	1						
	Judged Label	Input.PrimaryTarget			0	29999	0	5	0	-
	Area: Upper Limit	Input.Area.Max			99999999	99999999	0	8	0	✓
	Area: Lower Limit	Input.Area.Min			100	99999999	0	8	0	✓
	Volume: Upper Limit	Input.Volume.Max			99999999999.999	99999999999.999	0.000	11	3	✓
	Volume: Lower Limit	Input.Volume.Min			0.000	99999999999.999	0.000	11	3	✓
	Average Intensity Difference: Upper Limit	Input.AverageIntensityLevel.Max			0	255	0	3	0	✓
	Average Intensity Difference: Lower Limit	Input.AverageIntensityLevel.Min			0	255	0	3	0	✓
	Maximum Intensity Difference: Upper Limit	Input.MaximumIntensityLevel.Max			0	255	0	3	0	✓
	Maximum Intensity Difference: Lower Limit	Input.MaximumIntensityLevel.Min			0	255	0	3	0	✓
	Roundness: Upper Limit	Input.Roundness.Max			1.000	1.000	0.000	1	3	✓
	Roundness: Lower Limit	Input.Roundness.Min			0.000	1.000	0.000	1	3	✓
	Major Axis: Upper Limit	Input.MajorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Major Axis: Lower Limit	Input.MajorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Axes Ratio: Upper Limit	Input.AxesRatio.Max			99999.999	99999.999	0.000	5	3	✓
	Axes Ratio: Lower Limit	Input.AxesRatio.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis: Upper Limit	Input.DistOvalMajorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis: Lower Limit	Input.DistOvalMajorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio: Upper Limit	Input.AspectRatio.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio: Lower Limit	Input.AspectRatio.Min			0.000	99999.999	0.000	5	3	✓
Judgment Conditions	Total Area: Upper Limit Enabled	Input.Limit.TotalArea.Max.Enable			False	-	-	-	-	-
	Total Area: Upper Limit	Input.Limit.TotalArea.Max			99999999	99999999	0	8	0	✓
	Total Area: Lower Limit Enabled	Input.Limit.TotalArea.Min.Enable			False	-	-	-	-	-
	Total Area: Lower Limit	Input.Limit.TotalArea.Min			0	99999999	0	8	0	✓
	Total Volume: Upper Limit Enabled	Input.Limit.TotalVolume.Max.Enable			False	-	-	-	-	-
	Total Volume: Upper Limit	Input.Limit.TotalVolume.Max			99999999999	99999999999	0	11	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Total Volume: Lower Limit Enabled	Input.Limit.TotalVolume.Min.Enable			False	-	-	-	-	-
	Total Volume: Lower Limit	Input.Limit.TotalVolume.Min			0	99999999999	0	11	0	✓
	Label Count: Upper Limit Enabled	Input.Limit.Count.Max.Enable			False	-	-	-	-	-
	Label Count: Upper Limit	Input.Limit.Count.Max			30000	30000	0	5	0	✓
	Label Count: Lower Limit Enabled	Input.Limit.Count.Min.Enable			False	-	-	-	-	-
	Label Count: Lower Limit	Input.Limit.Count.Min			0	30000	0	5	0	✓
	Center of Gravity X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Center of Gravity X: Upper Limit	Input.Limit.Position.X.Max			99999.999	99999.999	-99999.999	5	3	✓
	Center of Gravity X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Center of Gravity X: Lower Limit	Input.Limit.Position.X.Min			-99999.999	99999.999	-99999.999	5	3	✓
	Center of Gravity Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Center of Gravity Y: Upper Limit	Input.Limit.Position.Y.Max			99999.999	99999.999	-99999.999	5	3	✓
	Center of Gravity Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-
	Center of Gravity Y: Lower Limit	Input.Limit.Position.Y.Min			-99999.999	99999.999	-99999.999	5	3	✓
	Major Axis Angle: Upper Limit Enabled	Input.Limit.Position.Angle.Max.Enable			False	-	-	-	-	-
	Major Axis Angle: Upper Limit	Input.Limit.Position.Angle.Max			180.000	180.000	-180.000	3	3	✓
	Major Axis Angle: Lower Limit Enabled	Input.Limit.Position.Angle.Min.Enable			False	-	-	-	-	-
	Major Axis Angle: Lower Limit	Input.Limit.Position.Angle.Min			-180.000	180.000	-180.000	3	3	✓
	Area: Upper Limit Enabled	Input.Limit.Area.Max.Enable			False	-	-	-	-	-
	Area: Upper Limit	Input.Limit.Area.Max			99999999	99999999	0	8	0	✓
	Area: Lower Limit Enabled	Input.Limit.Area.Min.Enable			False	-	-	-	-	-
	Area: Lower Limit	Input.Limit.Area.Min			0	99999999	0	8	0	✓
	Average Intensity Difference: Upper Limit Enabled	Input.Limit.AverageIntensityLevel.Max.Enable			False	-	-	-	-	-
	Average Intensity Difference: Upper Limit	Input.Limit.AverageIntensityLevel.Max			999	999	0	3	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Average Intensity Difference: Lower Limit Enabled	Input.Limit.AverageIntensityLevel.Min.Enable			False	-	-	-	-	-
	Average Intensity Difference: Lower Limit	Input.Limit.AverageIntensityLevel.Min			0	999	0	3	0	✓
	Maximum Intensity Difference: Upper Limit Enabled	Input.Limit.MaximumIntensityLevel.Max.Enable			False	-	-	-	-	-
	Maximum Intensity Difference: Upper Limit	Input.Limit.MaximumIntensityLevel.Max			999	999	0	3	0	✓
	Maximum Intensity Difference: Lower Limit Enabled	Input.Limit.MaximumIntensityLevel.Min.Enable			False	-	-	-	-	-
	Maximum Intensity Difference: Lower Limit	Input.Limit.MaximumIntensityLevel.Min			0	999	0	3	0	✓
	Volume: Upper Limit Enabled	Input.Limit.Volume.Max.Enable			False	-	-	-	-	-
	Volume: Upper Limit	Input.Limit.Volume.Max			99999999999	99999999999	0	11	0	✓
	Volume: Lower Limit Enabled	Input.Limit.Volume.Min.Enable			False	-	-	-	-	-
	Volume: Lower Limit	Input.Limit.Volume.Min			0	99999999999	0	11	0	✓
	Feret Diameter X: Upper Limit Enabled	Input.Limit.FeretDiameter.X.Max.Enable			False	-	-	-	-	-
	Feret Diameter X: Upper Limit	Input.Limit.FeretDiameter.X.Max			99999.999	99999.999	0.000	5	3	✓
	Feret Diameter X: Lower Limit Enabled	Input.Limit.FeretDiameter.X.Min.Enable			False	-	-	-	-	-
	Feret Diameter X: Lower Limit	Input.Limit.FeretDiameter.X.Min			0.000	99999.999	0.000	5	3	✓
	Feret Diameter Y: Upper Limit Enabled	Input.Limit.FeretDiameter.Y.Max.Enable			False	-	-	-	-	-
	Feret Diameter Y: Upper Limit	Input.Limit.FeretDiameter.Y.Max			99999.999	99999.999	0.000	5	3	✓
	Feret Diameter Y: Lower Limit Enabled	Input.Limit.FeretDiameter.Y.Min.Enable			False	-	-	-	-	-
	Feret Diameter Y: Lower Limit	Input.Limit.FeretDiameter.Y.Min			0.000	99999.999	0.000	5	3	✓
	Perimeter: Upper Limit Enabled	Input.Limit.Perimeter.Max.Enable			False	-	-	-	-	-
	Perimeter: Upper Limit	Input.Limit.Perimeter.Max			99999999	99999999	0	8	0	✓
	Perimeter: Lower Limit Enabled	Input.Limit.Perimeter.Min.Enable			False	-	-	-	-	-
	Perimeter: Lower Limit	Input.Limit.Perimeter.Min			0	99999999	0	8	0	✓
	Roundness: Upper Limit Enabled	Input.Limit.Roundness.Max.Enable			False	-	-	-	-	-
	Roundness: Upper Limit	Input.Limit.Roundness.Max			9.999	9.999	0.000	1	3	✓
	Roundness: Lower Limit Enabled	Input.Limit.Roundness.Min.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Roundness: Lower Limit	Input.Limit.Roundness.Min			0.000	9.999	0.000	1	3	✓
	Major Axis: Upper Limit Enabled	Input.Limit.MajorAxis.Max.Enable			False	-	-	-	-	-
	Major Axis: Upper Limit	Input.Limit.MajorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Major Axis: Lower Limit Enabled	Input.Limit.MajorAxis.Min.Enable			False	-	-	-	-	-
	Major Axis: Lower Limit	Input.Limit.MajorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Minor Axis: Upper Limit Enabled	Input.Limit.MinorAxis.Max.Enable			False	-	-	-	-	-
	Minor Axis: Upper Limit	Input.Limit.MinorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Minor Axis: Lower Limit Enabled	Input.Limit.MinorAxis.Min.Enable			False	-	-	-	-	-
	Minor Axis: Lower Limit	Input.Limit.MinorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Axes Ratio: Upper Limit Enabled	Input.Limit.AxesRatio.Max.Enable			False	-	-	-	-	-
	Axes Ratio: Upper Limit	Input.Limit.AxesRatio.Max			99999.999	99999.999	0.000	5	3	✓
	Axes Ratio: Lower Limit Enabled	Input.Limit.AxesRatio.Min.Enable			False	-	-	-	-	-
	Axes Ratio: Lower Limit	Input.Limit.AxesRatio.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis: Upper Limit Enabled	Input.Limit.DistOvalMajorAxis.Max.Enable			False	-	-	-	-	-
	Equivalent Oval Major Axis: Upper Limit	Input.Limit.DistOvalMajorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Major Axis: Lower Limit Enabled	Input.Limit.DistOvalMajorAxis.Min.Enable			False	-	-	-	-	-
	Equivalent Oval Major Axis: Lower Limit	Input.Limit.DistOvalMajorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Minor Axis: Upper Limit Enabled	Input.Limit.DistOvalMinorAxis.Max.Enable			False	-	-	-	-	-
	Equivalent Oval Minor Axis: Upper Limit	Input.Limit.DistOvalMinorAxis.Max			99999.999	99999.999	0.000	5	3	✓
	Equivalent Oval Minor Axis: Lower Limit Enabled	Input.Limit.DistOvalMinorAxis.Min.Enable			False	-	-	-	-	-
	Equivalent Oval Minor Axis: Lower Limit	Input.Limit.DistOvalMinorAxis.Min			0.000	99999.999	0.000	5	3	✓
	Equivalent Oval Aspect Ratio: Upper Limit Enabled	Input.Limit.AspectRatio.Max.Enable			False	-	-	-	-	-
	Equivalent Oval Aspect Ratio: Upper Limit	Input.Limit.AspectRatio.Max			99999.999	99999.999	0.000	5	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Equivalent Oval Aspect Ratio: Lower Limit Enabled	Input.Limit.AspectRatio.Min.Enable			False	-	-	-	-	-
	Equivalent Oval Aspect Ratio: Lower Limit	Input.Limit.AspectRatio.Min			0.000	99999.999	0.000	5	3	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Detected Position: Shape	Input.Graphic.PrimaryTarget.Shape	Circle	0	Plus/Minus	-	-	-	-	-
			Plus/Minus	1						
			Plus/Minus with Arrow	2						
	Detected Position: Size	Input.Graphic.PrimaryTarget.Size			16	1024	4	4	0	-
	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Detected Position: Display Label Number: Enabled	Input.Graphic.PrimaryTarget.Index.Visible			True	-	-	-	-	-
	Detected Position: Display Center of Gravity X: Enabled	Input.Graphic.PrimaryTarget.Position.X.Visible			False	-	-	-	-	-
	Detected Position: Display Center of Gravity Y: Enabled	Input.Graphic.PrimaryTarget.Position.Y.Visible			False	-	-	-	-	-
	Detected Position: Display Major Axis Angle: Enabled	Input.Graphic.PrimaryTarget.Position.Angle.Visible			False	-	-	-	-	-
	Detected Position: Display Area: Enabled	Input.Graphic.PrimaryTarget.Area.Visible			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position: Display Average Intensity Difference: Enabled	Input.Graphic.PrimaryTarget.AverageIntensityLevel.Visible			False	-	-	-	-	-
	Detected Position: Display Maximum Intensity Difference: Enabled	Input.Graphic.PrimaryTarget.MaximumIntensityLevel.Visible			False	-	-	-	-	-
	Detected Position: Display Volume: Enabled	Input.Graphic.PrimaryTarget.Volume.Visible			False	-	-	-	-	-
	Detected Position: Display Feret Diameter X: Enabled	Input.Graphic.PrimaryTarget.FeretDiameter.X.Visible			False	-	-	-	-	-
	Detected Position: Display Feret Diameter Y: Enabled	Input.Graphic.PrimaryTarget.FeretDiameter.Y.Visible			False	-	-	-	-	-
	Detected Position: Display Perimeter: Enabled	Input.Graphic.PrimaryTarget.Perimeter.Visible			False	-	-	-	-	-
	Detected Position: Display Roundness: Enabled	Input.Graphic.PrimaryTarget.Roundness.Visible			False	-	-	-	-	-
	Detected Position: Display Major Axis: Enabled	Input.Graphic.PrimaryTarget.MajorAxis.Visible			False	-	-	-	-	-
	Detected Position: Display Minor Axis: Enabled	Input.Graphic.PrimaryTarget.MinorAxis.Visible			False	-	-	-	-	-
	Detected Position: Display Axes Ratio: Enabled	Input.Graphic.PrimaryTarget.AxesRatio.Visible			False	-	-	-	-	-
	Detected Position: Display Oval Major Axis: Enabled	Input.Graphic.PrimaryTarget.DistOvalMajorAxis.Visible			False	-	-	-	-	-
	Detected Position: Display Oval Minor Axis: Enabled	Input.Graphic.PrimaryTarget.DistOvalMinorAxis.Visible			False	-	-	-	-	-
	Detected Position: Display Oval Ratio: Enabled	Input.Graphic.PrimaryTarget.AspectRatio.Visible			False	-	-	-	-	-
	Detected Position (Excluding Judged Label): Enabled	Input.Graphic.ArrayTarget.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Shape	Input.Graphic.ArrayTarget.Shape	Circle	0	Plus/Minus	-	-	-	-	-
			Plus/Minus	1						
			Plus/Minus with Arrow	2						
	Detected Position (Excluding Judged Label): Size	Input.Graphic.ArrayTarget.Size			16	1024	4	4	0	-
	Detected Position (Excluding Judged Label): Line Thickness	Input.Graphic.ArrayTarget.StrokeWidth			1	64	1	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position (Excluding Judged Label): Pass Color: Enabled	Input.Graphic.ArrayTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Pass Color: Red	Input.Graphic.ArrayTarget.ColorPass.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Green	Input.Graphic.ArrayTarget.ColorPass.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Pass Color: Blue	Input.Graphic.ArrayTarget.ColorPass.Blue			14	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Enabled	Input.Graphic.ArrayTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position (Excluding Judged Label): Fail Color: Red	Input.Graphic.ArrayTarget.ColorFail.Red			221	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Green	Input.Graphic.ArrayTarget.ColorFail.Green			182	255	0	3	0	-
	Detected Position (Excluding Judged Label): Fail Color: Blue	Input.Graphic.ArrayTarget.ColorFail.Blue			14	255	0	3	0	-

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Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Font Color	Input.CharacterColor	Black	0	Black	-	-	-	-	✓
			White	1						
	String Direction	Input.StringDirection	Clockwise	0	Clockwise	-	-	-	-	✓
			Counterclockwise	1						
	Block Mode	Input.BlockMode	Recognition	0	Recognition	-	-	-	-	-
			Auto	1						
			Fixed	2						
Detection Conditions (Recognition)	Line Block Target	Input.LineBlockTarget	Tallest Line	0	Tallest Line	-	-	-	-	✓
			Top Line	1						
			Bottom Line	2						
	Character Block Target	Input.CharacterBlockTarget	From Beginning	0	From Beginning	-	-	-	-	✓
			From End	1						
			From Wide Character	2						
	Rotation Correction	Input.LineRotationCorrection			True	-	-	-	-	✓
	Character Tilt Correction	Input.CharacterTiltCorrection			False	-	-	-	-	✓
	Active Border	Input.NoiseCancellation			True	-	-	-	-	-
	Manual Setting: Number of Characters Enabled	Input.NonTuningTarget.CharacterCount			False	-	-	-	-	-
	Manual Setting: Shading Level Enabled	Input.NonTuningTarget.ShadingLevel			False	-	-	-	-	-
	Manual Setting: Character Width Upper Limit (Line Height Ratio) Enabled	Input.NonTuningTarget.CharacterWidthHeightRatio.Max			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions (Recognition)	Manual Setting: Noise Width Upper Limit Enabled	Input.NonTuningTarget.NoiseWidth.Max			False	-	-	-	-	-
	Manual Setting: Noise Height Upper Limit Enabled	Input.NonTuningTarget.NoiseHeight.Max			False	-	-	-	-	-
	Manual Setting: X-Direction Interpolation (Pixel) Enabled	Input.NonTuningTarget.Interpolation.X			False	-	-	-	-	-
	Manual Setting: Y-Direction Interpolation (Pixel) Enabled	Input.NonTuningTarget.Interpolation.Y			False	-	-	-	-	-
	Number of Characters Numeric Input	Input.CharacterCount			100	100	1	3	0	-
	Shading Level Numeric Input	Input.ShadingLevel			20	255	0	3	0	✓
	Character Width Upper Limit (Line Height Ratio) Numeric Input	Input.CharacterWidthHeightRatio.Max			1.000	9.999	0.100	1	3	✓
	Noise Width Upper Limit Numeric Input	Input.NoiseWidth.Max			5	255	0	3	0	✓
	Noise Height Upper Limit Numeric Input	Input.NoiseHeight.Max			5	255	0	3	0	✓
	Period Height Upper Limit (Line Height Ratio)	Input.PeriodHeightRatio.Max			0.400	0.000	1.000	1	3	✓
	X-Direction Interpolation (Pixel) Numeric Input	Input.Interpolation.X			0	255	0	3	0	✓
	Y-Direction Interpolation (Pixel) Numeric Input	Input.Interpolation.Y			0	255	0	3	0	✓
Detection Conditions (Auto)	Read Direction	Input.ReadingDirection	→	0	→	-	-	-	-	✓
			←	1						
			↑	2						
			↓	3						
	Mirrored Reading	Input.MirroredReading			False	-	-	-	-	-
	Number of Lines	Input.NumberOfLines	1	0	1	-	-	-	-	-
			2	1						
Line Settings	Block Target	Input.LineBlockTarget	Tallest Line	0	Tallest Line	-	-	-	-	✓
			Top Line	1						
			Bottom Line	2						
	Rotation Correction	Input.LineRotationCorrection			True	-	-	-	-	✓
	Block Tool	Input.LineBlockTool	Waveform	0	Waveform	-	-	-	-	-
			Ratio Specification	1						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Line Settings	Line Block Ratio Setup: Start Position	Input.LineSeparation.Start			0.00	100.00	0.00	3	2	✓
	Line Block Ratio Setup: Line Separation Position	Input.LineSeparation.Point			50.00	100.00	0.00	3	2	✓
	Line Block Ratio Setup: End Position	Input.LineSeparation.End			100.00	100.00	0.00	3	2	✓
	Smoothing Filter	Input.SmoothingFilter			0	99	0	2	0	✓
	Line Height Upper Limit (Region Ratio)	Input.LineHeightRatio.Max			1.000	1.000	0.100	1	3	✓
	Detection Threshold	Input.Detection			40	255	0	3	0	✓
	Wave Width Lower Limit	Input.WaveWidthLowerLimit			10	255	0	3	0	✓
	Wave Intensity Lower Limit	Input.WaveIntensityLowerLimit			25	255	0	3	0	✓
Character Block Settings (Common)	Active Border(Line Common)	Input.ActiveBorder			True	-	-	-	-	-
	Intensity Deviation Lower Limit (Line Common)	Input.IntensityDeviation.LowerLimit			10	255	0	3	0	-
Line 1 Character Block Settings	Line 1: Number of Characters	Input.Line[0].CharacterCount			10	50	1	2	0	-
	Block Target	Input.Line[0].BlockTarget	From Beginning	0	From Beginning	-	-	-	-	✓
			From End	1						
			From Wide Character	2						
	Character Tilt Correction	Input.Line[0].CharacterTiltCorrection			False	-	-	-	-	✓
	Block Tool	Input.Line[0].BlockTool	Waveform	0	Waveform	-	-	-	-	-
			Ratio Specification	1						
	Character Block Ratio Setup: Start Position	Input.Line[0].CharacterSeparation.Point[0]			0.00	100.00	0.00	3	2	✓
	Character Block Ratio Setup: n-n+1	Input.Line[0].CharacterSeparation.Point[n]			0.00	100.00	0.00	3	2	✓
	Character Block Ratio Setup: End Position	Input.Line[0].CharacterSeparation.Point[n+1]			0.00	100.00	0.00	3	2	✓
	Smoothing Filter	Input.Line[0].SmoothingFilter			0	99	0	2	0	✓
	Character Width Upper Limit (Height Ratio)	Input.Line[0].CharacterWidthRatio.Max			1.000	9.999	0.100	1	3	✓
	Detection Threshold	Input.Line[0].Detection			40	255	0	3	0	✓
	Wave Width Lower Limit	Input.Line[0].WaveWidthLowerLimit			5	255	0	3	0	✓
	Wave Intensity Lower Limit	Input.Line[0].WaveIntensityLowerLimit			25	255	0	3	0	✓
	Fitting	Input.Line[0].Fitting			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Line 2 Character Block Settings	Line 2: Number of Characters	Input.Line[1].CharacterCount			10	50	1	2	0	-
	Block Target	Input.Line[1].BlockTarget	From Beginning	0	From Beginning	-	-	-	-	✓
			From End	1						
			From Wide Character	2						
	Character Tilt Correction	Input.Line[1].CharacterTiltCorrection			False	-	-	-	-	✓
	Block Tool	Input.Line[1].BlockTool	Waveform	0	Waveform	-	-	-	-	-
			Ratio Specification	1						
	Character Block Ratio Setup: Start Position	Input.Line[1].CharacterSeparation.Point[0]			0.00	100.00	0.00	3	2	✓
	Character Block Ratio Setup: n-n+1	Input.Line[1].CharacterSeparation.Point[n]			0.00	100.00	0.00	3	2	✓
	Character Block Ratio Setup: End Position	Input.Line[1].CharacterSeparation.Point[n+1]			0.00	100.00	0.00	3	2	✓
	Smoothing Filter	Input.Line[1].SmoothingFilter			0	99	0	2	0	✓
	Character Width Upper Limit (Height Ratio)	Input.Line[1].CharacterWidthRatio.Max			1.000	9.999	0.100	1	3	✓
	Detection Threshold	Input.Line[1].Detection			40	255	0	3	0	✓
	Wave Width Lower Limit	Input.Line[1].WaveWidthLowerLimit			5	255	0	3	0	✓
	Wave Intensity Lower Limit	Input.Line[1].WaveIntensityLowerLimit			25	255	0	3	0	✓
	Fitting	Input.Line[1].Fitting			True	-	-	-	-	-
Detection Conditions (Fixed)	Number of Characters	Input.RotatedRectangle.Length			-	20	0	2	0	-
	Mirrored Reading	Input.MirroredReading			False	-	-	-	-	-
	Region: Rectangle: Width	Input.RotatedRectangle[n].Shape.Width				2432	1	4	0	✓
	Region: Rectangle: Height	Input.RotatedRectangle[n].Shape.Height				2432	1	4	0	✓
	Region: Rectangle: Center X	Input.RotatedRectangle[n].Shape.Center.X				16382	0	5	0	✓
	Region: Rectangle: Center Y	Input.RotatedRectangle[n].Shape.Center.Y				16382	0	5	0	✓
	Region: Rectangle: Rotation Angle	Input.RotatedRectangle[n].Shape.RotatedAngle				359.9	0.0	3	1	✓
	Intensity Deviation Lower Limit	Input.IntensityDeviation.LowerLimit			10	255	0	3	0	-
	Fitting	Input.Fitting			True	-	-	-	-	✓
	Large Area Mode	Input.LargeAreaMode			False	-	-	-	-	-
Library Settings	Library Name	Input.Library			-	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Line 1: Correlation Lower Limit Enabled	Input.Limit.Line[0].Correlation.Min.Enable			False	-	-	-	-	-
	Line 1: Correlation Lower Limit	Input.Limit.Line[0].Correlation.Min			(Disabled)	99	0	2	0	✓
	Line 1: Stability Lower Limit Enabled	Input.Limit.Line[0].Stability.Min.Enable			False	-	-	-	-	-
	Line 1: Stability Lower Limit	Input.Limit.Line[0].Stability.Min			(Disabled)	99	0	2	0	✓
	Line 1: Number of Characters: Upper Limit Enabled	Input.Limit.Line[0].NumberOfCharacters.Max.Enable			False	-	-	-	-	-
	Line 1: Number of Characters: Upper Limit	Input.Limit.Line[0].NumberOfCharacters.Max			(Disabled)	100	0	3	0	✓
	Line 1: Number of Characters: Lower Limit Enabled	Input.Limit.Line[0].NumberOfCharacters.Min.Enable			False	-	-	-	-	-
	Line 1: Number of Characters: Lower Limit	Input.Limit.Line[0].NumberOfCharacters.Min			(Disabled)	100	0	3	0	✓
	Line 1: Judgment Character	Input.Limit.Line[0].JudgeString								✓
	Line 2: Correlation Lower Limit Enabled	Input.Limit.Line[1].Correlation.Min.Enable			False	-	-	-	-	-
	Line 2: Correlation Lower Limit	Input.Limit.Line[1].Correlation.Min			(Disabled)	99	0	2	0	✓
	Line 2: Stability Lower Limit Enabled	Input.Limit.Line[1].Stability.Min.Enable			False	-	-	-	-	-
	Line 2: Stability Lower Limit	Input.Limit.Line[1].Stability.Min			(Disabled)	99	0	2	0	✓
	Line 2: Number of Characters: Upper Limit Enabled	Input.Limit.Line[1].NumberOfCharacters.Max.Enable			False	-	-	-	-	-
	Line 2: Number of Characters: Upper Limit	Input.Limit.Line[1].NumberOfCharacters.Max			(Disabled)	100	0	3	0	✓
	Line 2: Number of Characters: Lower Limit Enabled	Input.Limit.Line[1].NumberOfCharacters.Min.Enable			False	-	-	-	-	-
	Line 2: Number of Characters: Lower Limit	Input.Limit.Line[1].NumberOfCharacters.Min			(Disabled)	100	0	3	0	✓
	Line 2: Judgment Character	Input.Limit.Line[1].JudgeString								✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 1): Character n: Character Type	Input.Restriction[n].Character[n].Type	*	0	*	-	-	-	-	-
			S	1						
			J	2						
			C	3						
			E	4						
			N	5						
			A	6						
			a	7						
			#	8						
	Restriction Settings (Line 1): Character n: Selected Character 0	Input.Restriction[0].Character[n].NumberZero								-
	Restriction Settings (Line 1): Character n: Selected Character 1	Input.Restriction[0].Character[n].NumberOne								-
	Restriction Settings (Line 1): Character n: Selected Character 2	Input.Restriction[0].Character[n].NumberTwo								-
	Restriction Settings (Line 1): Character n: Selected Character 3	Input.Restriction[0].Character[n].NumberThree								-
	Restriction Settings (Line 1): Character n: Selected Character 4	Input.Restriction[0].Character[n].NumberFour								-
	Restriction Settings (Line 1): Character n: Selected Character 5	Input.Restriction[0].Character[n].NumberFive								-
	Restriction Settings (Line 1): Character n: Selected Character 6	Input.Restriction[0].Character[n].NumberSix								-
	Restriction Settings (Line 1): Character n: Selected Character 7	Input.Restriction[0].Character[n].NumberSeven								-
	Restriction Settings (Line 1): Character n: Selected Character 8	Input.Restriction[0].Character[n].NumberEight								-
	Restriction Settings (Line 1): Character n: Selected Character 9	Input.Restriction[0].Character[n].NumberNine								-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 1): Character n: Selected Character A	Input.Restriction[0].Character[n].UpperCaseA								-
	Restriction Settings (Line 1): Character n: Selected Character B	Input.Restriction[0].Character[n].UpperCaseB								-
	Restriction Settings (Line 1): Character n: Selected Character C	Input.Restriction[0].Character[n].UpperCaseC								-
	Restriction Settings (Line 1): Character n: Selected Character D	Input.Restriction[0].Character[n].UpperCaseD								-
	Restriction Settings (Line 1): Character n: Selected Character E	Input.Restriction[0].Character[n].UpperCaseE								-
	Restriction Settings (Line 1): Character n: Selected Character F	Input.Restriction[0].Character[n].UpperCaseF								-
	Restriction Settings (Line 1): Character n: Selected Character G	Input.Restriction[0].Character[n].UpperCaseG								-
	Restriction Settings (Line 1): Character n: Selected Character H	Input.Restriction[0].Character[n].UpperCaseH								-
	Restriction Settings (Line 1): Character n: Selected Character I	Input.Restriction[0].Character[n].UpperCaseI								-
	Restriction Settings (Line 1): Character n: Selected Character J	Input.Restriction[0].Character[n].UpperCaseJ								-
	Restriction Settings (Line 1): Character n: Selected Character K	Input.Restriction[0].Character[n].UpperCaseK								-
	Restriction Settings (Line 1): Character n: Selected Character L	Input.Restriction[0].Character[n].UpperCaseL								-
	Restriction Settings (Line 1): Character n: Selected Character M	Input.Restriction[0].Character[n].UpperCaseM								-
	Restriction Settings (Line 1): Character n: Selected Character N	Input.Restriction[0].Character[n].UpperCaseN								-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 1): Character n: Selected Character O	Input.Restriction[0].Character[n].UpperCaseO								-
	Restriction Settings (Line 1): Character n: Selected Character P	Input.Restriction[0].Character[n].UpperCaseP								-
	Restriction Settings (Line 1): Character n: Selected Character Q	Input.Restriction[0].Character[n].UpperCaseQ								-
	Restriction Settings (Line 1): Character n: Selected Character R	Input.Restriction[0].Character[n].UpperCaseR								-
	Restriction Settings (Line 1): Character n: Selected Character S	Input.Restriction[0].Character[n].UpperCaseS								-
	Restriction Settings (Line 1): Character n: Selected Character T	Input.Restriction[0].Character[n].UpperCaseT								-
	Restriction Settings (Line 1): Character n: Selected Character U	Input.Restriction[0].Character[n].UpperCaseU								-
	Restriction Settings (Line 1): Character n: Selected Character V	Input.Restriction[0].Character[n].UpperCaseV								-
	Restriction Settings (Line 1): Character n: Selected Character W	Input.Restriction[0].Character[n].UpperCaseW								-
	Restriction Settings (Line 1): Character n: Selected Character X	Input.Restriction[0].Character[n].UpperCaseX								-
	Restriction Settings (Line 1): Character n: Selected Character Y	Input.Restriction[0].Character[n].UpperCaseY								-
	Restriction Settings (Line 1): Character n: Selected Character Z	Input.Restriction[0].Character[n].UpperCaseZ								-
	Restriction Settings (Line 1): Character n: Selected Character a	Input.Restriction[0].Character[n].LowerCaseA								-
	Restriction Settings (Line 1): Character n: Selected Character b	Input.Restriction[0].Character[n].LowerCaseB								-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 1): Character n: Selected Character c	Input.Restriction[0].Character[n].LowerCaseC								-
	Restriction Settings (Line 1): Character n: Selected Character d	Input.Restriction[0].Character[n].LowerCaseD								-
	Restriction Settings (Line 1): Character n: Selected Character e	Input.Restriction[0].Character[n].LowerCaseE								-
	Restriction Settings (Line 1): Character n: Selected Character f	Input.Restriction[0].Character[n].LowerCaseF								-
	Restriction Settings (Line 1): Character n: Selected Character g	Input.Restriction[0].Character[n].LowerCaseG								-
	Restriction Settings (Line 1): Character n: Selected Character h	Input.Restriction[0].Character[n].LowerCaseH								-
	Restriction Settings (Line 1): Character n: Selected Character i	Input.Restriction[0].Character[n].LowerCaseI								-
	Restriction Settings (Line 1): Character n: Selected Character j	Input.Restriction[0].Character[n].LowerCaseJ								-
	Restriction Settings (Line 1): Character n: Selected Character k	Input.Restriction[0].Character[n].LowerCaseK								-
	Restriction Settings (Line 1): Character n: Selected Character l	Input.Restriction[0].Character[n].LowerCaseL								-
	Restriction Settings (Line 1): Character n: Selected Character m	Input.Restriction[0].Character[n].LowerCaseM								-
	Restriction Settings (Line 1): Character n: Selected Character n	Input.Restriction[0].Character[n].LowerCaseN								-
	Restriction Settings (Line 1): Character n: Selected Character o	Input.Restriction[0].Character[n].LowerCaseO								-
	Restriction Settings (Line 1): Character n: Selected Character p	Input.Restriction[0].Character[n].LowerCaseP								-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 1): Character n: Selected Character q	Input.Restriction[0].Character[n].LowerCaseQ								-
	Restriction Settings (Line 1): Character n: Selected Character r	Input.Restriction[0].Character[n].LowerCaseR								-
	Restriction Settings (Line 1): Character n: Selected Character s	Input.Restriction[0].Character[n].LowerCaseS								-
	Restriction Settings (Line 1): Character n: Selected Character t	Input.Restriction[0].Character[n].LowerCaseT								-
	Restriction Settings (Line 1): Character n: Selected Character u	Input.Restriction[0].Character[n].LowerCaseU								-
	Restriction Settings (Line 1): Character n: Selected Character v	Input.Restriction[0].Character[n].LowerCaseV								-
	Restriction Settings (Line 1): Character n: Selected Character w	Input.Restriction[0].Character[n].LowerCaseW								-
	Restriction Settings (Line 1): Character n: Selected Character x	Input.Restriction[0].Character[n].LowerCaseX								-
	Restriction Settings (Line 1): Character n: Selected Character y	Input.Restriction[0].Character[n].LowerCaseY								-
	Restriction Settings (Line 1): Character n: Selected Character z	Input.Restriction[0].Character[n].LowerCaseZ								-
	Restriction Settings (Line 1): Character n: Selected Character -	Input.Restriction[0].Character[n].Hyphen								-
	Restriction Settings (Line 1): Character n: Selected Character .	Input.Restriction[0].Character[n].Dot								-
	Restriction Settings (Line 1): Character n: Selected Character :	Input.Restriction[0].Character[n].Colon								-
	Restriction Settings (Line 1): Character n: Selected Character /	Input.Restriction[0].Character[n].Slash								-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 1): Character n: Selected Character (	Input.Restriction[0].Character[n].LeftParenthesis								-
	Restriction Settings (Line 1): Character n: Selected Character)	Input.Restriction[0].Character[n].RightParenthesis								-
	Restriction Settings (Line 1): Character n: Selected Character +	Input.Restriction[0].Character[n].Plus								-
	Restriction Settings (Line 1): Character n: Selected Character _	Input.Restriction[0].Character[n].Space								-
	Restriction Settings (Line 2): Character n: Character Type	Input.Restriction[n].Character[n].Type	*	0	*	-	-	-	-	-
			S	1						
			J	2						
			C	3						
			E	4						
			N	5						
			A	6						
			a	7						
			#	8						
	Restriction Settings (Line 2): Character n: Selected Character 0	Input.Restriction[1].Character[n].NumberZero								-
	Restriction Settings (Line 2): Character n: Selected Character 1	Input.Restriction[1].Character[n].NumberOne								-
	Restriction Settings (Line 2): Character n: Selected Character 2	Input.Restriction[1].Character[n].NumberTwo								-
	Restriction Settings (Line 2): Character n: Selected Character 3	Input.Restriction[1].Character[n].NumberThree								-
	Restriction Settings (Line 2): Character n: Selected Character 4	Input.Restriction[1].Character[n].NumberFour								-
	Restriction Settings (Line 2): Character n: Selected Character 5	Input.Restriction[1].Character[n].NumberFive								-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 2): Character n: Selected Character 6	Input.Restriction[1].Character[n].NumberSix								-
	Restriction Settings (Line 2): Character n: Selected Character 7	Input.Restriction[1].Character[n].NumberSeven								-
	Restriction Settings (Line 2): Character n: Selected Character 8	Input.Restriction[1].Character[n].NumberEight								-
	Restriction Settings (Line 2): Character n: Selected Character 9	Input.Restriction[1].Character[n].NumberNine								-
	Restriction Settings (Line 2): Character n: Selected Character A	Input.Restriction[1].Character[n].UpperCaseA								-
	Restriction Settings (Line 2): Character n: Selected Character B	Input.Restriction[1].Character[n].UpperCaseB								-
	Restriction Settings (Line 2): Character n: Selected Character C	Input.Restriction[1].Character[n].UpperCaseC								-
	Restriction Settings (Line 2): Character n: Selected Character D	Input.Restriction[1].Character[n].UpperCaseD								-
	Restriction Settings (Line 2): Character n: Selected Character E	Input.Restriction[1].Character[n].UpperCaseE								-
	Restriction Settings (Line 2): Character n: Selected Character F	Input.Restriction[1].Character[n].UpperCaseF								-
	Restriction Settings (Line 2): Character n: Selected Character G	Input.Restriction[1].Character[n].UpperCaseG								-
	Restriction Settings (Line 2): Character n: Selected Character H	Input.Restriction[1].Character[n].UpperCaseH								-
	Restriction Settings (Line 2): Character n: Selected Character I	Input.Restriction[1].Character[n].UpperCaseI								-
	Restriction Settings (Line 2): Character n: Selected Character J	Input.Restriction[1].Character[n].UpperCaseJ								-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 2): Character n: Selected Character K	Input.Restriction[1].Character[n].UpperCaseK								-
	Restriction Settings (Line 2): Character n: Selected Character L	Input.Restriction[1].Character[n].UpperCaseL								-
	Restriction Settings (Line 2): Character n: Selected Character M	Input.Restriction[1].Character[n].UpperCaseM								-
	Restriction Settings (Line 2): Character n: Selected Character N	Input.Restriction[1].Character[n].UpperCaseN								-
	Restriction Settings (Line 2): Character n: Selected Character O	Input.Restriction[1].Character[n].UpperCaseO								-
	Restriction Settings (Line 2): Character n: Selected Character P	Input.Restriction[1].Character[n].UpperCaseP								-
	Restriction Settings (Line 2): Character n: Selected Character Q	Input.Restriction[1].Character[n].UpperCaseQ								-
	Restriction Settings (Line 2): Character n: Selected Character R	Input.Restriction[1].Character[n].UpperCaseR								-
	Restriction Settings (Line 2): Character n: Selected Character S	Input.Restriction[1].Character[n].UpperCaseS								-
	Restriction Settings (Line 2): Character n: Selected Character T	Input.Restriction[1].Character[n].UpperCaseT								-
	Restriction Settings (Line 2): Character n: Selected Character U	Input.Restriction[1].Character[n].UpperCaseU								-
	Restriction Settings (Line 2): Character n: Selected Character V	Input.Restriction[1].Character[n].UpperCaseV								-
	Restriction Settings (Line 2): Character n: Selected Character W	Input.Restriction[1].Character[n].UpperCaseW								-
	Restriction Settings (Line 2): Character n: Selected Character X	Input.Restriction[1].Character[n].UpperCaseX								-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 2): Character n: Selected Character Y	Input.Restriction[1].Character[n].UpperCaseY								-
	Restriction Settings (Line 2): Character n: Selected Character Z	Input.Restriction[1].Character[n].UpperCaseZ								-
	Restriction Settings (Line 2): Character n: Selected Character a	Input.Restriction[1].Character[n].LowerCaseA								-
	Restriction Settings (Line 2): Character n: Selected Character b	Input.Restriction[1].Character[n].LowerCaseB								-
	Restriction Settings (Line 2): Character n: Selected Character c	Input.Restriction[1].Character[n].LowerCaseC								-
	Restriction Settings (Line 2): Character n: Selected Character d	Input.Restriction[1].Character[n].LowerCaseD								-
	Restriction Settings (Line 2): Character n: Selected Character e	Input.Restriction[1].Character[n].LowerCaseE								-
	Restriction Settings (Line 2): Character n: Selected Character f	Input.Restriction[1].Character[n].LowerCaseF								-
	Restriction Settings (Line 2): Character n: Selected Character g	Input.Restriction[1].Character[n].LowerCaseG								-
	Restriction Settings (Line 2): Character n: Selected Character h	Input.Restriction[1].Character[n].LowerCaseH								-
	Restriction Settings (Line 2): Character n: Selected Character i	Input.Restriction[1].Character[n].LowerCaseI								-
	Restriction Settings (Line 2): Character n: Selected Character j	Input.Restriction[1].Character[n].LowerCaseJ								-
	Restriction Settings (Line 2): Character n: Selected Character k	Input.Restriction[1].Character[n].LowerCaseK								-
	Restriction Settings (Line 2): Character n: Selected Character l	Input.Restriction[1].Character[n].LowerCaseL								-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 2): Character n: Selected Character m	Input.Restriction[1].Character[n].LowerCaseM								-
	Restriction Settings (Line 2): Character n: Selected Character n	Input.Restriction[1].Character[n].LowerCaseN								-
	Restriction Settings (Line 2): Character n: Selected Character o	Input.Restriction[1].Character[n].LowerCaseO								-
	Restriction Settings (Line 2): Character n: Selected Character p	Input.Restriction[1].Character[n].LowerCaseP								-
	Restriction Settings (Line 2): Character n: Selected Character q	Input.Restriction[1].Character[n].LowerCaseQ								-
	Restriction Settings (Line 2): Character n: Selected Character r	Input.Restriction[1].Character[n].LowerCaseR								-
	Restriction Settings (Line 2): Character n: Selected Character s	Input.Restriction[1].Character[n].LowerCaseS								-
	Restriction Settings (Line 2): Character n: Selected Character t	Input.Restriction[1].Character[n].LowerCaseT								-
	Restriction Settings (Line 2): Character n: Selected Character u	Input.Restriction[1].Character[n].LowerCaseU								-
	Restriction Settings (Line 2): Character n: Selected Character v	Input.Restriction[1].Character[n].LowerCaseV								-
	Restriction Settings (Line 2): Character n: Selected Character w	Input.Restriction[1].Character[n].LowerCaseW								-
	Restriction Settings (Line 2): Character n: Selected Character x	Input.Restriction[1].Character[n].LowerCaseX								-
	Restriction Settings (Line 2): Character n: Selected Character y	Input.Restriction[1].Character[n].LowerCaseY								-
	Restriction Settings (Line 2): Character n: Selected Character z	Input.Restriction[1].Character[n].LowerCaseZ								-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Restriction Settings (Line 2): Character n: Selected Character -	Input.Restriction[1].Character[n].Hyphen								-
	Restriction Settings (Line 2): Character n: Selected Character .	Input.Restriction[1].Character[n].Dot								-
	Restriction Settings (Line 2): Character n: Selected Character :	Input.Restriction[1].Character[n].Colon								-
	Restriction Settings (Line 2): Character n: Selected Character /	Input.Restriction[1].Character[n].Slash								-
	Restriction Settings (Line 2): Character n: Selected Character (	Input.Restriction[1].Character[n].LeftParenthesis								-
	Restriction Settings (Line 2): Character n: Selected Character)	Input.Restriction[1].Character[n].RightParenthesis								-
	Restriction Settings (Line 2): Character n: Selected Character +	Input.Restriction[1].Character[n].Plus								-
	Restriction Settings (Line 2): Character n: Selected Character _	Input.Restriction[1].Character[n].Space								-
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			3	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Line Block Region: Enabled	Input.Graphic.LineBlockRegion.Visible			True	-	-	-	-	-
	Line Block Region: Line Thickness	Input.Graphic.LineBlockRegion.StrokeWidth			1	64	1	2	0	-
	Line Block Region: Pass Color: Enabled	Input.Graphic.LineBlockRegion.ColorPass.Visible			True	-	-	-	-	-
	Line Block Region: Pass Color: Red	Input.Graphic.LineBlockRegion.ColorPass.Red			221	255	0	3	0	-
	Line Block Region: Pass Color: Green	Input.Graphic.LineBlockRegion.ColorPass.Green			182	255	0	3	0	-
	Line Block Region: Pass Color: Blue	Input.Graphic.LineBlockRegion.ColorPass.Blue			14	255	0	3	0	-
	Line Block Region: Fail Color: Enabled	Input.Graphic.LineBlockRegion.ColorFail.Visible			True	-	-	-	-	-
	Line Block Region: Fail Color: Red	Input.Graphic.LineBlockRegion.ColorFail.Red			221	255	0	3	0	-
	Line Block Region: Fail Color: Green	Input.Graphic.LineBlockRegion.ColorFail.Green			182	255	0	3	0	-
	Line Block Region: Fail Color: Blue	Input.Graphic.LineBlockRegion.ColorFail.Blue			14	255	0	3	0	-
	Character Block Region: Enabled	Input.Graphic.CharacterRegion.Visible			True	-	-	-	-	-
	Character Block Region: Line Thickness	Input.Graphic.CharacterRegion.StrokeWidth			1	64	1	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Character Block Region: Pass Color: Enabled	Input.Graphic.CharacterRegion.ColorPass.Visible			True	-	-	-	-	-
	Character Block Region: Pass Color: Red	Input.Graphic.CharacterRegion.ColorPass.Red			90	255	0	3	0	-
	Character Block Region: Pass Color: Green	Input.Graphic.CharacterRegion.ColorPass.Green			210	255	0	3	0	-
	Character Block Region: Pass Color: Blue	Input.Graphic.CharacterRegion.ColorPass.Blue			70	255	0	3	0	-
	Character Block Region: Fail Color: Enabled	Input.Graphic.CharacterRegion.ColorFail.Visible			True	-	-	-	-	-
	Character Block Region: Fail Color: Red	Input.Graphic.CharacterRegion.ColorFail.Red			90	255	0	3	0	-
	Character Block Region: Fail Color: Green	Input.Graphic.CharacterRegion.ColorFail.Green			210	255	0	3	0	-
	Character Block Region: Fail Color: Blue	Input.Graphic.CharacterRegion.ColorFail.Blue			70	255	0	3	0	-
	Character Block Region: Display Recognized Characters: Enabled	Input.Graphic.CharacterRegion.Character.Visible			True	-	-	-	-	-
	Character Block Region: Display Correlation: Enabled	Input.Graphic.CharacterRegion.Correlation.Visible			True	-	-	-	-	-
	Character Block Region: Display Stability: Enabled	Input.Graphic.CharacterRegion.Stability.Visible			False	-	-	-	-	-
	Character Block Region: Character: Size	Input.Graphic.CharacterRegion.Font.Size			12	256	6	3	0	-

1D Code Reader

#O031

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Code Type	Input.CodeType	Not Set	0	Not Set	-	-	-	-	✓
			CODE39	1						
			CODE128	2						
			EAN/JAN/UPC	3						
			GS1 Databar	4						
			ITF	5						
			Codabar/NW-7	6						
			CODE93	7						
			Pharmacode	8						
Detection Parameters(Single Reading)	Code Resolution Enabled	Input.ModuleSize.Enable			False	-	-	-	-	-
	Code Resolution	Input.ModuleSize			0.00	200.00	0.00	3	2	✓
	Reference Contrast Enabled	Input.ReferenceContrast.Enable			False	-	-	-	-	-
	Reference Contrast	Input.ReferenceContrast	Highest	0	Normal	-	-	-	-	✓
			High	1						
			Normal	2						
			Low	3						
			Lowest	4						
	Code Color Enabled	Input.CodeColor.Enable			False	-	-	-	-	-
	Code Color	Input.CodeColor	Both	0	Both	-	-	-	-	✓
			Black	1						
			White	2						
	Starting Angle Enabled	Input.StartingAngle.Enable			False	-	-	-	-	-
	Starting Angle	Input.StartingAngle			0.000	180.000	-179.999	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Options(Single Reading)	Scale Variations	Input.ScaleVariation	Small	0	Small	-	-	-	-	✓
			Medium	1						
			Large	2						
			Unrestricted	3						
	Timeout	Input.TimeoutTime			3.00	60.00	0.01	2	2	✓
	Large Area Mode	Input.LargeAreaMode			False	-	-	-	-	-
Individual Settings (CODE39)	Number of Read Digits: Enabled	Input.CODE39.ReadDigits.Enable			False	-	-	-	-	-
	Number of Read Digits: Maximum	Input.CODE39.ReadDigits.Max			128	128	1	3	0	✓
	Number of Read Digits: Minimum	Input.CODE39.ReadDigits.Min			1	128	1	3	0	✓
	Check Digit	Input.CODE39.CheckDigit.Enable			False	-	-	-	-	-
	Verification	Input.CODE39.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15416	1						
Individual Settings (CODE128)	Number of Read Digits: Enabled	Input.CODE128.ReadDigits.Enable			False	-	-	-	-	-
	Number of Read Digits: Maximum	Input.CODE128.ReadDigits.Max			128	128	1	3	0	✓
	Number of Read Digits: Minimum	Input.CODE128.ReadDigits.Min			1	128	1	3	0	✓
	Verification	Input.CODE128.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15416	1						
Individual Settings (EAN/JAN/UPC)	Code Detail Enabled	Input.EanJanUpc.CodeDetail.Enable			False	-	-	-	-	-
	Code Detail: EAN/JAN-13, UPC-A	Input.EanJanUpc.CodeDetail.EAN13			True	-	-	-	-	-
	Code Detail: EAN/JAN-13, UPC-A & 2-digit	Input.EanJanUpc.CodeDetail.EAN13Addon2			True	-	-	-	-	-
	Code Detail: EAN/JAN-13, UPC-A & 5-digit	Input.EanJanUpc.CodeDetail.EAN13Addon5			True	-	-	-	-	-
	Code Detail: EAN/JAN-8	Input.EanJanUpc.CodeDetail.EAN8			True	-	-	-	-	-
	Code Detail: EAN/JAN-8 & 2-digit	Input.EanJanUpc.CodeDetail.EAN8Addon2			True	-	-	-	-	-
	Code Detail: EAN/JAN-8 & 5-digit	Input.EanJanUpc.CodeDetail.EAN8Addon5			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Individual Settings (EAN/JAN/UPC)	Code Detail: UPC-E	Input.EanJanUpc.CodeDetail.UPC			True	-	-	-	-	-
	Code Detail: UPC-E & 2-digit	Input.EanJanUpc.CodeDetail.UPCAddon2			True	-	-	-	-	-
	Code Detail: UPC-E & 5-digit	Input.EanJanUpc.CodeDetail.UPCAddon5			True	-	-	-	-	-
	Verification	Input.EanJanUpc.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15416	1						
Individual Settings (GS1 Databar)	Code Detail Enabled	Input.GS1Databar.CodeDetail.Enable			False	-	-	-	-	-
	Code Detail: Databar	Input.GS1Databar.CodeDetail.Databar			True	-	-	-	-	-
	Code Detail: Databar Stacked	Input.GS1Databar.CodeDetail.DatabarStacked			True	-	-	-	-	-
	Code Detail: Databar Limited	Input.GS1Databar.CodeDetail.DatabarLimited			True	-	-	-	-	-
	Code Detail: Databar Expanded	Input.GS1Databar.CodeDetail.DatabarExpanded			True	-	-	-	-	-
	Code Detail: Databar Expanded Stacked	Input.GS1Databar.CodeDetail.DatabarExpandedStacked			True	-	-	-	-	-
	Number of Read Digits: Enabled	Input.GS1Databar.ReadDigits.Enable			False	-	-	-	-	-
	Number of Read Digits: Maximum	Input.GS1Databar.ReadDigits.Max			128	128	1	3	0	✓
	Number of Read Digits: Minimum	Input.GS1Databar.ReadDigits.Min			1	128	1	3	0	✓
	Verification	Input.GS1Databar.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15416	1						
Individual Settings (ITF)	Number of Read Digits: Enabled	Input.ITF.ReadDigits.Enable			False	-	-	-	-	-
	Number of Read Digits: Maximum	Input.ITF.ReadDigits.Max			128	128	1	3	0	✓
	Number of Read Digits: Minimum	Input.ITF.ReadDigits.Min			1	128	1	3	0	✓
	Check Digit	Input.ITF.CheckDigit.Enable			False	-	-	-	-	-
	Verification	Input.ITF.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15416	1						
Individual Settings (Codabar/NW-7)	Number of Read Digits: Enabled	Input.CodabarNW7.ReadDigits.Enable			False	-	-	-	-	-
	Number of Read Digits: Maximum	Input.CodabarNW7.ReadDigits.Max			128	128	1	3	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Individual Settings (Codabar/NW-7)	Number of Read Digits: Minimum	Input.CodabarNW7.ReadDigits.Min			1	128	1	3	0	✓
	Check Digit	Input.CodabarNW7.CheckDigit	OFF	0	OFF	-	-	-	-	-
			Modulus 16	1						
			Modulus 11	2						
			Modulus 10/ Weight 2	3						
			Modulus 10/ Weight 3	4						
			7 Check DR	5						
			Modulus 11-A	6						
			Lunes	7						
	Verification	Input.CodabarNW7.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15416	1						
Individual Settings (Pharmacode)	Read Direction	Input.Pharmacode.Direction	→	0	→	-	-	-	-	✓
			←	1						
			↑	2						
			↓	3						
	Number of Read Digits: Enabled	Input.Pharmacode.ReadDigits.Enable			False	-	-	-	-	-
	Number of Read Digits: Maximum	Input.Pharmacode.ReadDigits.Max			128	128	1	3	0	✓
	Number of Read Digits: Minimum	Input.Pharmacode.ReadDigits.Min			1	128	1	3	0	✓
	Verification	Input.Pharmacode.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15416	1						
Individual Settings (CODE93)	Number of Read Digits: Enabled	Input.CODE93.ReadDigits.Enable			False	-	-	-	-	-
	Number of Read Digits: Maximum	Input.CODE93.ReadDigits.Max			128	128	1	3	0	✓
	Number of Read Digits: Minimum	Input.CODE93.ReadDigits.Min			1	128	1	3	0	✓
	Verification	Input.CODE93.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15416	1						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Verification	CODE39: Decode (DEC)	Input.OverallSymbolGrade.CODE39.Decode			True	-	-	-	-	-
	CODE39: Edge Determination (EDGE)	Input.OverallSymbolGrade.CODE39.EdgeDeterminati on			True	-	-	-	-	-
	CODE39: Symbol Contrast (SC)	Input.OverallSymbolGrade.CODE39.SymbolContrast			True	-	-	-	-	-
	CODE39: Minimum Reflectance (MINR)	Input.OverallSymbolGrade.CODE39.MinimumReflecta nce			True	-	-	-	-	-
	CODE39: Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.CODE39.MinimumEdgeCo ntrast			True	-	-	-	-	-
	CODE39: Modulation (MOD)	Input.OverallSymbolGrade.CODE39.Modulation			True	-	-	-	-	-
	CODE39: Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.CODE39.MinimumQuietZo ne			True	-	-	-	-	-
	CODE39: Decodability (DCD)	Input.OverallSymbolGrade.CODE39.Decodability			True	-	-	-	-	-
	CODE39: Defects (DEF)	Input.OverallSymbolGrade.CODE39.Defects			True	-	-	-	-	-
	CODE39: Wide-Narrow Ratio (WNR)	Input.OverallSymbolGrade.CODE39.WideToNarrowRa tio			True	-	-	-	-	-
	CODE39: Inter Character Gap (CGAP)	Input.OverallSymbolGrade.CODE39.InterCharacterGa p			True	-	-	-	-	-
	CODE128: Decode (DEC)	Input.OverallSymbolGrade.CODE128.Decode			True	-	-	-	-	-
	CODE128: Edge Determination (EDGE)	Input.OverallSymbolGrade.CODE128.EdgeDeterminat ion			True	-	-	-	-	-
	CODE128: Symbol Contrast (SC)	Input.OverallSymbolGrade.CODE128.SymbolContrast			True	-	-	-	-	-
	CODE128: Minimum Reflectance (MINR)	Input.OverallSymbolGrade.CODE128.MinimumReflect ance			True	-	-	-	-	-
	CODE128: Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.CODE128.MinimumEdgeC ontrast			True	-	-	-	-	-
	CODE128: Modulation (MOD)	Input.OverallSymbolGrade.CODE128.Modulation			True	-	-	-	-	-
	CODE128: Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.CODE128.MinimumQuietZ one			True	-	-	-	-	-
	CODE128: Decodability (DCD)	Input.OverallSymbolGrade.CODE128.Decodability			True	-	-	-	-	-
	CODE128: Defects (DEF)	Input.OverallSymbolGrade.CODE128.Defects			True	-	-	-	-	-
	EAN/JAN/UPC: Decode (DEC)	Input.OverallSymbolGrade.EanJanUpc.Decode			True	-	-	-	-	-
	EAN/JAN/UPC: Edge Determination (EDGE)	Input.OverallSymbolGrade.EanJanUpc.EdgeDetermin ation			True	-	-	-	-	-
	EAN/JAN/UPC: Symbol Contrast (SC)	Input.OverallSymbolGrade.EanJanUpc.SymbolContra st			True	-	-	-	-	-
	EAN/JAN/UPC: Minimum Reflectance (MINR)	Input.OverallSymbolGrade.EanJanUpc.MinimumRefle ctance			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Verification	EAN/JAN/UPC: Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.EanJanUpc.MinimumEdge Contrast			True	-	-	-	-	-
	EAN/JAN/UPC: Modulation (MOD)	Input.OverallSymbolGrade.EanJanUpc.Modulation			True	-	-	-	-	-
	EAN/JAN/UPC: Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.EanJanUpc.MinimumQuiet Zone			True	-	-	-	-	-
	EAN/JAN/UPC: Decodability (DCD)	Input.OverallSymbolGrade.EanJanUpc.Decodability			True	-	-	-	-	-
	EAN/JAN/UPC: Defects (DEF)	Input.OverallSymbolGrade.EanJanUpc.Defects			True	-	-	-	-	-
	GS1 Databar: Decode (DEC)	Input.OverallSymbolGrade.GS1Databar.Decode			True	-	-	-	-	-
	GS1 Databar: Edge Determination (EDGE)	Input.OverallSymbolGrade.GS1Databar.EdgeDetermi nation			True	-	-	-	-	-
	GS1 Databar: Symbol Contrast (SC)	Input.OverallSymbolGrade.GS1Databar.SymbolContra st			True	-	-	-	-	-
	GS1 Databar: Minimum Reflectance (MINR)	Input.OverallSymbolGrade.GS1Databar.MinimumRefle ctance			True	-	-	-	-	-
	GS1 Databar: Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.GS1Databar.MinimumEdg eContrast			True	-	-	-	-	-
	GS1 Databar: Modulation (MOD)	Input.OverallSymbolGrade.GS1Databar.Modulation			True	-	-	-	-	-
	GS1 Databar: Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.GS1Databar.MinimumQuie tZone			True	-	-	-	-	-
	GS1 Databar: Decodability (DCD)	Input.OverallSymbolGrade.GS1Databar.Decodability			True	-	-	-	-	-
	GS1 Databar: Defects (DEF)	Input.OverallSymbolGrade.GS1Databar.Defects			True	-	-	-	-	-
	ITF: Decode (DEC)	Input.OverallSymbolGrade.ITF.Decode			True	-	-	-	-	-
	ITF: Edge Determination (EDGE)	Input.OverallSymbolGrade.ITF.EdgeDetermination			True	-	-	-	-	-
	ITF: Symbol Contrast (SC)	Input.OverallSymbolGrade.ITF.SymbolContrast			True	-	-	-	-	-
	ITF: Minimum Reflectance (MINR)	Input.OverallSymbolGrade.ITF.MinimumReflectance			True	-	-	-	-	-
	ITF: Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.ITF.MinimumEdgeContrast			True	-	-	-	-	-
	ITF: Modulation (MOD)	Input.OverallSymbolGrade.ITF.Modulation			True	-	-	-	-	-
	ITF: Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.ITF.MinimumQuietZone			True	-	-	-	-	-
	ITF: Decodability (DCD)	Input.OverallSymbolGrade.ITF.Decodability			True	-	-	-	-	-
	ITF: Defects (DEF)	Input.OverallSymbolGrade.ITF.Defects			True	-	-	-	-	-
	ITF: Wide-Narrow Ratio (WNR)	Input.OverallSymbolGrade.ITF.WideToNarrowRatio			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Verification	Codabar/NW-7: Decode (DEC)	Input.OverallSymbolGrade.CodabarNW7.Decode			True	-	-	-	-	-
	Codabar/NW-7: Edge Determination (EDGE)	Input.OverallSymbolGrade.CodabarNW7.EdgeDetermination			True	-	-	-	-	-
	Codabar/NW-7: Symbol Contrast (SC)	Input.OverallSymbolGrade.CodabarNW7.SymbolContrast			True	-	-	-	-	-
	Codabar/NW-7: Minimum Reflectance (MINR)	Input.OverallSymbolGrade.CodabarNW7.MinimumReflectance			True	-	-	-	-	-
	Codabar/NW-7: Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.CodabarNW7.MinimumEdgeContrast			True	-	-	-	-	-
	Codabar/NW-7: Modulation (MOD)	Input.OverallSymbolGrade.CodabarNW7.Modulation			True	-	-	-	-	-
	Codabar/NW-7: Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.CodabarNW7.MinimumQuietZone			True	-	-	-	-	-
	Codabar/NW-7: Decodability (DCD)	Input.OverallSymbolGrade.CodabarNW7.Decodability			True	-	-	-	-	-
	Codabar/NW-7: Defects (DEF)	Input.OverallSymbolGrade.CodabarNW7.Defects			True	-	-	-	-	-
	Pharmacode: Decode (DEC)	Input.OverallSymbolGrade.Pharmacode.Decode			True	-	-	-	-	-
	Pharmacode: Edge Determination (EDGE)	Input.OverallSymbolGrade.Pharmacode.EdgeDetermination			True	-	-	-	-	-
	Pharmacode: Symbol Contrast (SC)	Input.OverallSymbolGrade.Pharmacode.SymbolContrast			True	-	-	-	-	-
	Pharmacode: Minimum Reflectance (MINR)	Input.OverallSymbolGrade.Pharmacode.MinimumReflectance			True	-	-	-	-	-
	Pharmacode: Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.Pharmacode.MinimumEdgeContrast			True	-	-	-	-	-
	Pharmacode: Modulation (MOD)	Input.OverallSymbolGrade.Pharmacode.Modulation			True	-	-	-	-	-
	Pharmacode: Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.Pharmacode.MinimumQuietZone			True	-	-	-	-	-
	Pharmacode: Decodability (DCD)	Input.OverallSymbolGrade.Pharmacode.Decodability			True	-	-	-	-	-
	Pharmacode: Defects (DEF)	Input.OverallSymbolGrade.Pharmacode.Defects			True	-	-	-	-	-
	CODE93: Decode (DEC)	Input.OverallSymbolGrade.CODE93.Decode			True	-	-	-	-	-
	CODE93: Edge Determination (EDGE)	Input.OverallSymbolGrade.CODE93.EdgeDetermination			True	-	-	-	-	-
	CODE93: Symbol Contrast (SC)	Input.OverallSymbolGrade.CODE93.SymbolContrast			True	-	-	-	-	-
	CODE93: Minimum Reflectance (MINR)	Input.OverallSymbolGrade.CODE93.MinimumReflectance			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Verification	CODE93: Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.CODE93.MinimumEdgeContrast			True	-	-	-	-	-
	CODE93: Modulation (MOD)	Input.OverallSymbolGrade.CODE93.Modulation			True	-	-	-	-	-
	CODE93: Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.CODE93.MinimumQuietZone			True	-	-	-	-	-
	CODE93: Decodability (DCD)	Input.OverallSymbolGrade.CODE93.Decodability			True	-	-	-	-	-
	CODE93: Defects (DEF)	Input.OverallSymbolGrade.CODE93.Defects			True	-	-	-	-	-
Read Data Settings	Read Start Digit	Input.StartDigit			1	128	1	3	0	✓
	Read Data Length	Input.DataLength			100	128	1	3	0	-
	Output Symbol Identifier	Input.SymbolIdentifier			True	-	-	-	-	-
Judgment Conditions	Collation Pattern	Input.Limit.Reference.String			-	-	-	-	-	✓
	Handling of [#], [*], [!]	Input.Limit.Reference.Setting.SpecialCharactersProcessing	Special		Normal	-	-	-	-	-
			Normal							
	Read Data Length: Upper Limit Enabled	Input.Limit.CodeLength.Max.Enable			False	-	-	-	-	-
	Read Data Length: Upper Limit	Input.Limit.CodeLength.Max			Current Value	999	0	3	0	✓
	Read Data Length: Lower Limit Enabled	Input.Limit.CodeLength.Min.Enable			False	-	-	-	-	-
	Read Data Length: Lower Limit	Input.Limit.CodeLength.Min			Current Value	999	0	3	0	✓
	Position X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Position X: Upper Limit	Input.Limit.Position.X.Max			Current Value	99999.999	-99999.999	5	3	✓
	Position X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Position X: Lower Limit	Input.Limit.Position.X.Min			Current Value	99999.999	-99999.999	5	3	✓
	Position Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Position Y: Upper Limit	Input.Limit.Position.Y.Max			Current Value	99999.999	-99999.999	5	3	✓
	Position Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-
	Position Y: Lower Limit	Input.Limit.Position.Y.Min			Current Value	99999.999	-99999.999	5	3	✓
	Detected Angle: Upper Limit Enabled	Input.Limit.Position.Angle.Max.Enable			False	-	-	-	-	-
	Detected Angle: Upper Limit	Input.Limit.Position.Angle.Max			Current Value	180.000	-180.000	3	3	✓
	Detected Angle: Lower Limit Enabled	Input.Limit.Position.Angle.Min.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Detected Angle: Lower Limit	Input.Limit.Position.Angle.Min			Current Value	180.000	-180.000	3	3	✓
	Quality Verification (CODE39): Enabled	Input.Limit.CODE39.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Quality Verification (CODE39): Lower Limit	Input.Limit.CODE39.Verification.OverallSymbolGrade.Min			Current Value	4.0	0.0	1	1	✓
	Quality Verification (CODE128): Enabled	Input.Limit.CODE128.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Quality Verification (CODE128): Lower Limit	Input.Limit.CODE128.Verification.OverallSymbolGrade.Min			Current Value	4.0	0.0	1	1	✓
	Quality Verification (EAN/JAN/UPC): Enabled	Input.Limit.EanJanUpc.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Quality Verification (EAN/JAN/UPC): Lower Limit	Input.Limit.EanJanUpc.Verification.OverallSymbolGrade.Min			Current Value	4.0	0.0	1	1	✓
	Quality Verification (GS1 Databar): Enabled	Input.Limit.GS1Databar.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Quality Verification (GS1 Databar): Lower Limit	Input.Limit.GS1Databar.Verification.OverallSymbolGrade.Min			Current Value	4.0	0.0	1	1	✓
	Quality Verification (ITF): Enabled	Input.Limit.ITF.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Quality Verification (ITF): Lower Limit	Input.Limit.ITF.Verification.OverallSymbolGrade.Min			Current Value	4.0	0.0	1	1	✓
	Quality Verification (Codabar/NW-7): Enabled	Input.Limit.CodabarNW7.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Quality Verification (Codabar/NW-7): Lower Limit	Input.Limit.CodabarNW7.Verification.OverallSymbolGrade.Min			Current Value	4.0	0.0	1	1	✓
	Quality Verification (Pharmacode): Enabled	Input.Limit.Pharmacode.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Quality Verification (Pharmacode): Lower Limit	Input.Limit.Pharmacode.Verification.OverallSymbolGrade.Min			Current Value	4.0	0.0	1	1	✓
	Quality Verification (CODE93): Enabled	Input.Limit.CODE93.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Quality Verification (CODE93): Lower Limit	Input.Limit.CODE93.Verification.OverallSymbolGrade.Min			Current Value	4.0	0.0	1	1	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			145	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Detected Position: Size	Input.Graphic.PrimaryTarget.Size			16	1024	4	4	0	-
	Detected Position: Shape	Input.Graphic.PrimaryTarget.Shape	Cross	0	Cross with Arrow	-	-	-	-	-
			Cross with Arrow	1						
	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Detected Position: Display Read Data: Enabled	Input.Graphic.PrimaryTarget.CodeData.Visible			False	-	-	-	-	-
	Detected Position: Display Read Data Length: Enabled	Input.Graphic.PrimaryTarget.CodeLength.Visible			False	-	-	-	-	-
	Detected Position: Display Position X: Enabled	Input.Graphic.PrimaryTarget.Position.X.Visible			False	-	-	-	-	-
	Detected Position: Display Position Y: Enabled	Input.Graphic.PrimaryTarget.Position.Y.Visible			False	-	-	-	-	-
	Detected Position: Display Detected Angle: Enabled	Input.Graphic.PrimaryTarget.Position.Angle.Visible			False	-	-	-	-	-
	Detected Position: Display Overall Symbol Grade: Enabled	Input.Graphic.PrimaryTarget.OverallSymbolGrade.Visible			False	-	-	-	-	-
	Detected Position: Font: Size	Input.Graphic.PrimaryTarget.Font.Size			12	256	6	3	0	-

2D Code Reader

#O032

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Code Type	Input.CodeType	Not Set	0	Not Set	-	-	-	-	-
			QR	1						
			Micro QR	2						
			DataMatrix	3						
			Rectangular DataMatrix	4						
			PDF417	5						
			MicroPDF417	6						
			Composite Code	7						
Detection Parameters(Single Reading)	Code Resolution Enabled	Input.ModuleSize.Enable			False	-	-	-	-	-
	Code Resolution	Input.ModuleSize			0.00	200.00	0.00	3	2	✓
	Reference Contrast Enabled	Input.ReferenceContrast.Enable			False	-	-	-	-	-
	Reference Contrast	Input.ReferenceContrast	Highest	0	Normal	-	-	-	-	✓
			High	1						
			Normal	2						
			Low	3						
			Lowest	4						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
	Code Color Enabled	Input.CodeColor.Enable			False	-	-	-	-	-
	Code Color	Input.CodeColor	Both	0	Both	-	-	-	-	✓
			Black	1						
			White	2						
	Mirrored Reading Enabled	Input.MirrordReading.Enable			False	-	-	-	-	-
	Mirrored Reading	Input.MirrordReading	Standard and Mirrored	0	Standard and Mirrored	-	-	-	-	✓
			Standard Only	1						
			Mirrored Only	2						
	Starting Angle Enabled	Input.StartingAngle.Enable			False	-	-	-	-	-
Detection Parameters(Single Reading)	Starting Angle	Input.StartingAngle			0.000	180.000	-179.999	3	3	✓
	Angle Range	Input.AngleRange			180.000	180.000	0.000	3	3	✓
	Scale Variations	Input.ScaleVariation	Small	0	Small	-	-	-	-	✓
			Medium	1						
			Large	2						
			Unrestricted	3						
	Timeout	Input.TimeoutTime			3.00	60.00	0.01	2	2	✓
	Large Area Mode	Input.LargeAreaMode			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Individual Settings (QR)	Number of Cells Enabled	Input.QR.CodeSize.Enable			False	-	-	-	-	-
	Number of Cells	Input.QR.CodeSize	Any	0	Any	-	-	-	-	✓
			21x21	1						
			25x25	2						
			29x29	3						
			33x33	4						
			37x37	5						
			41x41	6						
			45x45	7						
			49x49	8						
			53x53	9						
			57x57	10						
			61x61	11						
			65x65	12						
			69x69	13						
			73x73	14						
			77x77	15						
			81x81	16						
			85x85	17						
			89x89	18						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Individual Settings (QR)	Number of Cells	Input.QR.CodeSize	93x93	19	Any	-	-	-	-	✓
			97x97	20						
			101x101	21						
			105x105	22						
			109x109	23						
			113x113	24						
			117x117	25						
			121x121	26						
			125x125	27						
			129x129	28						
			133x133	29						
			137x137	30						
			141x141	31						
			145x145	32						
			149x149	33						
			153x153	34						
			157x157	35						
			161x161	36						
			165x165	37						
			169x169	38						
			173x173	39						
			177x177	40						
	Verification	Input.QR.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15415	1						
			AIM DPM-1-2006	2						
Individual Settings (Micro QR)	Number of Cells Enabled	Input.MicroQR.CodeSize.Enable			False	-	-	-	-	-
	Number of Cells	Input.MicroQR.CodeSize	Any	0	Any	-	-	-	-	✓
			11x11	1						
			13x13	2						
			15x15	3						
			17x17	4						
	Verification	Input.MicroQR.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15415	1						
			AIM DPM-1-2006	2						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Individual Settings (DataMatrix)	Number of Cells Enabled	Input.DataMatrix.CodeSize.Enable			False	-	-	-	-	-
	Number of Cells	Input.DataMatrix.CodeSize	Any	0	Any	-	-	-	-	✓
			10x10	1						
			12x12	2						
			14x14	3						
			16x16	4						
			18x18	5						
			20x20	6						
			22x22	7						
			24x24	8						
			26x26	9						
			32x32	10						
			36x36	11						
			40x40	12						
			44x44	13						
			48x48	14						
			52x52	15						
			64x64	16						
			72x72	17						
			80x80	18						
			88x88	19						
			96x96	20						
			104x104	21						
			120x120	22						
			132x132	23						
			144x144	24						
	Verification	Input.DataMatrix.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15415	1						
			AIM DPM-1-2006	2						
			SAE AS9132	3						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Individual Settings (Rectangular DataMatrix)	Number of Cells Enabled	Input.RectangularDataMatrix.CodeSize.Enable			False	-	-	-	-	-
	Number of Cells	Input.RectangularDataMatrix.CodeSize	Any	0	Any	-	-	-	-	✓
			8x18	1						
			8x32	2						
			12x26	3						
			12x36	4						
			16x36	5						
			16x48	6						
	Verification	Input.RectangularDataMatrix.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15415	1						
			AIM DPM-1-2006	2						
			SAE AS9132	3						
Individual Settings (PDF417)	Verification	Input.PDF417.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15415	1						
Individual Settings (MicroPDF417)	Verification	Input.MicroPDF417.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15415	1						
Individual Settings (Composite Code)	Composite Code	Input.CompositeCode			False	-	-	-	-	-
Individual Settings (Composite Code).2D Part	Code Detail Enabled	Input.CompositeCode.2dPart.CodeDetail.Enable			False	-	-	-	-	-
	Code Detail (CC-A)	Input.CompositeCode.2dPart.CodeDetail.CCA			True	-	-	-	-	-
	Code Detail (CC-B)	Input.CompositeCode.2dPart.CodeDetail.CCB			True	-	-	-	-	-
	Code Detail (CC-C)	Input.CompositeCode.2dPart.CodeDetail.CCC			True	-	-	-	-	-
Individual Settings (Composite Code).1D Part	Code Type Enabled	Input.CompositeCode.1dPart.CodeType.Enable			False	-	-	-	-	-
	Code Type (EAN/JAN/UPC)	Input.CompositeCode.1dPart.CodeType.EanJanUpc			True	-	-	-	-	-
	Code Type (GS1 Databar)	Input.CompositeCode.1dPart.CodeType.GS1Databar			True	-	-	-	-	-
	Code Type (GS1 128)	Input.CompositeCode.1dPart.CodeType.GS1128			True	-	-	-	-	-
	Code Detail Enabled	Input.CompositeCode.1dPart.CodeDetail.Enable			False	-	-	-	-	-
	Code Detail (Databar)	Input.CompositeCode.1dPart.CodeDetail.Databar			True	-	-	-	-	-
	Code Detail (Databar Stacked)	Input.CompositeCode.1dPart.CodeDetail.DatabarStacked			True	-	-	-	-	-
	Code Detail (Databar Limited)	Input.CompositeCode.1dPart.CodeDetail.DatabarLimited			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Individual Settings (Composite Code).1D Part	Code Detail (Databar Expanded)	Input.CompositeCode.1dPart.CodeDetail.DatabarExpanded			True	-	-	-	-	-
	Code Detail (Databar Expanded Stacked)	Input.CompositeCode.1dPart.CodeDetail.DatabarExpandedStacked			True	-	-	-	-	-
	Code Detail (EAN/JAN-13, UPC-A)	Input.CompositeCode.1dPart.CodeDetail.EAN13			True	-	-	-	-	-
	Code Detail (EAN/JAN-13, UPC-A & 2-digit)	Input.CompositeCode.1dPart.CodeDetail.EAN13Addon2			True	-	-	-	-	-
	Code Detail (EAN/JAN-13, UPC-A & 5-digit)	Input.CompositeCode.1dPart.CodeDetail.EAN13Addon5			True	-	-	-	-	-
	Code Detail (EAN/JAN-8)	Input.CompositeCode.1dPart.CodeDetail.EAN8			True	-	-	-	-	-
	Code Detail (EAN/JAN-8 & 2-digit)	Input.CompositeCode.1dPart.CodeDetail.EAN8Addon2			True	-	-	-	-	-
	Code Detail (EAN/JAN-8 & 5-digit)	Input.CompositeCode.1dPart.CodeDetail.EAN8Addon5			True	-	-	-	-	-
	Code Detail (UPC-E)	Input.CompositeCode.1dPart.CodeDetail.UPC			True	-	-	-	-	-
	Code Detail (UPC-E & 2-digit)	Input.CompositeCode.1dPart.CodeDetail.UPCAddon2			True	-	-	-	-	-
	Code Detail (UPC-E & 5-digit)	Input.CompositeCode.1dPart.CodeDetail.UPCAddon5			True	-	-	-	-	-
	Number of Read Digits: Enabled	Input.CompositeCode.1dPart.ReadDigits.Enable			False	-	-	-	-	-
	Number of Read Digits: Maximum	Input.CompositeCode.1dPart.ReadDigits.Max			128	128	1	3	0	✓
	Number of Read Digits: Minimum	Input.CompositeCode.1dPart.ReadDigits.Min			1	128	1	3	0	✓
	Verification	Input.CompositeCode.Verification.Type	OFF	0	OFF	-	-	-	-	-
			ISO/IEC 15415	1						
Verification (QR)	Decode (DEC)	Input.OverallSymbolGrade.QR.Decode			True	-	-	-	-	-
	Symbol Contrast (SC)	Input.OverallSymbolGrade.QR.SymbolContrast			True	-	-	-	-	-
	Cell Contrast (CC)	Input.OverallSymbolGrade.QR.CellContrast			True	-	-	-	-	-
	Modulation (MOD)	Input.OverallSymbolGrade.QR.Modulation			True	-	-	-	-	-
	Cell Modulation(CM)	Input.OverallSymbolGrade.QR.CellModulation			True	-	-	-	-	-
	Reflectance Margin (RM)	Input.OverallSymbolGrade.QR.ReflectanceMargin			True	-	-	-	-	-
	Fixed Pattern Damage (FPD)	Input.OverallSymbolGrade.QR.FixedPatternDamage			True	-	-	-	-	-
	Axial Nonuniformity (AN)	Input.OverallSymbolGrade.QR.AxialNonuniformity			True	-	-	-	-	-
	Grid Nonuniformity(GN)	Input.OverallSymbolGrade.QR.GridNonuniformity			True	-	-	-	-	-
	Unused Error Correction (UEC)	Input.OverallSymbolGrade.QR.UnusedErrorCorrection			True	-	-	-	-	-
	Format Information Damage (FID)	Input.OverallSymbolGrade.QR.FormatInformationDamage			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Verification (Micro QR)	Version Information Damage(VID)	Input.OverallSymbolGrade.QR.VersionInformationDamage			True	-	-	-	-	-
	Print Growth Horizontal (PGH)	Input.OverallSymbolGrade.QR.PrintGrowthHorizontal			False	-	-	-	-	-
	Print Growth Vertical (PGV)	Input.OverallSymbolGrade.QR.PrintGrowthVertical			False	-	-	-	-	-
	Decode (DEC)	Input.OverallSymbolGrade.MicroQR.Decode			True	-	-	-	-	-
	Symbol Contrast (SC)	Input.OverallSymbolGrade.MicroQR.SymbolContrast			True	-	-	-	-	-
	Cell Contrast (CC)	Input.OverallSymbolGrade.MicroQR.CellContrast			True	-	-	-	-	-
	Modulation (MOD)	Input.OverallSymbolGrade.MicroQR.Modulation			True	-	-	-	-	-
	Cell Modulation (CM)	Input.OverallSymbolGrade.MicroQR.CellModulation			True	-	-	-	-	-
	Reflectance Margin (RM)	Input.OverallSymbolGrade.MicroQR.ReflectanceMargin			True	-	-	-	-	-
	Fixed Pattern Damage (FPD)	Input.OverallSymbolGrade.MicroQR.FixedPatternDamage			True	-	-	-	-	-
	Axial Nonuniformity (AN)	Input.OverallSymbolGrade.MicroQR.AxialNonuniformity			True	-	-	-	-	-
	Grid Nonuniformity(GN)	Input.OverallSymbolGrade.MicroQR.GridNonuniformity			True	-	-	-	-	-
	Unused Error Correction (UEC)	Input.OverallSymbolGrade.MicroQR.UnusedErrorCorrection			True	-	-	-	-	-
	Format Information Damage (FID)	Input.OverallSymbolGrade.MicroQR.FormatInformationDamage			True	-	-	-	-	-
	Version Information Damage(VID)	Input.OverallSymbolGrade.MicroQR.VersionInformationDamage			True	-	-	-	-	-
	Print Growth Horizontal (PGH)	Input.OverallSymbolGrade.MicroQR.PrintGrowthHorizontal			True	-	-	-	-	-
	Print Growth Vertical (PGV)	Input.OverallSymbolGrade.MicroQR.PrintGrowthVertical			False	-	-	-	-	-
Verification (DataMatrix)	Decode (DEC)	Input.OverallSymbolGrade.DataMatrix.Decode			False	-	-	-	-	-
	Quiet Zone (QZ)	Input.OverallSymbolGrade.DataMatrix.QuietZone			True	-	-	-	-	-
	Symbol Contrast (SC)	Input.OverallSymbolGrade.DataMatrix.SymbolContrast			True	-	-	-	-	-
	Cell Contrast (CC)	Input.OverallSymbolGrade.DataMatrix.CellContrast			True	-	-	-	-	-
	Modulation (MOD)	Input.OverallSymbolGrade.DataMatrix.Modulation			True	-	-	-	-	-
	Cell Modulation (CM)	Input.OverallSymbolGrade.DataMatrix.CellModulation			True	-	-	-	-	-
	Angular Distortion (AD)	Input.OverallSymbolGrade.DataMatrix.AngularDistortion			True	-	-	-	-	-
	Module Fill (MF)	Input.OverallSymbolGrade.DataMatrix.ModuleFill			True	-	-	-	-	-
	Reflectance Margin (RM)	Input.OverallSymbolGrade.DataMatrix.ReflectanceMargin			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Verification (DataMatrix)	Fixed Pattern Damage (FPD)	Input.OverallSymbolGrade.DataMatrix.FixedPatternDamage			True	-	-	-	-	-
	Axial Nonuniformity (AN)	Input.OverallSymbolGrade.DataMatrix.AxialNonuniformity			True	-	-	-	-	-
	Grid Nonuniformity(GN)	Input.OverallSymbolGrade.DataMatrix.GridNonuniformity			True	-	-	-	-	-
	Unused Error Correction (UEC)	Input.OverallSymbolGrade.DataMatrix.UnusedErrorCorrection			True	-	-	-	-	-
	Format Information Damage (FID)	Input.OverallSymbolGrade.DataMatrix.FormatInformationDamage			True	-	-	-	-	-
	Version Information Damage(VID)	Input.OverallSymbolGrade.DataMatrix.VersionInformationDamage			True	-	-	-	-	-
	Print Growth Horizontal (PGH)	Input.OverallSymbolGrade.DataMatrix.PrintGrowthHorizontal			False	-	-	-	-	-
	Print Growth Vertical (PGV)	Input.OverallSymbolGrade.DataMatrix.PrintGrowthVertical			False	-	-	-	-	-
Verification (Rectangular DataMatrix)	Decode (DEC)	Input.OverallSymbolGrade.RectangularDataMatrix.Decode			True	-	-	-	-	-
	Quiet Zone (QZ)	Input.OverallSymbolGrade.RectangularDataMatrix.QuietZone			True	-	-	-	-	-
	Symbol Contrast (SC)	Input.OverallSymbolGrade.RectangularDataMatrix.SymbolContrast			True	-	-	-	-	-
	Cell Contrast (CC)	Input.OverallSymbolGrade.RectangularDataMatrix.CellContrast			True	-	-	-	-	-
	Modulation (MOD)	Input.OverallSymbolGrade.RectangularDataMatrix.Modulation			True	-	-	-	-	-
	Cell Modulation (CM)	Input.OverallSymbolGrade.RectangularDataMatrix.CellModulation			True	-	-	-	-	-
	Angular Distortion (AD)	Input.OverallSymbolGrade.RectangularDataMatrix.AngularDistortion			True	-	-	-	-	-
	Module Fill (MF)	Input.OverallSymbolGrade.RectangularDataMatrix.ModuleFill			True	-	-	-	-	-
	Reflectance Margin (RM)	Input.OverallSymbolGrade.RectangularDataMatrix.ReflectanceMargin			True	-	-	-	-	-
	Fixed Pattern Damage (FPD)	Input.OverallSymbolGrade.RectangularDataMatrix.FixedPatternDamage			True	-	-	-	-	-
	Axial Nonuniformity (AN)	Input.OverallSymbolGrade.RectangularDataMatrix.AxialNonuniformity			True	-	-	-	-	-
	Grid Nonuniformity(GN)	Input.OverallSymbolGrade.RectangularDataMatrix.GridNonuniformity			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Verification (Rectangular DataMatrix)	Unused Error Correction (UEC)	Input.OverallSymbolGrade.RectangularDataMatrix.UnusedErrorCorrection			True	-	-	-	-	-
	Format Information Damage (FID)	Input.OverallSymbolGrade.RectangularDataMatrix.FormatInformationDamage			True	-	-	-	-	-
	Version Information Damage(VID)	Input.OverallSymbolGrade.RectangularDataMatrix.VersionInformationDamage			True	-	-	-	-	-
	Print Growth Horizontal (PGH)	Input.OverallSymbolGrade.RectangularDataMatrix.PrintGrowthHorizontal			False	-	-	-	-	-
	Print Growth Vertical (PGV)	Input.OverallSymbolGrade.RectangularDataMatrix.PrintGrowthVertical			False	-	-	-	-	-
Verification (PDF417)	Decode (DEC)	Input.OverallSymbolGrade.PDF417.Decode			True	-	-	-	-	-
	Edge Determination (EDGE)	Input.OverallSymbolGrade.PDF417.EdgeDetermination			True	-	-	-	-	-
	Symbol Contrast (SC)	Input.OverallSymbolGrade.PDF417.SymbolContrast			True	-	-	-	-	-
	Minimum Reflectance (MINR)	Input.OverallSymbolGrade.PDF417.MinimumReflectance			True	-	-	-	-	-
	Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.PDF417.MinimumEdgeContrast			True	-	-	-	-	-
	Modulation (MOD)	Input.OverallSymbolGrade.PDF417.Modulation			True	-	-	-	-	-
	Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.PDF417.MinimumQuietZone			True	-	-	-	-	-
	Decodability (DCD)	Input.OverallSymbolGrade.PDF417.Decodability			True	-	-	-	-	-
	Defects (DEF)	Input.OverallSymbolGrade.PDF417.Defects			True	-	-	-	-	-
	Codeword Yield (CY)	Input.OverallSymbolGrade.PDF417.CodewordYield			True	-	-	-	-	-
	Codeword Print Quality(CPQ)	Input.OverallSymbolGrade.PDF417.CodewordPrintQuality			True	-	-	-	-	-
	Unused Error Correction (UEC)	Input.OverallSymbolGrade.PDF417.UnusedErrorCorrection			True	-	-	-	-	-
Verification (MicroPDF417)	Decode (DEC)	Input.OverallSymbolGrade.MicroPDF417.Decode			True	-	-	-	-	-
	Edge Determination (EDGE)	Input.OverallSymbolGrade.MicroPDF417.EdgeDetermination			True	-	-	-	-	-
	Symbol Contrast (SC)	Input.OverallSymbolGrade.MicroPDF417.SymbolContrast			True	-	-	-	-	-
	Minimum Reflectance (MINR)	Input.OverallSymbolGrade.MicroPDF417.MinimumReflectance			True	-	-	-	-	-
	Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.MicroPDF417.MinimumEdgeContrast			True	-	-	-	-	-
	Modulation (MOD)	Input.OverallSymbolGrade.MicroPDF417.Modulation			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Verification (MicroPDF417)	Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.MicroPDF417.MinimumQuietZone			True	-	-	-	-	-
	Decodability (DCD)	Input.OverallSymbolGrade.MicroPDF417.Decodability			True	-	-	-	-	-
	Defects (DEF)	Input.OverallSymbolGrade.MicroPDF417.Defects			True	-	-	-	-	-
	Codeword Yield (CY)	Input.OverallSymbolGrade.MicroPDF417.CodewordYield			True	-	-	-	-	-
	Codeword Print Quality(CPQ)	Input.OverallSymbolGrade.MicroPDF417.CodewordPrintQuality			True	-	-	-	-	-
	Unused Error Correction (UEC)	Input.OverallSymbolGrade.MicroPDF417.UnusedErrorCorrection			True	-	-	-	-	-
Verification (Composite Code)	Decode (DEC)	Input.OverallSymbolGrade.CompositeCode.2dPart.Decode			True	-	-	-	-	-
	Edge Determination (EDGE)	Input.OverallSymbolGrade.CompositeCode.2dPart.EdgeDetermination			True	-	-	-	-	-
	Symbol Contrast (SC)	Input.OverallSymbolGrade.CompositeCode.2dPart.SymbolContrast			True	-	-	-	-	-
	Minimum Reflectance (MINR)	Input.OverallSymbolGrade.CompositeCode.2dPart.MinimumReflectance			True	-	-	-	-	-
	Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.CompositeCode.2dPart.MinimumEdgeContrast			True	-	-	-	-	-
	Modulation (MOD)	Input.OverallSymbolGrade.CompositeCode.2dPart.Modulation			True	-	-	-	-	-
	Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.CompositeCode.2dPart.MinimumQuietZone			True	-	-	-	-	-
	Decodability (DCD)	Input.OverallSymbolGrade.CompositeCode.2dPart.Decodability			True	-	-	-	-	-
	Defects (DEF)	Input.OverallSymbolGrade.CompositeCode.2dPart.Defects			True	-	-	-	-	-
	Codeword Yield (CY)	Input.OverallSymbolGrade.CompositeCode.2dPart.CodewordYield			True	-	-	-	-	-
	Codeword Print Quality(CPQ)	Input.OverallSymbolGrade.CompositeCode.2dPart.CodewordPrintQuality			True	-	-	-	-	-
	Unused Error Correction (UEC)	Input.OverallSymbolGrade.CompositeCode.2dPart.UnusedErrorCorrection			True	-	-	-	-	-
	Decode (DEC)	Input.OverallSymbolGrade.CompositeCode.1dPart.Decode			True	-	-	-	-	-
	Edge Determination (EDGE)	Input.OverallSymbolGrade.CompositeCode.1dPart.EdgeDetermination			True	-	-	-	-	-
	Symbol Contrast (SC)	Input.OverallSymbolGrade.CompositeCode.1dPart.SymbolContrast			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Verification (Composite Code)	Minimum Reflectance (MINR)	Input.OverallSymbolGrade.CompositeCode.1dPart.MinimumReflectance			True	-	-	-	-	-
	Minimum Edge Contrast (MINE)	Input.OverallSymbolGrade.CompositeCode.1dPart.MinimumEdgeContrast			True	-	-	-	-	-
	Modulation (MOD)	Input.OverallSymbolGrade.CompositeCode.1dPart.Modulation			True	-	-	-	-	-
	Minimum Quiet Zone (QZ)	Input.OverallSymbolGrade.CompositeCode.1dPart.MinimumQuietZone			True	-	-	-	-	-
	Decodability (DCD)	Input.OverallSymbolGrade.CompositeCode.1dPart.Decodability			True	-	-	-	-	-
	Defects (DEF)	Input.OverallSymbolGrade.CompositeCode.1dPart.Defects			True	-	-	-	-	-
Read Data Settings	Read Start Digit	Input.StartDigit			1	9999	1	4	0	✓
	Read Data Length	Input.DataLength			100	512	1	3	0	-
	Output Symbol Identifier	Input.SymbolIdentifier			False	-	-	-	-	-
	Extended Channel Interpretation (ECI)	Input.ExtendedChannelInterpretation	Ignore	0	Ignore	-	-	-	-	-
			Output	1						
Judgment Conditions	Collation Pattern	Input.Limit.Reference.String			-	-	-	-	-	✓
	Handling of [#], [*], [!]	Input.Limit.Reference.Setting.SpecialCharactersProcessing	Special		Normal	-	-	-	-	-
			Normal							
	Read Data Length: Upper Limit Enabled	Input.Limit.CodeLength.Max.Enable			False	-	-	-	-	-
	Read Data Length: Upper Limit	Input.Limit.CodeLength.Max			Current Value	999	0	3	0	✓
	Read Data Length: Lower Limit Enabled	Input.Limit.CodeLength.Min.Enable			False	-	-	-	-	-
	Read Data Length: Lower Limit	Input.Limit.CodeLength.Min			Current Value	999	0	3	0	✓
	Position X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Position X: Upper Limit	Input.Limit.Position.X.Max			Current Value	99999.999	-99999.999	5	3	✓
	Position X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Position X: Lower Limit	Input.Limit.Position.X.Min			Current Value	99999.999	-99999.999	5	3	✓
	Position Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Position Y: Upper Limit	Input.Limit.Position.Y.Max			Current Value	99999.999	-99999.999	5	3	✓
	Position Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Position Y: Lower Limit	Input.Limit.Position.Y.Min			Current Value	99999.999	-99999.999	5	3	✓
	Detected Angle: Upper Limit Enabled	Input.Limit.Position.Angle.Max.Enable			False	-	-	-	-	-
	Detected Angle: Upper Limit	Input.Limit.Position.Angle.Max			Current Value	180.000	-180.000	3	3	✓
	Detected Angle: Lower Limit Enabled	Input.Limit.Position.Angle.Min.Enable			False	-	-	-	-	-
	Detected Angle: Lower Limit	Input.Limit.Position.Angle.Min			Current Value	180.000	-180.000	3	3	✓
Judgment Conditions (QR)	Enabled	Input.Limit.QR.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Lower Limit	Input.Limit.QR.Verification.OverallSymbolGrade.Min			Current Value	4	0	1	0	✓
Judgment Conditions (Micro QR)	Enabled	Input.Limit.MicroQR.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Lower Limit	Input.Limit.MicroQR.Verification.OverallSymbolGrade.Min			Current Value	4	0	1	0	✓
Judgment Conditions (DataMatrix)	Enabled	Input.Limit.DataMatrix.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Lower Limit	Input.Limit.DataMatrix.Verification.OverallSymbolGrade.Min			Current Value	4	0	1	0	✓
Judgment Conditions (Rectangular DataMatrix)	Enabled	Input.Limit.RectangularDataMatrix.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Lower Limit	Input.Limit.RectangularDataMatrix.Verification.OverallSymbolGrade.Min			Current Value	4	0	1	0	✓
Judgment Conditions (PDF417)	Enabled	Input.Limit.PDF417.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Lower Limit	Input.Limit.PDF417.Verification.OverallSymbolGrade.Min			Current Value	4	0	1	0	✓
Judgment Conditions (MicroPDF417)	Enabled	Input.Limit.MicroPDF417.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Lower Limit	Input.Limit.MicroPDF417.Verification.OverallSymbolGrade.Min			Current Value	4	0	1	0	✓
Judgment Conditions (Composite Code)	Enabled	Input.Limit.CompositeCode.Verification.OverallSymbolGrade.Min.Enable			False	-	-	-	-	-
	Lower Limit	Input.Limit.CompositeCode.Verification.OverallSymbolGrade.Min			Current Value	4	0	1	0	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Detected Position: Enabled	Input.Graphic.PrimaryTarget.Visible			True	-	-	-	-	-
	Detected Position: Size	Input.Graphic.PrimaryTarget.Size			16	1024	4	4	0	-
	Detected Position: Shape	Input.Graphic.PrimaryTarget.Shape	Cross	0	Cross with Arrow	-	-	-	-	-
			Cross with Arrow	1						
	Detected Position: Line Thickness	Input.Graphic.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position: Pass Color: Green	Input.Graphic.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Detected Position: Display Read Data: Enabled	Input.Graphic.PrimaryTarget.CodeData.Visible			False	-	-	-	-	-
	Detected Position: Display Read Data Length: Enabled	Input.Graphic.PrimaryTarget.CodeLength.Visible			False	-	-	-	-	-
	Detected Position: Display Position X: Enabled	Input.Graphic.PrimaryTarget.Position.X.Visible			False	-	-	-	-	-
	Detected Position: Display Position Y: Enabled	Input.Graphic.PrimaryTarget.Position.Y.Visible			False	-	-	-	-	-
	Detected Position: Display Detected Angle: Enabled	Input.Graphic.PrimaryTarget.Position.Angle.Visible			False	-	-	-	-	-
	Detected Position: Display Overall Symbol Grade: Enabled	Input.Graphic.PrimaryTarget.OverallSymbolGrade.Visible			False	-	-	-	-	-
	Detected Position: Font: Size	Input.Graphic.PrimaryTarget.Font.Size			12	256	6	3	0	-

AI Classification

#O033

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Detection Point	Specify Individually	Input.DetectedPoint.Individual			False	-	-	-	-	-
	Reference Tool	Input.DetectedPoint.ID	None	0	None	-	-	-	-	-
			Referable Tool							
	X	Input.DetectedPoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.DetectedPoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.DetectedPoint.Angle			0.000	359.999	0.000	3	3	✓
Reference Position	X	Input.ReferencePoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.ReferencePoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.ReferencePoint.Angle			0.000	359.999	0.000	3	3	✓
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Judgment Conditions	Match Degree: Lower Limit Enabled	Input.Limit.Score.Min.Enable			False	-	-	-	-	-
	Match Degree: Lower Limit	Input.Limit.Score.Min			0	100	0	3	0	✓
	Judge Specified Classification Label as Pass: Enable	Input.Limit.SelectClass.Enable			False	-	-	-	-	-
	Judge Specified Classification Label as Pass: Judgment by Classification Label: Enable	Input.Limit.SelectClass.Class[n].Enable			False	-	-	-	-	-
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	✓
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	✓
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	✓
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	✓
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	✓
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	✓
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	✓
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	✓
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	✓
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	✓
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	✓
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	✓
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	✓
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	✓
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	✓
	Result Display: Result Classification Label: Display Result Classification Label	Input.Graphic.Result.Class.Visible			True	-	-	-	-	✓
	Result Display: Display Character Count	Input.Graphic.Result.NumberOfCharacters			8	256	1	3	0	✓
	Result Display: Result Classification Label Count	Input.Graphic.Result.NumberOfClasses			1	32	1	2	0	✓
	Result Display: Match Degree: Display Match Degree	Input.Graphic.Result.Score.Visible			True	-	-	-	-	✓
	Result Display: Font: Size	Input.Graphic.Result.Font.Size			12	256	6	3	0	✓

AI Detection

#O034

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Region	Region	Input.Region	Refer to "Region".							
Detection Point	Specify Individually	Input.DetectedPoint.Individual			False	-	-	-	-	-
	Reference Tool	Input.DetectedPoint.ID	None	0	None	-	-	-	-	-
			Referable Tool							
	X	Input.DetectedPoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.DetectedPoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.DetectedPoint.Angle			0.000	359.999	0.000	3	3	✓
Reference Position	X	Input.ReferencePoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.ReferencePoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.ReferencePoint.Angle			0.000	359.999	0.000	3	3	✓
Color Extraction	Color Extraction	Input.ColorExtraction	Refer to "Color Extraction".							
Train	Anomaly Size	Input.DefectSize	Small	0	Medium	-	-	-	-	✓
			Medium	1						
			Large	2						
	Training Image Data Augmentation	Input.TrainImageAugmentation			False	-	-	-	-	-
	Heat Map Range	Input.ContrastRange	Set Automatically	0	Set Automatically	-	-	-	-	-
			Value Specification	1						
	Enabled	Input.ContrastRange.Enable			False	-	-	-	-	-
	Value Specification: Upper Limit Value (Red)	Input.ContrastRange.Manual.Max			500.000	9999.999	0.000	4	3	✓
	Value Specification: Lower Limit Value (Blue)	Input.ContrastRange.Manual.Min			20.000	9999.999	0.000	4	3	✓
Judgment Conditions	Anomaly Level: Upper Limit Enabled	Input.Limit.Level.Max.Enable			False	-	-	-	-	-
	Anomaly Level: Upper Limit	Input.Limit.Level.Max			Current Value	9999.999	0.000	4	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color	Input.Graphic.Region.ColorPass			-	-	-	-	-	-
	Inspection Region: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color	Input.Graphic.Region.ColorFail			-	-	-	-	-	-
	Inspection Region: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color	Input.Graphic.Region.Mask.ColorPass			-	-	-	-	-	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color	Input.Graphic.Region.Mask.ColorFail			-	-	-	-	-	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Result Display: Anomaly Level	Input.Graphic.Result.Level			-	-	-	-	-	-
	Result Display: Display Anomaly Level	Input.Graphic.Result.Level.Visible			True	-	-	-	-	✓
	Result Display: Font	Input.Graphic.Result.Font			-	-	-	-	-	-
	Result Display: Size	Input.Graphic.Result.Font.Size			12	256	6	3	0	✓

AI Segmentation

#O151

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Region	Region	Input.Region	Refer to "Region".							
Detection Point	Specify Individually	Input.DetectedPoint.Individual			False	-	-	-	-	-
	Reference Tool	Input.DetectedPoint.ID	None	0	None	-	-	-	-	-
			Referable Tool							
	X	Input.DetectedPoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.DetectedPoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.DetectedPoint.Angle			0.000	359.999	0.000	3	3	✓
Reference Position	X	Input.ReferencePoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.ReferencePoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.ReferencePoint.Angle			0.000	359.999	0.000	3	3	✓
Color Extraction	Color Extraction	Input.ColorExtraction	Refer to "Color Extraction".							
Train	Anomaly Size	Input.DefectSize.Value			20	16383	5	5	0	-
	High-Sensitivity Mode	Input.DetectionSensitivity	True	0	True	-	-	-	-	-
			False	1						
	Heat Map Range: Upper Limit Value (Red)	Input.ContrastRange.Manual.Max			100.000	100.000	0.000	3	3	✓
	Heat Map Range: Lower Limit Value (Blue)	Input.ContrastRange.Manual.Min			0.000	100.000	0.000	3	3	✓
Judgment Conditions	Anomaly Level: Upper Limit Enabled	Input.Limit.Level.Max.Enable			False	-	-	-	-	-
	Anomaly Level: Upper Limit	Input.Limit.Level.Max			Current Value	9999.999	0.000	4	3	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	✓
	Inspection Region: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	✓
	Inspection Region: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	✓
	Inspection Region: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	✓
	Inspection Region: Line Thickness: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	✓
	Inspection Region: Line Thickness: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	✓
	Inspection Region: Line Thickness: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	✓
	Inspection Region: Line Thickness: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	✓
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: EnabledLine Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	✓
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	✓
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	✓
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	✓
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	✓
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	✓
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	✓
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	✓
	Result Display: Anomaly Level: Display Anomaly Level	Input.Graphic.Result.Level.Visible			True	-	-	-	-	✓
	Result Display: Character(s): Size	Input.Graphic.Result.Font.Size			12	256	6	3	0	✓

AI OCR

#O153

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Region	Region	Input.Region	Refer to "Region".							
Color Extraction	Color Extraction	Input.ColorExtraction	Refer to "Color Extraction".							
Image Enhance	Image Enhance	Input.ImageEnhancement	Refer to "Image Enhance".							
Library Settings	Library Name	Input.Library			-	-	-	-	-	-
Character Recognition Settings	Character Size Setting: Height	Input.CharacterSize.Height			*	2000	16	4	0	-
	Character Size Setting: Width	Input.CharacterSize.Width			Resolution dependent	2000	16	4	0	-
			Disabled	3						
	Character Detection Restriction: Letter Reading	Input.Restriction.Characters	Upper/Lower Case	0	Upper/Lower Case	-	-	-	-	✓
			Upper Case	1						
			Lower Case	2						
			Disable	3						
	Character Detection Restriction: Number Reading	Input.Restriction.Numbers	Enabled	0	Enabled	-	-	-	-	✓
			Disable	1						
	Character Detection Restriction: Symbol Reading	Input.Restriction.Symbols	Enabled	0	Enabled	-	-	-	-	✓
			Disable	1						
	Output Line Delimiter	Input.NewlineCharacter.Enable			False	-	-	-	-	-
	Line Delimiter	Input.NewlineCharacter			_	-	-	-	-	-
	Output Match Degree	Input.QualityInspection.Enable			False	-	-	-	-	-
	String Direction	Input.StringDirection	Clockwise	0	Clockwise	-	-	-	-	✓
			Counterclockwise	1						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Options	Symbol Reading Settings: Selected Character (.)	Input.SymbolReadSetting.Dot			True	-	-	-	-	-
	Symbol Reading Settings: Selected Character (/)	Input.SymbolReadSetting.Slash			True	-	-	-	-	-
	Symbol Reading Settings: Selected Character (-)	Input.SymbolReadSetting.Hyphen			True	-	-	-	-	-
	Symbol Reading Settings: Selected Character (()	Input.SymbolReadSetting.LeftParenthesis			True	-	-	-	-	-
	Symbol Reading Settings: Selected Character ())	Input.SymbolReadSetting.RightParenthesis			True	-	-	-	-	-
	Symbol Reading Settings: Selected Character (#)	Input.SymbolReadSetting.Hash			True	-	-	-	-	-
	Symbol Reading Settings: Selected Character (*)	Input.SymbolReadSetting.Asterisk			True	-	-	-	-	-
	Symbol Reading Settings: Selected Character (:)	Input.SymbolReadSetting.Colon			True	-	-	-	-	-
	Symbol Reading Settings: Selected Character (+)	Input.SymbolReadSetting.Plus			True	-	-	-	-	-
	Symbol Reading Settings: Selected Character (年)	Input.SymbolReadSetting.Year			True	-	-	-	-	-
	Symbol Reading Settings: Selected Character (月)	Input.SymbolReadSetting.Month			True	-	-	-	-	-
	Recognized Character Width (Character Size Setting Ratio): Upper Limit	Input.CharacterWidthRatio.Max			2.000	2.000	0.100	1	3	✓
	Recognized Character Width (Character Size Setting Ratio): Lower Limit	Input.CharacterWidthRatio.Min			0.100	2.000	0.100	1	3	✓
	Recognized Character Height (Character Size Setting Ratio): Upper Limit	Input.CharacterHeightRatio.Max			2.000	2.000	0.100	1	3	✓
	Recognized Character Height (Character Size Setting Ratio): Lower Limit	Input.CharacterHeightRatio.Min			0.100	2.000	0.100	1	3	✓
	Timeout (sec)	Input.TimeoutTime			5.0	60.0	0.5	2	1	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Detected String: Judgment Character	Input.Limit.Line[0].JudgeString				-	-	-	-	✓
	Detected String: Registered String: Number of Characters: Number of Characters Upper Limit Enabled	Input.Limit.Line[0].NumberOfCharacters.Max.Enable			False	-	-	-	-	-
	Detected String: Registered String: Number of Characters: Number of Characters Upper Limit	Input.Limit.Line[0].NumberOfCharacters.Max			(Disabled)	128	0	3	0	✓
	Detected String: Registered String: Number of Characters: Number of Characters Lower Limit Enabled	Input.Limit.Line[0].NumberOfCharacters.Min.Enable			False	-	-	-	-	-
	Detected String: Registered String: Number of Characters: Number of Characters Lower Limit	Input.Limit.Line[0].NumberOfCharacters.Min			(Disabled)	128	0	3	0	✓
	Detected String: Match Degree Lower Limit Enabled	Input.Limit.Line[0].QualityScore.Min.Enable			False	-	-	-	-	-
	Detected String: Match Degree Lower Limit	Input.Limit.Line[0].QualityScore.Min			(Disabled)	99	0	2	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Character Block Region: Enabled	Input.Graphic.CharacterRegion.Visible			True	-	-	-	-	-
	Character Block Region: Line Thickness	Input.Graphic.CharacterRegion.StrokeWidth			1	64	1	2	0	-
	Character Block Region: Pass Color: Enabled	Input.Graphic.CharacterRegion.ColorPass.Visible			True	-	-	-	-	-
	Character Block Region: Pass Color: Red	Input.Graphic.CharacterRegion.ColorPass.Red			90	255	0	3	0	-
	Character Block Region: Pass Color: Green	Input.Graphic.CharacterRegion.ColorPass.Green			210	255	0	3	0	-
	Character Block Region: Pass Color: Blue	Input.Graphic.CharacterRegion.ColorPass.Blue			70	255	0	3	0	-
	Character Block Region: Fail Color: Enabled	Input.Graphic.CharacterRegion.ColorFail.Visible			True	-	-	-	-	-
	Character Block Region: Fail Color: Red	Input.Graphic.CharacterRegion.ColorFail.Red			90	255	0	3	0	-
	Character Block Region: Fail Color: Green	Input.Graphic.CharacterRegion.ColorFail.Green			210	255	0	3	0	-
	Character Block Region: Fail Color: Blue	Input.Graphic.CharacterRegion.ColorFail.Blue			70	255	0	3	0	-
	Display Recognized Characters: Enabled	Input.Graphic.CharacterRegion.Character.Visible			True	-	-	-	-	-
	Display Match Degree: Enabled	Input.Graphic.CharacterRegion.QualityScore.Visible			True	-	-	-	-	-
	Display Match Degree: Font	Input.Graphic.CharacterRegion.Font			-	-	-	-	-	-
	Display Match Degree: Size	Input.Graphic.CharacterRegion.Font.Size			12	256	6	3	0	-

Points Distance

#O035

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Point (1st): Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Point (1st): Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Point (2nd): Position X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Point (2nd): Position Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
Judgment Conditions	Distance: Upper Limit Enabled	Input.Limit.Distance.Max.Enable			False	-	-	-	-	-
	Distance: Upper Limit	Input.Limit.Distance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance: Lower Limit Enabled	Input.Limit.Distance.Min.Enable			False	-	-	-	-	-
	Distance: Lower Limit	Input.Limit.Distance.Min			0.000	99999.999	0.000	5	3	✓
	Distance X: Upper Limit Enabled	Input.Limit.Distance.X.Max.Enable			False	-	-	-	-	-
	Distance X: Upper Limit	Input.Limit.Distance.X.Max			Current Value	99999.999	0.000	5	3	✓
	Distance X: Lower Limit Enabled	Input.Limit.Distance.X.Min.Enable			False	-	-	-	-	-
	Distance X: Lower Limit	Input.Limit.Distance.X.Min			0.000	99999.999	0.000	5	3	✓
	Distance Y: Upper Limit Enabled	Input.Limit.Distance.Y.Max.Enable			False	-	-	-	-	-
	Distance Y: Upper Limit	Input.Limit.Distance.Y.Max			Current Value	99999.999	0.000	5	3	✓
	Distance Y: Lower Limit Enabled	Input.Limit.Distance.Y.Min.Enable			False	-	-	-	-	-
	Distance Y: Lower Limit	Input.Limit.Distance.Y.Min			0.000	99999.999	0.000	5	3	✓
Display Settings	Detection Points: Size	Input.Graphic.Target.Size			16	1024	4	4	0	✓
	Detection Points: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detection Points: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detection Points: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detection Points: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detection Points: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-
	Detection Points: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detection Points: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detection Points: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detection Points: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-
	Detection Points: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Dimension Line: Enabled	Input.Graphic.DimensionLine.Visible			True	-	-	-	-	-
	Dimension Line: Line Thickness	Input.Graphic.DimensionLine.StrokeWidth			2	64	1	2	0	-
	Dimension Line: Pass Color: Enabled	Input.Graphic.DimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Dimension Line: Pass Color: Red	Input.Graphic.DimensionLine.ColorPass.Red			9	255	0	3	0	-
	Dimension Line: Pass Color: Green	Input.Graphic.DimensionLine.ColorPass.Green			139	255	0	3	0	-
	Dimension Line: Pass Color: Blue	Input.Graphic.DimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Dimension Line: Fail Color: Enabled	Input.Graphic.DimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Dimension Line: Fail Color: Red	Input.Graphic.DimensionLine.ColorFail.Red			245	255	0	3	0	-
	Dimension Line: Fail Color: Green	Input.Graphic.DimensionLine.ColorFail.Green			63	255	0	3	0	-
	Dimension Line: Fail Color: Blue	Input.Graphic.DimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Dimension Line: Display Distance	Input.Graphic.DimensionLine.Distance.Visible			False	-	-	-	-	-
	Dimension Line: Font: Size	Input.Graphic.DimensionLine.Font.Size			12	256	6	3	0	-
	X Dimension Line: Enabled	Input.Graphic.XDimensionLine.Visible			False	-	-	-	-	-
	X Dimension Line: Line Thickness	Input.Graphic.XDimensionLine.StrokeWidth			2	64	1	2	0	-
	X Dimension Line: Pass Color: Enabled	Input.Graphic.XDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	X Dimension Line: Pass Color: Red	Input.Graphic.XDimensionLine.ColorPass.Red			9	255	0	3	0	-
	X Dimension Line: Pass Color: Green	Input.Graphic.XDimensionLine.ColorPass.Green			139	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	X Dimension Line: Pass Color: Blue	Input.Graphic.XDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	X Dimension Line: Fail Color: Enabled	Input.Graphic.XDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	X Dimension Line: Fail Color: Red	Input.Graphic.XDimensionLine.ColorFail.Red			245	255	0	3	0	-
	X Dimension Line: Fail Color: Green	Input.Graphic.XDimensionLine.ColorFail.Green			63	255	0	3	0	-
	X Dimension Line: Fail Color: Blue	Input.Graphic.XDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	X Dimension Line: Display Distance X	Input.Graphic.XDimensionLine.Distance.Visible			False	-	-	-	-	-
	X Dimension Line: Font: Size	Input.Graphic.XDimensionLine.Font.Size			12	256	6	3	0	-
	Y Dimension Line: Enabled	Input.Graphic.YDimensionLine.Visible			False	-	-	-	-	-
	Y Dimension Line: Line Thickness	Input.Graphic.YDimensionLine.StrokeWidth			2	64	1	2	0	-
	Y Dimension Line: Pass Color: Enabled	Input.Graphic.YDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Y Dimension Line: Pass Color: Red	Input.Graphic.YDimensionLine.ColorPass.Red			9	255	0	3	0	-
	Y Dimension Line: Pass Color: Green	Input.Graphic.YDimensionLine.ColorPass.Green			139	255	0	3	0	-
	Y Dimension Line: Pass Color: Blue	Input.Graphic.YDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Y Dimension Line: Fail Color: Enabled	Input.Graphic.YDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Y Dimension Line: Fail Color: Red	Input.Graphic.YDimensionLine.ColorFail.Red			245	255	0	3	0	-
	Y Dimension Line: Fail Color: Green	Input.Graphic.YDimensionLine.ColorFail.Green			63	255	0	3	0	-
	Y Dimension Line: Fail Color: Blue	Input.Graphic.YDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Y Dimension Line: Display Distance Y	Input.Graphic.YDimensionLine.Distance.Visible			False	-	-	-	-	-
	Y Dimension Line: Font: Size	Input.Graphic.YDimensionLine.Font.Size			12	256	6	3	0	-

Point/Line Distance

#O036

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Point: Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Point: Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line: Position X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line: Position Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line: Angle	Input.Target2.Angle			0.000	180.000	-180.000	3	3	✓
Judgment Conditions	Distance: Upper Limit Enabled	Input.Limit.Distance.Max.Enable			False	-	-	-	-	-
	Distance: Upper Limit	Input.Limit.Distance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance: Lower Limit Enabled	Input.Limit.Distance.Min.Enable			False	-	-	-	-	-
	Distance: Lower Limit	Input.Limit.Distance.Min			0.000	99999.999	0.000	5	3	✓
	Distance X: Upper Limit Enabled	Input.Limit.Distance.X.Max.Enable			False	-	-	-	-	-
	Distance X: Upper Limit	Input.Limit.Distance.X.Max			Current Value	99999.999	0.000	5	3	✓
	Distance X: Lower Limit Enabled	Input.Limit.Distance.X.Min.Enable			False	-	-	-	-	-
	Distance X: Lower Limit	Input.Limit.Distance.X.Min			0.000	99999.999	0.000	5	3	✓
	Distance Y: Upper Limit Enabled	Input.Limit.Distance.Y.Max.Enable			False	-	-	-	-	-
	Distance Y: Upper Limit	Input.Limit.Distance.Y.Max			Current Value	99999.999	0.000	5	3	✓
	Distance Y: Lower Limit Enabled	Input.Limit.Distance.Y.Min.Enable			False	-	-	-	-	-
	Distance Y: Lower Limit	Input.Limit.Distance.Y.Min			0.000	99999.999	0.000	5	3	✓
Display Settings	Detected Point, Detected Line: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Point, Detected Line: Size	Input.Graphic.Target.Size			16	1024	4	4	0	-
	Detected Point, Detected Line: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Point, Detected Line: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Point, Detected Line: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detected Point, Detected Line: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Point, Detected Line: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-
	Detected Point, Detected Line: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Point, Detected Line: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Point, Detected Line: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-
	Detected Point, Detected Line: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Dimension Line: Enabled	Input.Graphic.DimensionLine.Visible			True	-	-	-	-	-
	Dimension Line: Line Thickness	Input.Graphic.DimensionLine.StrokeWidth			2	64	1	2	0	-
	Dimension Line: Pass Color: Enabled	Input.Graphic.DimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Dimension Line: Pass Color: Red	Input.Graphic.DimensionLine.ColorPass.Red			9	255	0	3	0	-
	Dimension Line: Pass Color: Green	Input.Graphic.DimensionLine.ColorPass.Green			139	255	0	3	0	-
	Dimension Line: Pass Color: Blue	Input.Graphic.DimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Dimension Line: Fail Color: Enabled	Input.Graphic.DimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Dimension Line: Fail Color: Red	Input.Graphic.DimensionLine.ColorFail.Red			245	255	0	3	0	-
	Dimension Line: Fail Color: Green	Input.Graphic.DimensionLine.ColorFail.Green			63	255	0	3	0	-
	Dimension Line: Fail Color: Blue	Input.Graphic.DimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Dimension Line: Display Distance	Input.Graphic.DimensionLine.Distance.Visible			False	-	-	-	-	-
	Dimension Line: Font: Size	Input.Graphic.DimensionLine.Font.Size			12	256	6	3	0	-
	X Dimension Line: Enabled	Input.Graphic.XDimensionLine.Visible			False	-	-	-	-	-
	X Dimension Line: Line Thickness	Input.Graphic.XDimensionLine.StrokeWidth			2	64	1	2	0	-
	X Dimension Line: Pass Color: Enabled	Input.Graphic.XDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	X Dimension Line: Pass Color: Red	Input.Graphic.XDimensionLine.ColorPass.Red			9	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	X Dimension Line: Pass Color: Green	Input.Graphic.XDimensionLine.ColorPass.Green			139	255	0	3	0	-
	X Dimension Line: Pass Color: Blue	Input.Graphic.XDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	X Dimension Line: Fail Color: Enabled	Input.Graphic.XDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	X Dimension Line: Fail Color: Red	Input.Graphic.XDimensionLine.ColorFail.Red			245	255	0	3	0	-
	X Dimension Line: Fail Color: Green	Input.Graphic.XDimensionLine.ColorFail.Green			63	255	0	3	0	-
	X Dimension Line: Fail Color: Blue	Input.Graphic.XDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	X Dimension Line: Display Distance X	Input.Graphic.XDimensionLine.Distance.Visible			False	-	-	-	-	-
	X Dimension Line: Font: Size	Input.Graphic.XDimensionLine.Font.Size			12	256	6	3	0	-
	Y Dimension Line: Enabled	Input.Graphic.YDimensionLine.Visible			False	-	-	-	-	-
	Y Dimension Line: Line Thickness	Input.Graphic.YDimensionLine.StrokeWidth			2	64	1	2	0	-
	Y Dimension Line: Pass Color: Enabled	Input.Graphic.YDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Y Dimension Line: Pass Color: Red	Input.Graphic.YDimensionLine.ColorPass.Red			9	255	0	3	0	-
	Y Dimension Line: Pass Color: Green	Input.Graphic.YDimensionLine.ColorPass.Green			139	255	0	3	0	-
	Y Dimension Line: Pass Color: Blue	Input.Graphic.YDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Y Dimension Line: Fail Color: Enabled	Input.Graphic.YDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Y Dimension Line: Fail Color: Red	Input.Graphic.YDimensionLine.ColorFail.Red			245	255	0	3	0	-
	Y Dimension Line: Fail Color: Green	Input.Graphic.YDimensionLine.ColorFail.Green			63	255	0	3	0	-
	Y Dimension Line: Fail Color: Blue	Input.Graphic.YDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Y Dimension Line: Display Distance Y	Input.Graphic.YDimensionLine.Distance.Visible			False	-	-	-	-	-
	Y Dimension Line: Font: Size	Input.Graphic.YDimensionLine.Font.Size			12	256	6	3	0	-

Lines Distance

#O037

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Line (1st): Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (1st): Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (1st): Angle	Input.Target1.Angle			0.000	180.000	-180.000	3	3	✓
	Specify Line (2nd): Position X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (2nd): Position Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (2nd): Angle	Input.Target2.Angle			0.000	180.000	-180.000	3	3	✓
Judgment Conditions	Distance: Upper Limit Enabled	Input.Limit.Distance.Max.Enable			False	-	-	-	-	-
	Distance: Upper Limit	Input.Limit.Distance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance: Lower Limit Enabled	Input.Limit.Distance.Min.Enable			False	-	-	-	-	-
	Distance: Lower Limit	Input.Limit.Distance.Min			0.000	99999.999	0.000	5	3	✓
	Distance X: Upper Limit Enabled	Input.Limit.Distance.X.Max.Enable			False	-	-	-	-	-
	Distance X: Upper Limit	Input.Limit.Distance.X.Max			Current Value	99999.999	0.000	5	3	✓
	Distance X: Lower Limit Enabled	Input.Limit.Distance.X.Min.Enable			False	-	-	-	-	-
	Distance X: Lower Limit	Input.Limit.Distance.X.Min			0.000	99999.999	0.000	5	3	✓
	Distance Y: Upper Limit Enabled	Input.Limit.Distance.Y.Max.Enable			False	-	-	-	-	-
	Distance Y: Upper Limit	Input.Limit.Distance.Y.Max			Current Value	99999.999	0.000	5	3	✓
	Distance Y: Lower Limit Enabled	Input.Limit.Distance.Y.Min.Enable			False	-	-	-	-	-
	Distance Y: Lower Limit	Input.Limit.Distance.Y.Min			0.000	99999.999	0.000	5	3	✓
Display Settings	Detected Line: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Line: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Line: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Line: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detected Line: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-
	Detected Line: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Line: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Line: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Line: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-
	Detected Line: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Dimension Line: Enabled	Input.Graphic.DimensionLine.Visible			True	-	-	-	-	-
	Dimension Line: Line Thickness	Input.Graphic.DimensionLine.StrokeWidth			2	64	1	2	0	-
	Dimension Line: Pass Color: Enabled	Input.Graphic.DimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Dimension Line: Pass Color: Red	Input.Graphic.DimensionLine.ColorPass.Red			9	255	0	3	0	-
	Dimension Line: Pass Color: Green	Input.Graphic.DimensionLine.ColorPass.Green			139	255	0	3	0	-
	Dimension Line: Pass Color: Blue	Input.Graphic.DimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Dimension Line: Fail Color: Enabled	Input.Graphic.DimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Dimension Line: Fail Color: Red	Input.Graphic.DimensionLine.ColorFail.Red			245	255	0	3	0	-
	Dimension Line: Fail Color: Green	Input.Graphic.DimensionLine.ColorFail.Green			63	255	0	3	0	-
	Dimension Line: Fail Color: Blue	Input.Graphic.DimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Dimension Line: Display Distance: Enabled	Input.Graphic.DimensionLine.Distance.Visible			False	-	-	-	-	-
	Dimension Line: Font: Size	Input.Graphic.DimensionLine.Font.Size			12	256	6	3	0	-
	X Dimension Line: Enabled	Input.Graphic.XDimensionLine.Visible			False	-	-	-	-	-
	X Dimension Line: Line Thickness	Input.Graphic.XDimensionLine.StrokeWidth			2	64	1	2	0	-
	X Dimension Line: Pass Color: Enabled	Input.Graphic.XDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	X Dimension Line: Pass Color: Red	Input.Graphic.XDimensionLine.ColorPass.Red			9	255	0	3	0	-
	X Dimension Line: Pass Color: Green	Input.Graphic.XDimensionLine.ColorPass.Green			139	255	0	3	0	-
	X Dimension Line: Pass Color: Blue	Input.Graphic.XDimensionLine.ColorPass.Blue			126	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	X Dimension Line: Fail Color: Enabled	Input.Graphic.XDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	X Dimension Line: Fail Color: Red	Input.Graphic.XDimensionLine.ColorFail.Red			245	255	0	3	0	-
	X Dimension Line: Fail Color: Green	Input.Graphic.XDimensionLine.ColorFail.Green			63	255	0	3	0	-
	X Dimension Line: Fail Color: Blue	Input.Graphic.XDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	X Dimension Line: Display Distance X: Enabled	Input.Graphic.XDimensionLine.Distance.Visible			False	-	-	-	-	-
	X Dimension Line: Font: Size	Input.Graphic.XDimensionLine.Font.Size			12	256	6	3	0	-
	Y Dimension Line: Enabled	Input.Graphic.YDimensionLine.Visible			False	-	-	-	-	-
	Y Dimension Line: Line Thickness	Input.Graphic.YDimensionLine.StrokeWidth			2	64	1	2	0	-
	Y Dimension Line: Pass Color: Enabled	Input.Graphic.YDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Y Dimension Line: Pass Color: Red	Input.Graphic.YDimensionLine.ColorPass.Red			9	255	0	3	0	-
	Y Dimension Line: Pass Color: Green	Input.Graphic.YDimensionLine.ColorPass.Green			139	255	0	3	0	-
	Y Dimension Line: Pass Color: Blue	Input.Graphic.YDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Y Dimension Line: Fail Color: Enabled	Input.Graphic.YDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Y Dimension Line: Fail Color: Red	Input.Graphic.YDimensionLine.ColorFail.Red			245	255	0	3	0	-
	Y Dimension Line: Fail Color: Green	Input.Graphic.YDimensionLine.ColorFail.Green			63	255	0	3	0	-
	Y Dimension Line: Fail Color: Blue	Input.Graphic.YDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Y Dimension Line: Display Distance Y: Enabled	Input.Graphic.YDimensionLine.Distance.Visible			False	-	-	-	-	-
	Y Dimension Line: Font: Size	Input.Graphic.YDimensionLine.Font.Size			12	256	6	3	0	-

Point/Circle Distance

#O038

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Point: Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Point: Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Circle: Center X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Circle: Center Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Circle: Radius	Input.Target2.Radius			0.000	99999.999	0.000	5	3	✓
Judgment Conditions	Distance: Upper Limit Enabled	Input.Limit.Distance.Max.Enable			False	-	-	-	-	-
	Distance: Upper Limit	Input.Limit.Distance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance: Lower Limit Enabled	Input.Limit.Distance.Min.Enable			False	-	-	-	-	-
	Distance: Lower Limit	Input.Limit.Distance.Min			0.000	99999.999	0.000	5	3	✓
	Distance X: Upper Limit Enabled	Input.Limit.Distance.X.Max.Enable			False	-	-	-	-	-
	Distance X: Upper Limit	Input.Limit.Distance.X.Max			Current Value	99999.999	0.000	5	3	✓
	Distance X: Lower Limit Enabled	Input.Limit.Distance.X.Min.Enable			False	-	-	-	-	-
	Distance X: Lower Limit	Input.Limit.Distance.X.Min			0.000	99999.999	0.000	5	3	✓
	Distance Y: Upper Limit Enabled	Input.Limit.Distance.Y.Max.Enable			False	-	-	-	-	-
	Distance Y: Upper Limit	Input.Limit.Distance.Y.Max			Current Value	99999.999	0.000	5	3	✓
	Distance Y: Lower Limit Enabled	Input.Limit.Distance.Y.Min.Enable			False	-	-	-	-	-
	Distance Y: Lower Limit	Input.Limit.Distance.Y.Min			0.000	99999.999	0.000	5	3	✓
Display Settings	Detected Point, Detected Circle: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Point, Detected Circle: Size	Input.Graphic.Target.Size			16	1024	4	4	0	-
	Detected Point, Detected Circle: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Point, Detected Circle: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Point, Detected Circle: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			9	255	0	3	0	-
	Detected Point, Detected Circle: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			139	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Point, Detected Circle: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			126	255	0	3	0	-
	Detected Point, Detected Circle: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Point, Detected Circle: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			245	255	0	3	0	-
	Detected Point, Detected Circle: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			63	255	0	3	0	-
	Detected Point, Detected Circle: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			8	255	0	3	0	-
	Dimension Line: Enabled	Input.Graphic.DimensionLine.Visible			True	-	-	-	-	-
	Dimension Line: Line Thickness	Input.Graphic.DimensionLine.StrokeWidth			2	64	1	2	0	-
	Dimension Line: Pass Color: Enabled	Input.Graphic.DimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Dimension Line: Pass Color: Red	Input.Graphic.DimensionLine.ColorPass.Red			9	255	0	3	0	-
	Dimension Line: Pass Color: Green	Input.Graphic.DimensionLine.ColorPass.Green			139	255	0	3	0	-
	Dimension Line: Pass Color: Blue	Input.Graphic.DimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Dimension Line: Fail Color: Enabled	Input.Graphic.DimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Dimension Line: Fail Color: Red	Input.Graphic.DimensionLine.ColorFail.Red			245	255	0	3	0	-
	Dimension Line: Fail Color: Green	Input.Graphic.DimensionLine.ColorFail.Green			63	255	0	3	0	-
	Dimension Line: Fail Color: Blue	Input.Graphic.DimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Dimension Line: Display Distance: Enabled	Input.Graphic.DimensionLine.Distance.Visible			False	-	-	-	-	
	Dimension Line: Font: Size	Input.Graphic.DimensionLine.Font.Size			12	256	6	3	0	-
	X Dimension Line: Enabled	Input.Graphic.XDimensionLine.Visible			True	-	-	-	-	-
	X Dimension Line: Line Thickness	Input.Graphic.XDimensionLine.StrokeWidth			2	64	1	2	0	-
	X Dimension Line: Pass Color: Enabled	Input.Graphic.XDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	X Dimension Line: Pass Color: Red	Input.Graphic.XDimensionLine.ColorPass.Red			9	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	X Dimension Line: Pass Color: Green	Input.Graphic.XDimensionLine.ColorPass.Green			139	255	0	3	0	-
	X Dimension Line: Pass Color: Blue	Input.Graphic.XDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	X Dimension Line: Fail Color: Enabled	Input.Graphic.XDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	X Dimension Line: Fail Color: Red	Input.Graphic.XDimensionLine.ColorFail.Red			245	255	0	3	0	-
	X Dimension Line: Fail Color: Green	Input.Graphic.XDimensionLine.ColorFail.Green			63	255	0	3	0	-
	X Dimension Line: Fail Color: Blue	Input.Graphic.XDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	X Dimension Line: Display Distance X: Enabled	Input.Graphic.XDimensionLine.Distance.Visible			False	-	-	-	-	-
	X Dimension Line: Font: Size	Input.Graphic.XDimensionLine.Font.Size			12	256	6	3	0	-
	Y Dimension Line: Enabled	Input.Graphic.YDimensionLine.Visible			True	-	-	-	-	-
	Y Dimension Line: Line Thickness	Input.Graphic.YDimensionLine.StrokeWidth			2	64	1	2	0	-
	Y Dimension Line: Pass Color: Enabled	Input.Graphic.YDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Y Dimension Line: Pass Color: Red	Input.Graphic.YDimensionLine.ColorPass.Red			9	255	0	3	0	-
	Y Dimension Line: Pass Color: Green	Input.Graphic.YDimensionLine.ColorPass.Green			139	255	0	3	0	-
	Y Dimension Line: Pass Color: Blue	Input.Graphic.YDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Y Dimension Line: Fail Color: Enabled	Input.Graphic.YDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Y Dimension Line: Fail Color: Red	Input.Graphic.YDimensionLine.ColorFail.Red			245	255	0	3	0	-
	Y Dimension Line: Fail Color: Green	Input.Graphic.YDimensionLine.ColorFail.Green			63	255	0	3	0	-
	Y Dimension Line: Fail Color: Blue	Input.Graphic.YDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Y Dimension Line: Display Distance Y: Enabled	Input.Graphic.YDimensionLine.Distance.Visible			False	-	-	-	-	-
	Y Dimension Line: Font: Size	Input.Graphic.YDimensionLine.Font.Size			12	256	6	3	0	-

Line/Circle Distance

#O039

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Line: Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line: Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line: Angle	Input.Target1.Angle			0.000	180.000	-180.000	3	3	✓
	Specify Circle: Center X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Circle: Center Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Circle: Radius	Input.Target2.Radius			0.000	99999.999	0.000	5	3	✓
Judgment Conditions	Distance: Upper Limit Enabled	Input.Limit.Distance.Max.Enable			False	-	-	-	-	-
	Distance: Upper Limit	Input.Limit.Distance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance: Lower Limit Enabled	Input.Limit.Distance.Min.Enable			False	-	-	-	-	-
	Distance: Lower Limit	Input.Limit.Distance.Min			0.000	99999.999	0.000	5	3	✓
	Distance X: Upper Limit Enabled	Input.Limit.Distance.X.Max.Enable			False	-	-	-	-	-
	Distance X: Upper Limit	Input.Limit.Distance.X.Max			Current Value	99999.999	0.000	5	3	✓
	Distance X: Lower Limit Enabled	Input.Limit.Distance.X.Min.Enable			False	-	-	-	-	-
	Distance X: Lower Limit	Input.Limit.Distance.X.Min			0.000	99999.999	0.000	5	3	✓
	Distance Y: Upper Limit Enabled	Input.Limit.Distance.Y.Max.Enable			False	-	-	-	-	-
	Distance Y: Upper Limit	Input.Limit.Distance.Y.Max			Current Value	99999.999	0.000	5	3	✓
	Distance Y: Lower Limit Enabled	Input.Limit.Distance.Y.Min.Enable			False	-	-	-	-	-
	Distance Y: Lower Limit	Input.Limit.Distance.Y.Min			0.000	99999.999	0.000	5	3	✓
Display Settings	Detected Line, Detected Circle: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Line, Detected Circle: Size	Input.Graphic.Target.Size			16	1024	4	4	0	-
	Detected Line, Detected Circle: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Line, Detected Circle: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Line, Detected Circle: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Line, Detected Circle: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-
	Detected Line, Detected Circle: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-
	Detected Line, Detected Circle: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Line, Detected Circle: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Line, Detected Circle: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-
	Detected Line, Detected Circle: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Dimension Line: Enabled	Input.Graphic.DimensionLine.Visible			True	-	-	-	-	-
	Dimension Line: Line Thickness	Input.Graphic.DimensionLine.StrokeWidth			2	64	1	2	0	-
	Dimension Line: Pass Color: Enabled	Input.Graphic.DimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Dimension Line: Pass Color: Red	Input.Graphic.DimensionLine.ColorPass.Red			9	255	0	3	0	-
	Dimension Line: Pass Color: Green	Input.Graphic.DimensionLine.ColorPass.Green			139	255	0	3	0	-
	Dimension Line: Pass Color: Blue	Input.Graphic.DimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Dimension Line: Fail Color: Enabled	Input.Graphic.DimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Dimension Line: Fail Color: Red	Input.Graphic.DimensionLine.ColorFail.Red			245	255	0	3	0	-
	Dimension Line: Fail Color: Green	Input.Graphic.DimensionLine.ColorFail.Green			63	255	0	3	0	-
	Dimension Line: Fail Color: Blue	Input.Graphic.DimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Dimension Line: Display Distance: Enabled	Input.Graphic.DimensionLine.Distance.Visible			False	-	-	-	-	-
	Dimension Line: Font:: Size	Input.Graphic.DimensionLine.Font.Size			12	256	6	3	0	-
	X Dimension Line: Enabled	Input.Graphic.XDimensionLine.Visible			False	-	-	-	-	-
	X Dimension Line: Line Thickness	Input.Graphic.XDimensionLine.StrokeWidth			2	64	1	2	0	-
	X Dimension Line: Pass Color: Enabled	Input.Graphic.XDimensionLine.ColorPass.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	X Dimension Line: Pass Color: Red	Input.Graphic.XDimensionLine.ColorPass.Red			9	255	0	3	0	-
	X Dimension Line: Pass Color: Green	Input.Graphic.XDimensionLine.ColorPass.Green			139	255	0	3	0	-
	X Dimension Line: Pass Color: Blue	Input.Graphic.XDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	X Dimension Line: Fail Color: Enabled	Input.Graphic.XDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	X Dimension Line: Fail Color: Red	Input.Graphic.XDimensionLine.ColorFail.Red			245	255	0	3	0	-
	X Dimension Line: Fail Color: Green	Input.Graphic.XDimensionLine.ColorFail.Green			63	255	0	3	0	-
	X Dimension Line: Fail Color: Blue	Input.Graphic.XDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	X Dimension Line: Display Distance X: Enabled	Input.Graphic.XDimensionLine.Distance.Visible			False	-	-	-	-	-
	X Dimension Line: Font: Size	Input.Graphic.XDimensionLine.Font.Size			12	256	6	3	0	-
	Y Dimension Line: Enabled	Input.Graphic.YDimensionLine.Visible			False	-	-	-	-	-
	Y Dimension Line: Line Thickness	Input.Graphic.YDimensionLine.StrokeWidth			2	64	1	2	0	-
	Y Dimension Line: Pass Color: Enabled	Input.Graphic.YDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Y Dimension Line: Pass Color: Red	Input.Graphic.YDimensionLine.ColorPass.Red			9	255	0	3	0	-
	Y Dimension Line: Pass Color: Green	Input.Graphic.YDimensionLine.ColorPass.Green			139	255	0	3	0	-
	Y Dimension Line: Pass Color: Blue	Input.Graphic.YDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Y Dimension Line: Fail Color: Enabled	Input.Graphic.YDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Y Dimension Line: Fail Color: Red	Input.Graphic.YDimensionLine.ColorFail.Red			245	255	0	3	0	-
	Y Dimension Line: Fail Color: Green	Input.Graphic.YDimensionLine.ColorFail.Green			63	255	0	3	0	-
	Y Dimension Line: Fail Color: Blue	Input.Graphic.YDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Y Dimension Line: Display Distance Y: Enabled	Input.Graphic.YDimensionLine.Distance.Visible			False	-	-	-	-	-
	Y Dimension Line: Font: Size	Input.Graphic.YDimensionLine.Font.Size			12	256	6	3	0	-

Circles Distance

#O040

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Circle (1st): Center X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Circle (1st): Center Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Circle (1st): Radius	Input.Target1.Radius			0.000	99999.999	0.000	5	3	✓
	Specify Circle (2nd): Center X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Circle (2nd): Center Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Circle (2nd): Radius	Input.Target2.Radius			0.000	99999.999	0.000	5	3	✓
Judgment Conditions	Distance: Upper Limit Enabled	Input.Limit.Distance.Max.Enable			False	-	-	-	-	-
	Distance: Upper Limit	Input.Limit.Distance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance: Lower Limit Enabled	Input.Limit.Distance.Min.Enable			False	-	-	-	-	-
	Distance: Lower Limit	Input.Limit.Distance.Min			0.000	99999.999	0.000	5	3	✓
	Distance X: Upper Limit Enabled	Input.Limit.Distance.X.Max.Enable			False	-	-	-	-	-
	Distance X: Upper Limit	Input.Limit.Distance.X.Max			Current Value	99999.999	0.000	5	3	✓
	Distance X: Lower Limit Enabled	Input.Limit.Distance.X.Min.Enable			False	-	-	-	-	-
	Distance X: Lower Limit	Input.Limit.Distance.X.Min			0.000	99999.999	0.000	5	3	✓
	Distance Y: Upper Limit Enabled	Input.Limit.Distance.Y.Max.Enable			False	-	-	-	-	-
	Distance Y: Upper Limit	Input.Limit.Distance.Y.Max			Current Value	99999.999	0.000	5	3	✓
	Distance Y: Lower Limit Enabled	Input.Limit.Distance.Y.Min.Enable			False	-	-	-	-	-
	Distance Y: Lower Limit	Input.Limit.Distance.Y.Min			0.000	99999.999	0.000	5	3	✓
Display Settings	Detected Circle: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Circle: Size	Input.Graphic.Target.Size			16	1024	4	4	0	-
	Detected Circle: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Circle: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Circle: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detected Circle: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Circle: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-
	Detected Circle: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Circle: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Circle: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-
	Detected Circle: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Dimension Line: Enabled	Input.Graphic.DimensionLine.Visible			True	-	-	-	-	-
	Dimension Line: Line Thickness	Input.Graphic.DimensionLine.StrokeWidth			2	64	1	2	0	-
	Dimension Line: Pass Color: Enabled	Input.Graphic.DimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Dimension Line: Pass Color: Red	Input.Graphic.DimensionLine.ColorPass.Red			9	255	0	3	0	-
	Dimension Line: Pass Color: Green	Input.Graphic.DimensionLine.ColorPass.Green			139	255	0	3	0	-
	Dimension Line: Pass Color: Blue	Input.Graphic.DimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Dimension Line: Fail Color: Enabled	Input.Graphic.DimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Dimension Line: Fail Color: Red	Input.Graphic.DimensionLine.ColorFail.Red			245	255	0	3	0	-
	Dimension Line: Fail Color: Green	Input.Graphic.DimensionLine.ColorFail.Green			63	255	0	3	0	-
	Dimension Line: Fail Color: Blue	Input.Graphic.DimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Dimension Line: Display Distance: Enabled	Input.Graphic.DimensionLine.Distance.Visible			False	-	-	-	-	-
	Dimension Line: Font: Size	Input.Graphic.DimensionLine.Font.Size			12	256	6	3	0	-
	X Dimension Line: Enabled	Input.Graphic.XDimensionLine.Visible			False	-	-	-	-	-
	X Dimension Line: Line Thickness	Input.Graphic.XDimensionLine.StrokeWidth			2	64	1	2	0	-
	X Dimension Line: Pass Color: Enabled	Input.Graphic.XDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	X Dimension Line: Pass Color: Red	Input.Graphic.XDimensionLine.ColorPass.Red			9	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	X Dimension Line: Pass Color: Green	Input.Graphic.XDimensionLine.ColorPass.Green			139	255	0	3	0	-
	X Dimension Line: Pass Color: Blue	Input.Graphic.XDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	X Dimension Line: Fail Color: Enabled	Input.Graphic.XDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	X Dimension Line: Fail Color: Red	Input.Graphic.XDimensionLine.ColorFail.Red			245	255	0	3	0	-
	X Dimension Line: Fail Color: Green	Input.Graphic.XDimensionLine.ColorFail.Green			63	255	0	3	0	-
	X Dimension Line: Fail Color: Blue	Input.Graphic.XDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	X Dimension Line:Display Distance X: Enabled	Input.Graphic.XDimensionLine.Distance.Visible			False	-	-	-	-	-
	X Dimension Line: Font: Size	Input.Graphic.XDimensionLine.Font.Size			12	256	6	3	0	-
	Y Dimension Line: Enabled	Input.Graphic.YDimensionLine.Visible			False	-	-	-	-	-
	Y Dimension Line: Line Thickness	Input.Graphic.YDimensionLine.StrokeWidth			2	64	1	2	0	-
	Y Dimension Line: Pass Color: Enabled	Input.Graphic.YDimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Y Dimension Line: Pass Color: Red	Input.Graphic.YDimensionLine.ColorPass.Red			9	255	0	3	0	-
	Y Dimension Line: Pass Color: Green	Input.Graphic.YDimensionLine.ColorPass.Green			139	255	0	3	0	-
	Y Dimension Line: Pass Color: Blue	Input.Graphic.YDimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Y Dimension Line: Fail Color: Enabled	Input.Graphic.YDimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Y Dimension Line: Fail Color: Red	Input.Graphic.YDimensionLine.ColorFail.Red			245	255	0	3	0	-
	Y Dimension Line: Fail Color: Green	Input.Graphic.YDimensionLine.ColorFail.Green			63	255	0	3	0	-
	Y Dimension Line: Fail Color: Blue	Input.Graphic.YDimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Y Dimension Line: Display Distance Y: Enabled	Input.Graphic.YDimensionLine.Distance.Visible			False	-	-	-	-	-
	Y Dimension Line: Font: Size	Input.Graphic.YDimensionLine.Font.Size			12	256	6	3	0	-

Line Detection

#O041

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Trend Direction	Input.TrendDirection			↓	-	-	-	-	-
	Scan Direction	Input.ScanDirection	Forward	4	Forward	-	-	-	-	✓
			Reverse	5						
	Edge Direction	Input.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Specified Edge	Input.SpecifiedEdge			0	3599	-3600	4	0	✓
	Edge Sensitivity (%)	Input.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width	Input.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit	Input.Intensity.Max			255.000	255.000	0.000	3	3	✓
	Edge Intensity Lower Limit	Input.Intensity.Min			5.000	255.000	0.000	3	3	✓
	Segment Size	Input.SegmentSize			10	9999	1	4	0	✓
	Segment Shift	Input.SegmentShift			5.00	9999.99	0.01	4	2	✓
	Starting Offset	Input.StartingOffset			0	9999	0	4	0	✓
	Judged Label Type	Input.PrimaryTargetType	Maximum	0	Maximum	-	-	-	-	-
			Minimum	1						
			Specified	2						
	Judged Label	Input.PrimaryTarget			0	29999	0	5	0	-
	Angled Edge Detection	Input.AngledEdgeDetection			False	-	-	-	-	✓
	Maximum Number of Segments	Input.MaxSegments			100	30000	1	5	0	-
	Best Fit Circle/Line	Input.BestFitCircleLine			Line	-	-	-	-	-
	Deformation Correction	Input.Correction			True	-	-	-	-	✓
	Abnormal Gap Size	Input.AbnormalGapSize			5.0	999.9	0.0	3	1	✓
	Abnormal Point Ratio Upper Limit	Input.AbnormalSensitivity			25	100	0	3	0	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Number of Detected Segments: Upper Limit Enabled	Input.Limit.DetectedSegments.Max.Enable			False	-	-	-	-	-
	Number of Detected Segments: Upper Limit	Input.Limit.DetectedSegments.Max			Current Value	99999	0	5	0	✓
	Number of Detected Segments: Lower Limit Enabled	Input.Limit.DetectedSegments.Min.Enable			False	-	-	-	-	-
	Number of Detected Segments: Lower Limit	Input.Limit.DetectedSegments.Min			Current Value	99999	0	5	0	✓
	Distance (Maximum): Upper Limit Enabled	Input.Limit.MaxDistance.Max.Enable			False	-	-	-	-	-
	Distance (Maximum): Upper Limit	Input.Limit.MaxDistance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance (Maximum): Lower Limit Enabled	Input.Limit.MaxDistance.Min.Enable			False	-	-	-	-	-
	Distance (Maximum): Lower Limit	Input.Limit.MaxDistance.Min			Current Value	99999.999	0.000	5	3	✓
	Distance (Minimum): Upper Limit Enabled	Input.Limit.MinDistance.Max.Enable			False	-	-	-	-	-
	Distance (Minimum): Upper Limit	Input.Limit.MinDistance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance (Minimum): Lower Limit Enabled	Input.Limit.MinDistance.Min.Enable			False	-	-	-	-	-
	Distance (Minimum): Lower Limit	Input.Limit.MinDistance.Min			Current Value	99999.999	0.000	5	3	✓
	Distance: Upper Limit Enabled	Input.Limit.Distance.Max.Enable			False	-	-	-	-	-
	Distance: Upper Limit	Input.Limit.Distance.Max			Current Value	99999.999	0.000	5	3	✓
	Distance: Lower Limit Enabled	Input.Limit.Distance.Min.Enable			False	-	-	-	-	-
	Distance: Lower Limit	Input.Limit.Distance.Min			Current Value	99999.999	0.000	5	3	✓
	Detected Line Angle (+/-180°): Upper Limit Enabled	Input.Limit.DetectedLine.Angle.Max.Enable			False	-	-	-	-	-
	Detected Line Angle (+/-180°): Upper Limit	Input.Limit.DetectedLine.Angle.Max			Current Value	180.000	-180.000	3	3	✓
	Detected Line Angle (+/-180°): Lower Limit Enabled	Input.Limit.DetectedLine.Angle.Min.Enable			False	-	-	-	-	-
	Detected Line Angle (+/-180°): Lower Limit	Input.Limit.DetectedLine.Angle.Min			Current Value	180.000	-180.000	3	3	✓
	Detected Line Angle: Upper Limit Enabled	Input.Limit.DetectionLine.Position.Angle.Max.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Detected Line Angle: Upper Limit	Input.Limit.DetectionLine.Position.Angle.Max			Current Value	90.000	-90.000	2	3	✓
	Detected Line Angle: Lower Limit Enabled	Input.Limit.DetectionLine.Position.Angle.Min.Enable			False	-	-	-	-	-
	Detected Line Angle: Lower Limit	Input.Limit.DetectionLine.Position.Angle.Min			Current Value	90.000	-90.000	2	3	✓
	Detected Line Count: Upper Limit Enabled	Input.Limit.DetectedLine.Count.Max.Enable			False	-	-	-	-	-
	Detected Line Count: Upper Limit	Input.Limit.DetectedLine.Count.Max			Current Value	1	0	1	0	✓
	Detected Line Count: Lower Limit Enabled	Input.Limit.DetectedLine.Count.Min.Enable			False	-	-	-	-	-
	Detected Line Count: Lower Limit	Input.Limit.DetectedLine.Count.Min			Current Value	1	0	1	0	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True					-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Judged Label: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.Visible			True	-	-	-	-	-
	Judged Label: Shape	Input.Graphic.TrendEdge.PrimaryTarget.Shape	Cross	1	Bar	-	-	-	-	-
			Circle	4						
			Bar	13						
	Judged Label: Size	Input.Graphic.TrendEdge.PrimaryTarget.Size			16	1024	4	4	0	-
	Judged Label: Line Thickness	Input.Graphic.TrendEdge.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Judged Label: Pass Color: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-
	Judged Label: Pass Color: Red	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Judged Label: Pass Color: Green	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Judged Label: Pass Color: Blue	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Judged Label: Fail Color: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Judged Label: Fail Color: Red	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Judged Label: Fail Color: Green	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Judged Label: Fail Color: Blue	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Maximum Label: Enabled	Input.Graphic.TrendEdge.MaximumTarget.Visible			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Maximum Label: Shape	Input.Graphic.TrendEdge.MaximumTarget.Shape	Cross	1	Bar	-	-	-	-	-
			Circle	4						
			Bar	13						
	Maximum Label: Size	Input.Graphic.TrendEdge.MaximumTarget.Size			16	1024	4	4	0	-
	Maximum Label: Line Thickness	Input.Graphic.TrendEdge.MaximumTarget.StrokeWidth			1	64	1	2	0	-
	Maximum Label: Pass Color: Enabled	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Visible			True	-	-	-	-	-
	Maximum Label: Pass Color: Red	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Red			221	255	0	3	0	-
	Maximum Label: Pass Color: Green	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Green			182	255	0	3	0	-
	Maximum Label: Pass Color: Blue	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Blue			14	255	0	3	0	-
	Maximum Label: Fail Color: Enabled	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Visible			True	-	-	-	-	-
	Maximum Label: Fail Color: Red	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Red			221	255	0	3	0	-
	Maximum Label: Fail Color: Green	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Green			182	255	0	3	0	-
	Maximum Label: Fail Color: Blue	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Blue			14	255	0	3	0	-
	Minimum Label: Enabled	Input.Graphic.TrendEdge.MinimumTarget.Visible			False	-	-	-	-	-
	Minimum Label: Shape	Input.Graphic.TrendEdge.MinimumTarget.Shape	Cross	1	Bar	-	-	-	-	-
			Circle	4						
			Bar	13						
	Minimum Label: Size	Input.Graphic.TrendEdge.MinimumTarget.Size			16	1024	4	4	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Minimum Label: Line Thickness	Input.Graphic.TrendEdge.MinimumTarget.StrokeWidth			1	64	1	2	0	-
	Minimum Label: Pass Color: Enabled	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Visible			True	-	-	-	-	-
	Minimum Label: Pass Color: Red	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Red			221	255	0	3	0	-
	Minimum Label: Pass Color: Green	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Green			182	255	0	3	0	-
	Minimum Label: Pass Color: Blue	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Blue			14	255	0	3	0	-
	Minimum Label: Fail Color: Enabled	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Visible			True	-	-	-	-	-
	Minimum Label: Fail Color: Red	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Red			221	255	0	3	0	-
	Minimum Label: Fail Color: Green	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Green			182	255	0	3	0	-
	Minimum Label: Fail Color: Blue	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Blue			14	255	0	3	0	-
	Display Detected Circle/Line: Line Thickness	Input.Graphic.DetectedShape.StrokeWidth			2	64	1	2	0	-
	Display Detected Circle/Line: Color: Enabled	Input.Graphic.DetectedShape.Color.Visible			True	-	-	-	-	-
	Display Detected Circle/Line: Color: Red	Input.Graphic.DetectedShape.Color.Red			135	255	0	3	0	-
	Display Detected Circle/Line: Color: Green	Input.Graphic.DetectedShape.Color.Green			187	255	0	3	0	-
	Display Detected Circle/Line: Color: Blue	Input.Graphic.DetectedShape.Color.Blue			12	255	0	3	0	-
	Display Profile: Enabled	Input.Graphic.TrendEdge.Profile.Visible			True	-	-	-	-	-
	Display Profile: Line Thickness	Input.Graphic.TrendEdge.Profile.StrokeWidth			2	64	1	2	0	-
	Display Profile: Pass Color: Enabled	Input.Graphic.TrendEdge.Profile.ColorPass.Visible			True	-	-	-	-	-
	Display Profile: Pass Color: Red	Input.Graphic.TrendEdge.Profile.ColorPass.Red			221	255	0	3	0	-
	Display Profile: Pass Color: Green	Input.Graphic.TrendEdge.Profile.ColorPass.Green			182	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Display Profile: Pass Color: Blue	Input.Graphic.TrendEdge.Profile.ColorPass.Blue			14	255	0	3	0	-
	Display Profile: Fail Color: Enabled	Input.Graphic.TrendEdge.Profile.ColorFail.Visible			True	-	-	-	-	-
	Display Profile: Fail Color: Red	Input.Graphic.TrendEdge.Profile.ColorFail.Red			221	255	0	3	0	-
	Display Profile: Fail Color: Green	Input.Graphic.TrendEdge.Profile.ColorFail.Green			182	255	0	3	0	-
	Display Profile: Fail Color: Blue	Input.Graphic.TrendEdge.Profile.ColorFail.Blue			14	255	0	3	0	-
	Display Segments: Enabled	Input.Graphic.TrendEdge.Segment.Visible			True	-	-	-	-	-
	Display Segments: Line Thickness	Input.Graphic.TrendEdge.Segment.StrokeWidth			1	64	1	2	0	-
	Display Segments: Pass Color: Enabled	Input.Graphic.TrendEdge.Segment.ColorPass.Visible			True	-	-	-	-	-
	Display Segments: Pass Color: Red	Input.Graphic.TrendEdge.Segment.ColorPass.Red			221	255	0	3	0	-
	Display Segments: Pass Color: Green	Input.Graphic.TrendEdge.Segment.ColorPass.Green			182	255	0	3	0	-
	Display Segments: Pass Color: Blue	Input.Graphic.TrendEdge.Segment.ColorPass.Blue			14	255	0	3	0	-
	Display Segments: Fail Color: Enabled	Input.Graphic.TrendEdge.Segment.ColorFail.Visible			True	-	-	-	-	-
	Display Segments: Fail Color: Red	Input.Graphic.TrendEdge.Segment.ColorFail.Red			221	255	0	3	0	-
	Display Segments: Fail Color: Green	Input.Graphic.TrendEdge.Segment.ColorFail.Green			182	255	0	3	0	-
	Display Segments: Fail Color: Blue	Input.Graphic.TrendEdge.Segment.ColorFail.Blue			14	255	0	3	0	-

Line Passing Two Points

#O042

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Point (1st): Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Point (1st): Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Point (2nd): Position X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Point (2nd): Position Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
Measurement Target	Target Angle	Input.MeasurementTarget.Type	Angle 1: Point 1 to Point 2	0	Angle 1	-	-	-	-	-
			Angle 2: Point 2 to Point 1	1						
Judgment Conditions	Detected Line Angle (+/-180°): Upper Limit Enabled	Input.Limit.Angle.Max.Enable			False	-	-	-	-	-
	Detected Line Angle (+/-180°): Upper Limit	Input.Limit.Angle.Max			Current Value	180.000	-180.000	3	3	✓
	Detected Line Angle (+/-180°): Lower Limit Enabled	Input.Limit.Angle.Min.Enable			False	-	-	-	-	-
	Detected Line Angle (+/-180°): Lower Limit	Input.Limit.Angle.Min			Current Value	180.000	-180.000	3	3	✓
	Detected Line Angle: Upper Limit Enabled	Input.Limit.DetectionLine.Position.Angle.Max.Enable			False	-	-	-	-	-
	Detected Line Angle: Upper Limit	Input.Limit.DetectionLine.Position.Angle.Max			Current Value	90.000	-90.000	2	3	✓
	Detected Line Angle: Lower Limit Enabled	Input.Limit.DetectionLine.Position.Angle.Min.Enable			False	-	-	-	-	-
	Detected Line Angle: Lower Limit	Input.Limit.DetectionLine.Position.Angle.Min			Current Value	90.000	-90.000	2	3	✓
Display Settings	Detected Points: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Points: Size	Input.Graphic.Target.Size			16	1024	4	4	0	-
	Detected Points: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Points: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Points: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detected Points: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-
	Detected Points: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-
	Detected Points: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Points: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Points: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-
	Detected Points: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Dimension Line: Enabled	Input.Graphic.DimensionLine.Visible			True	-	-	-	-	-
	Dimension Line: Line Thickness	Input.Graphic.DimensionLine.StrokeWidth			2	64	1	2	0	-
	Dimension Line: Pass Color: Enabled	Input.Graphic.DimensionLine.ColorPass.Visible			True	-	-	-	-	-
	Dimension Line: Pass Color: Red	Input.Graphic.DimensionLine.ColorPass.Red			9	255	0	3	0	-
	Dimension Line: Pass Color: Green	Input.Graphic.DimensionLine.ColorPass.Green			139	255	0	3	0	-
	Dimension Line: Pass Color: Blue	Input.Graphic.DimensionLine.ColorPass.Blue			126	255	0	3	0	-
	Dimension Line: Fail Color: Enabled	Input.Graphic.DimensionLine.ColorFail.Visible			True	-	-	-	-	-
	Dimension Line: Fail Color: Red	Input.Graphic.DimensionLine.ColorFail.Red			245	255	0	3	0	-
	Dimension Line: Fail Color: Green	Input.Graphic.DimensionLine.ColorFail.Green			63	255	0	3	0	-
	Dimension Line: Fail Color: Blue	Input.Graphic.DimensionLine.ColorFail.Blue			8	255	0	3	0	-
	Dimension Line: Display Detected Line Angle: Enabled	Input.Graphic.DimensionLine.Angle.Visible			False	-	-	-	-	-
	Dimension Line: Font: Size	Input.Graphic.DimensionLine.Font.Size			12	256	6	3	0	-
	Auxiliary Line: Enabled	Input.Graphic.AuxiliaryLine.Visible			False	-	-	-	-	-
	Auxiliary Line: Line Thickness	Input.Graphic.AuxiliaryLine.StrokeWidth			2	64	1	2	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Auxiliary Line: Pass Color: Enabled	Input.Graphic.AuxiliaryLine.ColorPass.Visible			True	-	-	-	-	-
	Auxiliary Line: Pass Color: Red	Input.Graphic.AuxiliaryLine.ColorPass.Red			9	255	0	3	0	-
	Auxiliary Line: Pass Color: Green	Input.Graphic.AuxiliaryLine.ColorPass.Green			139	255	0	3	0	-
	Auxiliary Line: Pass Color: Blue	Input.Graphic.AuxiliaryLine.ColorPass.Blue			126	255	0	3	0	-
	Auxiliary Line: Fail Color: Enabled	Input.Graphic.AuxiliaryLine.ColorFail.Visible			True	-	-	-	-	-
	Auxiliary Line: Fail Color: Red	Input.Graphic.AuxiliaryLine.ColorFail.Red			245	255	0	3	0	-
	Auxiliary Line: Fail Color: Green	Input.Graphic.AuxiliaryLine.ColorFail.Green			63	255	0	3	0	-
	Auxiliary Line: Fail Color: Blue	Input.Graphic.AuxiliaryLine.ColorFail.Blue			8	255	0	3	0	-

Bisection of Two Lines

#O043

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Line (1st): Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (1st): Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (1st): Angle	Input.Target1.Angle			0.000	180.000	-180.000	3	3	✓
	Specify Line (2nd): Position X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (2nd): Position Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (2nd): Angle	Input.Target2.Angle			0.000	180.000	-180.000	3	3	✓
Measurement Target	Target Median Line	Input.MeasurementTarget.Type	Median 1	0	Median 1	-	-	-	-	-
			Median 2	1						
Judgment Conditions	Bisector Angle (+/-180°) Upper Limit: Enabled	Input.Limit.Angle.Max.Enable			False	-	-	-	-	-
	Bisector Angle (+/-180°): Upper Limit	Input.Limit.Angle.Max			Current Value	90.000	-90.000	2	3	✓
	Bisector Angle (+/-180°): Lower Limit Enabled	Input.Limit.Angle.Min.Enable			False	-	-	-	-	-
	Bisector Angle (+/-180°): Lower Limit	Input.Limit.Angle.Min			Current Value	90.000	-90.000	2	3	✓
	Detected Bisector Angle: Upper Limit Enabled	Input.Limit.DetectionLine.Position.Angle.Max.Enable			False	-	-	-	-	-
	Detected Bisector Angle: Upper Limit	Input.Limit.DetectionLine.Position.Angle.Max			Current Value	90.000	-90.000	2	3	✓
	Detected Bisector Angle: Lower Limit Enabled	Input.Limit.DetectionLine.Position.Angle.Min.Enable			False	-	-	-	-	-
	Detected Bisector Angle: Lower Limit	Input.Limit.DetectionLine.Position.Angle.Min			Current Value	90.000	-90.000	2	3	✓
Display Settings	Detected Line: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Line: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Line: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Line: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detected Line: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Line: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-
	Detected Line: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Line: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Line: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-
	Detected Line: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Detected Median: Enabled	Input.Graphic.MedianLine.Visible			True	-	-	-	-	-
	Detected Median: Line Thickness	Input.Graphic.MedianLine.StrokeWidth			2	64	1	2	0	-
	Detected Median: Pass Color: Enabled	Input.Graphic.MedianLine.ColorPass.Visible			True	-	-	-	-	-
	Detected Median: Pass Color: Red	Input.Graphic.MedianLine.ColorPass.Red			9	255	0	3	0	-
	Detected Median: Pass Color: Green	Input.Graphic.MedianLine.ColorPass.Green			139	255	0	3	0	-
	Detected Median: Pass Color: Blue	Input.Graphic.MedianLine.ColorPass.Blue			126	255	0	3	0	-
	Detected Median: Fail Color: Enabled	Input.Graphic.MedianLine.ColorFail.Visible			True	-	-	-	-	-
	Detected Median: Fail Color: Red	Input.Graphic.MedianLine.ColorFail.Red			245	255	0	3	0	-
	Detected Median: Fail Color: Green	Input.Graphic.MedianLine.ColorFail.Green			63	255	0	3	0	-
	Detected Median: Fail Color: Blue	Input.Graphic.MedianLine.ColorFail.Blue			8	255	0	3	0	-
	Result Display: Detection: Display Bisector Angle: Enabled	Input.Graphic.MedianLine.Angle.Visible			False	-	-	-	-	-
	Result Display: Character(s): Size	Input.Graphic.MedianLine.Font.Size			12	256	6	3	0	-

Angle Formed by Two Lines

#O044

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Line (1st): Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (1st): Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (1st): Angle	Input.Target1.Angle			0.000	180.000	-180.000	3	3	✓
	Specify Line (2nd): Position X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (2nd): Position Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (2nd): Angle	Input.Target2.Angle			0.000	180.000	-180.000	3	3	✓
Measurement Target	Target Angle	Input.MeasurementTarget.Type	Angle 1: Line 2 to Line 1 (Clockwise)	0	Angle 1	-	-	-	-	-
			Angle 2: Line 1 to Line 2 (Clockwise)	1						
			Angle 3: 360° - Angle 1	2						
			Angle 4: 360° - Angle 2	3						
	Inverse Target	Input.MeasurementTarget.Inverse	False	0	False	-	-	-	-	-
			True	1						
Judgment Conditions	Angle: Upper Limit Enabled	Input.Limit.Angle.Max.Enable			False	-	-	-	-	-
	Angle: Upper Limit	Input.Limit.Angle.Max			Current Value	360.000	0.000	3	3	✓
	Angle: Lower Limit Enabled	Input.Limit.Angle.Min.Enable			False	-	-	-	-	-
	Angle: Lower Limit	Input.Limit.Angle.Min			Current Value	360.000	0.000	3	3	✓
Display Settings	Detected Line: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Line: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Line: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Line: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detected Line: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Line: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-
	Detected Line: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Line: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Line: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-
	Detected Line: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Angle Auxiliary Line: Enabled	Input.Graphic.AngleAuxiliaryLine.Visible			True	-	-	-	-	-
	Angle Auxiliary Line: Line Thickness	Input.Graphic.AngleAuxiliaryLine.StrokeWidth			2	64	1	2	0	-
	Angle Auxiliary Line: Pass Color: Enabled	Input.Graphic.AngleAuxiliaryLine.ColorPass.Visible			True	-	-	-	-	-
	Angle Auxiliary Line: Pass Color: Red	Input.Graphic.AngleAuxiliaryLine.ColorPass.Red			9	255	0	3	0	-
	Angle Auxiliary Line: Pass Color: Green	Input.Graphic.AngleAuxiliaryLine.ColorPass.Green			139	255	0	3	0	-
	Angle Auxiliary Line: Pass Color: Blue	Input.Graphic.AngleAuxiliaryLine.ColorPass.Blue			126	255	0	3	0	-
	Angle Auxiliary Line: Fail Color: Enabled	Input.Graphic.AngleAuxiliaryLine.ColorFail.Visible			True	-	-	-	-	-
	Angle Auxiliary Line: Fail Color: Red	Input.Graphic.AngleAuxiliaryLine.ColorFail.Red			245	255	0	3	0	-
	Angle Auxiliary Line: Fail Color: Green	Input.Graphic.AngleAuxiliaryLine.ColorFail.Green			63	255	0	3	0	-
	Angle Auxiliary Line: Fail Color: Blue	Input.Graphic.AngleAuxiliaryLine.ColorFail.Blue			8	255	0	3	0	-
	Result Display: Display Angle: Enabled	Input.Graphic.AngleAuxiliaryLine.Angle.Visible			False	-	-	-	-	-
	Result Display: Character(s): Size	Input.Graphic.AngleAuxiliaryLine.Font.Size			12	256	6	3	0	-

Circle Detection

#O045

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Conditions	Trend Direction	Input.TrendDirection			Clockwise	-	-	-	-	-
	Scan Direction	Input.ScanDirection	Center to Outer	6	Center to Outer	-	-	-	-	✓
			Outer to Center	7						
	Edge Direction	Input.ContrastChangeDirection	Both	0	Both	-	-	-	-	✓
			Bright to Dark	1						
			Dark to Bright	2						
	Specified Edge	Input.SpecifiedEdge			0	3599	-3600	4	0	✓
	Edge Sensitivity (%)	Input.Sensitivity			30	100	0	3	0	✓
	Edge Filter Width	Input.FilterWidth			5	100	0	3	0	✓
	Edge Intensity Upper Limit	Input.Intensity.Max			255.000	255.000	0.000	3	3	✓
	Edge Intensity Lower Limit	Input.Intensity.Min			5.000	255.000	0.000	3	3	✓
	Segment Size	Input.SegmentSizeAngle			10.00	359.99	0.01	3	2	✓
	Segment Shift	Input.SegmentShift			5.00	359.99	0.01	3	2	✓
	Starting Offset	Input.StartingOffsetAngle			0.00	359.99	0.00	3	2	✓
	Starting Angle	Input.StartingAngle			0.00	359.99	0.00	3	2	✓
	Judged Label Type	Input.PrimaryTargetType	Maximum	0	Maximum	-	-	-	-	-
			Minimum	1						
			Specified	2						
	Judged Label	Input.PrimaryTarget			0	29999	0	5	0	-
	Angled Edge Detection	Input.AngledEdgeDetection			False	-	-	-	-	✓
	Maximum Number of Segments	Input.MaxSegments			100	30000	1	5	0	-
	Best Fit Circle/Line	Input.BestFitCircleLine			Circle	-	-	-	-	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Detection Conditions	Deformation Correction	Input.Correction			True	-	-	-	-	✓
	Abnormal Gap Size	Input.AbnormalGapSize			5.0	999.9	0.0	3	1	✓
	Abnormal Point Ratio Upper Limit	Input.AbnormalSensitivity			25	100	0	3	0	✓
Judgment Conditions	Number of Detected Segments: Upper Limit Enabled	Input.Limit.DetectedSegments.Max.Enable			False	-	-	-	-	-
	Number of Detected Segments: Upper Limit	Input.Limit.DetectedSegments.Max			Current Value	99999	0	5	0	✓
	Number of Detected Segments: Lower Limit Enabled	Input.Limit.DetectedSegments.Min.Enable			False	-	-	-	-	-
	Number of Detected Segments: Lower Limit	Input.Limit.DetectedSegments.Min			Current Value	99999	0	5	0	✓
	Radius (Maximum): Upper Limit Enabled	Input.Limit.MaxRadius.Max.Enable			False	-	-	-	-	-
	Radius (Maximum): Upper Limit	Input.Limit.MaxRadius.Max			Current Value	99999.999	0.000	5	3	✓
	Radius (Maximum): Lower Limit Enabled	Input.Limit.MaxRadius.Min.Enable			False	-	-	-	-	-
	Radius (Maximum): Lower Limit	Input.Limit.MaxRadius.Min			Current Value	99999.999	0.000	5	3	✓
	Radius (Minimum): Upper Limit Enabled	Input.Limit.MinRadius.Max.Enable			False	-	-	-	-	-
	Radius (Minimum): Upper Limit	Input.Limit.MinRadius.Max			Current Value	99999.999	0.000	5	3	✓
	Radius (Minimum): Lower Limit Enabled	Input.Limit.MinRadius.Min.Enable			False	-	-	-	-	-
	Radius (Minimum): Lower Limit	Input.Limit.MinRadius.Min			Current Value	99999.999	0.000	5	3	✓
	Radius: Upper Limit Enabled	Input.Limit.Radius.Max.Enable			False	-	-	-	-	-
	Radius: Upper Limit	Input.Limit.Radius.Max			Current Value	99999.999	0.000	5	3	✓
	Radius: Lower Limit Enabled	Input.Limit.Radius.Min.Enable			False	-	-	-	-	-
	Radius: Lower Limit	Input.Limit.Radius.Min			Current Value	99999.999	0.000	5	3	✓
	Detected Circle Center X: Upper Limit Enabled	Input.Limit.DetectedCircle.CenterX.Max.Enable			False	-	-	-	-	-
	Detected Circle Center X: Upper Limit	Input.Limit.DetectedCircle.CenterX.Max			Current Value	99999.999	-99999.999	5	3	✓
	Detected Circle Center X: Lower Limit Enabled	Input.Limit.DetectedCircle.CenterX.Min.Enable			False	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Detected Circle Center X: Lower Limit	Input.Limit.DetectedCircle.CenterX.Min			Current Value	99999.999	-99999.999	5	3	✓
	Detected Circle Center Y: Upper Limit Enabled	Input.Limit.DetectedCircle.CenterY.Max.Enable			False	-	-	-	-	-
	Detected Circle Center Y: Upper Limit	Input.Limit.DetectedCircle.CenterY.Max			Current Value	99999.999	-99999.999	5	3	✓
	Detected Circle Center Y: Lower Limit Enabled	Input.Limit.DetectedCircle.CenterY.Min.Enable			False	-	-	-	-	-
	Detected Circle Center Y: Lower Limit	Input.Limit.DetectedCircle.CenterY.Min			Current Value	99999.999	-99999.999	5	3	✓
	Detected Circle Radius: Upper Limit Enabled	Input.Limit.DetectedCircle.Radius.Max.Enable			False	-	-	-	-	-
	Detected Circle Radius: Upper Limit	Input.Limit.DetectedCircle.Radius.Max			Current Value	99999.999	0.000	5	3	✓
	Detected Circle Radius: Lower Limit Enabled	Input.Limit.DetectedCircle.Radius.Min.Enable			False	-	-	-	-	-
	Detected Circle Radius: Lower Limit	Input.Limit.DetectedCircle.Radius.Min			Current Value	99999.999	0.000	5	3	✓
	Detected Circle Diameter: Upper Limit Enabled	Input.Limit.DetectedCircle.Diameter.Max.Enable			False	-	-	-	-	-
	Detected Circle Diameter: Upper Limit	Input.Limit.DetectedCircle.Diameter.Max			Current Value	99999.999	0.000	5	3	✓
	Detected Circle Diameter: Lower Limit Enabled	Input.Limit.DetectedCircle.Diameter.Min.Enable			False	-	-	-	-	-
	Detected Circle Diameter: Lower Limit	Input.Limit.DetectedCircle.Diameter.Min			Current Value	99999.999	0.000	5	3	✓
	Detected Circle Count: Upper Limit Enabled	Input.Limit.DetectedCircle.Count.Max.Enable			False	-	-	-	-	-
	Detected Circle Count: Upper Limit	Input.Limit.DetectedCircle.Count.Max			Current Value	1	0	1	0	✓
	Detected Circle Count: Lower Limit Enabled	Input.Limit.DetectedCircle.Count.Min.Enable			False	-	-	-	-	-
	Detected Circle Count: Lower Limit	Input.Limit.DetectedCircle.Count.Min			Current Value	1	0	1	0	✓
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Pass Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Pass Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Inspection Region: Pass Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Pass Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Inspection Region: Fail Color: Enabled	Input.Graphic.Region.ColorFail.Visible			True	-	-	-	-	-
	Inspection Region: Fail Color: Red	Input.Graphic.Region.ColorFail.Red			245	255	0	3	0	-
	Inspection Region: Fail Color: Green	Input.Graphic.Region.ColorFail.Green			63	255	0	3	0	-
	Inspection Region: Fail Color: Blue	Input.Graphic.Region.ColorFail.Blue			8	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Pass Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Pass Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Pass Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Pass Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-
	Mask Region: Fail Color: Enabled	Input.Graphic.Region.Mask.ColorFail.Visible			True	-	-	-	-	-
	Mask Region: Fail Color: Red	Input.Graphic.Region.Mask.ColorFail.Red			245	255	0	3	0	-
	Mask Region: Fail Color: Green	Input.Graphic.Region.Mask.ColorFail.Green			124	255	0	3	0	-
	Mask Region: Fail Color: Blue	Input.Graphic.Region.Mask.ColorFail.Blue			177	255	0	3	0	-
	Judged Label: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.Visible			True	-	-	-	-	-
	Judged Label: Shape	Input.Graphic.TrendEdge.PrimaryTarget.Shape	Cross	1	Bar	-	-	-	-	-
			Circle	4						
			Bar	13						
	Judged Label: Size	Input.Graphic.TrendEdge.PrimaryTarget.Size			16	1024	4	4	0	-
	Judged Label: Line Thickness	Input.Graphic.TrendEdge.PrimaryTarget.StrokeWidth			2	64	1	2	0	-
	Judged Label: Pass Color: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Judged Label: Pass Color: Red	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Red			135	255	0	3	0	-
	Judged Label: Pass Color: Green	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Green			187	255	0	3	0	-
	Judged Label: Pass Color: Blue	Input.Graphic.TrendEdge.PrimaryTarget.ColorPass.Blue			12	255	0	3	0	-
	Judged Label: Fail Color: Enabled	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Visible			True	-	-	-	-	-
	Judged Label: Fail Color: Red	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Red			135	255	0	3	0	-
	Judged Label: Fail Color: Green	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Green			187	255	0	3	0	-
	Judged Label: Fail Color: Blue	Input.Graphic.TrendEdge.PrimaryTarget.ColorFail.Blue			12	255	0	3	0	-
	Maximum Label: Enabled	Input.Graphic.TrendEdge.MaximumTarget.Visible			False	-	-	-	-	-
	Maximum Label: Shape	Input.Graphic.TrendEdge.MaximumTarget.Shape	Cross	1	Bar	-	-	-	-	-
			Circle	4						
			Bar	13						
	Maximum Label: Size	Input.Graphic.TrendEdge.MaximumTarget.Size			16	1024	4	4	0	-
	Maximum Label: Line Thickness	Input.Graphic.TrendEdge.MaximumTarget.StrokeWidth			1	64	1	2	0	-
	Maximum Label: Pass Color: Enabled	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Visible			True	-	-	-	-	-
	Maximum Label: Pass Color: Red	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Red			221	255	0	3	0	-
	Maximum Label: Pass Color: Green	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Green			182	255	0	3	0	-
	Maximum Label: Pass Color: Blue	Input.Graphic.TrendEdge.MaximumTarget.ColorPass.Blue			14	255	0	3	0	-
	Maximum Label: Fail Color: Enabled	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Visible			True	-	-	-	-	-
	Maximum Label: Fail Color: Red	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Red			221	255	0	3	0	-
	Maximum Label: Fail Color: Green	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Green			182	255	0	3	0	-
	Maximum Label: Fail Color: Blue	Input.Graphic.TrendEdge.MaximumTarget.ColorFail.Blue			14	255	0	3	0	-
	Minimum Label: Enabled	Input.Graphic.TrendEdge.MinimumTarget.Visible			False	-	-	-	-	-
	Minimum Label: Shape	Input.Graphic.TrendEdge.MinimumTarget.Shape	Cross	1	Bar	-	-	-	-	-
			Circle	4						
			Bar	13						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Minimum Label: Size	Input.Graphic.TrendEdge.MinimumTarget.Size			16	1024	4	4	0	-
	Minimum Label: Line Thickness	Input.Graphic.TrendEdge.MinimumTarget.StrokeWidth			1	64	1	2	0	-
	Minimum Label: Pass Color: Enabled	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Visible			True	-	-	-	-	-
	Minimum Label: Pass Color: Red	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Red			221	255	0	3	0	-
	Minimum Label: Pass Color: Green	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Green			182	255	0	3	0	-
	Minimum Label: Pass Color: Blue	Input.Graphic.TrendEdge.MinimumTarget.ColorPass.Blue			14	255	0	3	0	-
	Minimum Label: Fail Color: Enabled	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Visible			True	-	-	-	-	-
	Minimum Label: Fail Color: Red	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Red			221	255	0	3	0	-
	Minimum Label: Fail Color: Green	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Green			182	255	0	3	0	-
	Minimum Label: Fail Color: Blue	Input.Graphic.TrendEdge.MinimumTarget.ColorFail.Blue			14	255	0	3	0	-
	Display Profile: Enabled	Input.Graphic.TrendEdge.Profile.Visible			True	-	-	-	-	-
	Display Profile: Line Thickness	Input.Graphic.TrendEdge.Profile.StrokeWidth			2	64	1	2	0	-
	Display Profile: Pass Color: Enabled	Input.Graphic.TrendEdge.Profile.ColorPass.Visible			True	-	-	-	-	-
	Display Profile: Pass Color: Red	Input.Graphic.TrendEdge.Profile.ColorPass.Red			221	255	0	3	0	-
	Display Profile: Pass Color: Green	Input.Graphic.TrendEdge.Profile.ColorPass.Green			182	255	0	3	0	-
	Display Profile: Pass Color: Blue	Input.Graphic.TrendEdge.Profile.ColorPass.Blue			14	255	0	3	0	-
	Display Profile: Fail Color: Enabled	Input.Graphic.TrendEdge.Profile.ColorFail.Visible			True	-	-	-	-	-
	Display Profile: Fail Color: Red	Input.Graphic.TrendEdge.Profile.ColorFail.Red			221	255	0	3	0	-
	Display Profile: Fail Color: Green	Input.Graphic.TrendEdge.Profile.ColorFail.Green			182	255	0	3	0	-
	Display Profile: Fail Color: Blue	Input.Graphic.TrendEdge.Profile.ColorFail.Blue			14	255	0	3	0	-
	Display Segments: Enabled	Input.Graphic.TrendEdge.Segment.Visible			True	-	-	-	-	-
	Display Segments: Line Thickness	Input.Graphic.TrendEdge.Segment.StrokeWidth			1	64	1	2	0	-
	Display Segments: Pass Color: Enabled	Input.Graphic.TrendEdge.Segment.ColorPass.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Display Segments: Pass Color: Red	Input.Graphic.TrendEdge.Segment.ColorPass.Red			221	255	0	3	0	-
	Display Segments: Pass Color: Green	Input.Graphic.TrendEdge.Segment.ColorPass.Green			182	255	0	3	0	-
	Display Segments: Pass Color: Blue	Input.Graphic.TrendEdge.Segment.ColorPass.Blue			14	255	0	3	0	-
	Display Segments: Fail Color: Enabled	Input.Graphic.TrendEdge.Segment.ColorFail.Visible			True	-	-	-	-	-
	Display Segments: Fail Color: Red	Input.Graphic.TrendEdge.Segment.ColorFail.Red			221	255	0	3	0	-
	Display Segments: Fail Color: Green	Input.Graphic.TrendEdge.Segment.ColorFail.Green			182	255	0	3	0	-
	Display Segments: Fail Color: Blue	Input.Graphic.TrendEdge.Segment.ColorFail.Blue			14	255	0	3	0	-
	Display Detected Circle/Line: Line Thickness	Input.Graphic.DetectedShape.StrokeWidth			2	64	1	2	0	-
	Display Detected Circle/Line: Color: Enabled	Input.Graphic.DetectedShape.Color.Visible			True	-	-	-	-	-
	Display Detected Circle/Line: Color: Red	Input.Graphic.DetectedShape.Color.Red			135	255	0	3	0	-
	Display Detected Circle/Line: Color: Green	Input.Graphic.DetectedShape.Color.Green			187	255	0	3	0	-
	Display Detected Circle/Line: Color: Blue	Input.Graphic.DetectedShape.Color.Blue			12	255	0	3	0	-

Line/V-Line Intersection

#O046

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Line: Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line: Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line: Angle	Input.Target1.Angle			0.000	180.000	-180.000	3	3	✓
	Specify Point: Position X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Point: Position Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
Judgment Conditions	Intersection X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Intersection X: Upper Limit	Input.Limit.Position.X.Max			Current Value	99999.999	-99999.999	5	3	✓
	Intersection X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Intersection X: Lower Limit	Input.Limit.Position.X.Min			Current Value	99999.999	-99999.999	5	3	✓
	Intersection Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Intersection Y: Upper Limit	Input.Limit.Position.Y.Max			Current Value	99999.999	-99999.999	5	3	✓
	Intersection Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-
	Intersection Y: Lower Limit	Input.Limit.Position.Y.Min			Current Value	99999.999	-99999.999	5	3	✓
Display Settings	Detected Line, Detected Point: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Line, Detected Point: Size	Input.Graphic.Target.Size			16	1024	4	4	0	-
	Detected Line, Detected Point: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Line, Detected Point: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Line, Detected Point: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detected Line, Detected Point: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-
	Detected Line, Detected Point: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-
	Detected Line, Detected Point: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Line, Detected Point: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Line, Detected Point: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-
	Detected Line, Detected Point: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Auxiliary Line: Enabled	Input.Graphic.AuxiliaryLine.Visible			True	-	-	-	-	-
	Auxiliary Line: Line Thickness	Input.Graphic.AuxiliaryLine.StrokeWidth			2	64	1	2	0	-
	Auxiliary Line: Pass Color: Enabled	Input.Graphic.AuxiliaryLine.ColorPass.Visible			True	-	-	-	-	-
	Auxiliary Line: Pass Color: Red	Input.Graphic.AuxiliaryLine.ColorPass.Red			9	255	0	3	0	-
	Auxiliary Line: Pass Color: Green	Input.Graphic.AuxiliaryLine.ColorPass.Green			139	255	0	3	0	-
	Auxiliary Line: Pass Color: Blue	Input.Graphic.AuxiliaryLine.ColorPass.Blue			126	255	0	3	0	-
	Auxiliary Line: Fail Color: Enabled	Input.Graphic.AuxiliaryLine.ColorFail.Visible			True	-	-	-	-	-
	Auxiliary Line: Fail Color: Red	Input.Graphic.AuxiliaryLine.ColorFail.Red			245	255	0	3	0	-
	Auxiliary Line: Fail Color: Green	Input.Graphic.AuxiliaryLine.ColorFail.Green			63	255	0	3	0	-
	Auxiliary Line: Fail Color: Blue	Input.Graphic.AuxiliaryLine.ColorFail.Blue			8	255	0	3	0	-
	Intersection: Enabled	Input.Graphic.Intersection.Visible			True	-	-	-	-	-
	Intersection: Size	Input.Graphic.Intersection.Size			16	1024	4	4	0	-
	Intersection: Line Thickness	Input.Graphic.Intersection.StrokeWidth			2	64	1	2	0	-
	Intersection: Pass Color: Enabled	Input.Graphic.Intersection.ColorPass.Visible			True	-	-	-	-	-
	Intersection: Pass Color: Red	Input.Graphic.Intersection.ColorPass.Red			9	255	0	3	0	-
	Intersection: Pass Color: Green	Input.Graphic.Intersection.ColorPass.Green			139	255	0	3	0	-
	Intersection: Pass Color: Blue	Input.Graphic.Intersection.ColorPass.Blue			126	255	0	3	0	-
	Intersection: Fail Color: Enabled	Input.Graphic.Intersection.ColorFail.Visible			True	-	-	-	-	-
	Intersection: Fail Color: Red	Input.Graphic.Intersection.ColorFail.Red			245	255	0	3	0	-
	Intersection: Fail Color: Green	Input.Graphic.Intersection.ColorFail.Green			63	255	0	3	0	-
	Intersection: Fail Color: Blue	Input.Graphic.Intersection.ColorFail.Blue			8	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Result Display: Display Intersection X: Enabled	Input.Graphic.Intersection.Position.X.Visible			False	-	-	-	-	-
	Result Display: Display Intersection Y: Enabled	Input.Graphic.Intersection.Position.Y.Visible			False	-	-	-	-	-
	Result Display: Character(s): Size	Input.Graphic.Intersection.Font.Size			12	256	6	3	0	-

Two Lines Intersection

#O047

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Line (1st): Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (1st): Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (1st): Angle	Input.Target1.Angle			0.000	180.000	-180.000	3	3	✓
	Specify Line (2nd): Position X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (2nd): Position Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (2nd): Angle	Input.Target2.Angle			0.000	180.000	-180.000	3	3	✓
Judgment Conditions	Intersection X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Intersection X: Upper Limit	Input.Limit.Position.X.Max			Current Value	99999.999	-99999.999	5	3	✓
	Intersection X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Intersection X: Lower Limit	Input.Limit.Position.X.Min			Current Value	99999.999	-99999.999	5	3	✓
	Intersection Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Intersection Y: Upper Limit	Input.Limit.Position.Y.Max			Current Value	99999.999	-99999.999	5	3	✓
	Intersection Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-
	Intersection Y: Lower Limit	Input.Limit.Position.Y.Min			Current Value	99999.999	-99999.999	5	3	✓
Display Settings	Detected Line: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Line: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Line: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Line: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detected Line: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-
	Detected Line: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-
	Detected Line: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Line: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Line: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Line: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Intersection: Enabled	Input.Graphic.Intersection.Visible			True	-	-	-	-	-
	Intersection: Size	Input.Graphic.Intersection.Size			16	1024	4	4	0	-
	Intersection: Line Thickness	Input.Graphic.Intersection.StrokeWidth			2	64	1	2	0	-
	Intersection: Pass Color: Enabled	Input.Graphic.Intersection.ColorPass.Visible			True	-	-	-	-	-
	Intersection: Pass Color: Red	Input.Graphic.Intersection.ColorPass.Red			9	255	0	3	0	-
	Intersection: Pass Color: Green	Input.Graphic.Intersection.ColorPass.Green			139	255	0	3	0	-
	Intersection: Pass Color: Blue	Input.Graphic.Intersection.ColorPass.Blue			126	255	0	3	0	-
	Intersection: Fail Color: Enabled	Input.Graphic.Intersection.ColorFail.Visible			True	-	-	-	-	-
	Intersection: Fail Color: Red	Input.Graphic.Intersection.ColorFail.Red			245	255	0	3	0	-
	Intersection: Fail Color: Green	Input.Graphic.Intersection.ColorFail.Green			63	255	0	3	0	-
	Intersection: Fail Color: Blue	Input.Graphic.Intersection.ColorFail.Blue			8	255	0	3	0	-
	Result Display: Display Intersection X: Enabled	Input.Graphic.Intersection.Position.X.Visible			False	-	-	-	-	-
	Result Display: Display Intersection Y: Enabled	Input.Graphic.Intersection.Position.Y.Visible			False	-	-	-	-	-
	Result Display: Character(s): Size	Input.Graphic.Intersection.Font.Size			12	256	6	3	0	-

Center of Quadrangle

#O048

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Line (Upper): Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (Upper): Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (Upper): Angle	Input.Target1.Angle			0.000	180.000	-180.000	3	3	✓
	Specify Line (Right): Position X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (Right): Position Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (Right): Angle	Input.Target2.Angle			0.000	180.000	-180.000	3	3	✓
	Specify Line (Lower): Position X	Input.Target3.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (Lower): Position Y	Input.Target3.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (Lower): Angle	Input.Target3.Angle			0.000	180.000	-180.000	3	3	✓
	Specify Line (Left): Position X	Input.Target4.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (Left): Position Y	Input.Target4.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Line (Left): Angle	Input.Target4.Angle			0.000	180.000	-180.000	3	3	✓
Judgment Conditions	Center X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Center X: Upper Limit	Input.Limit.Position.X.Max			Current Value	99999.999	-99999.999	5	3	✓
	Center X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Center X: Lower Limit	Input.Limit.Position.X.Min			Current Value	99999.999	-99999.999	5	3	✓
	Center Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Center Y: Upper Limit	Input.Limit.Position.Y.Max			Current Value	99999.999	-99999.999	5	3	✓
	Center Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-
	Center Y: Lower Limit	Input.Limit.Position.Y.Min			Current Value	99999.999	-99999.999	5	3	✓
Display Settings	Detected Line: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Line: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Line: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Line: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detected Line: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-
	Detected Line: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Line: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Line: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Line: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-
	Detected Line: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Intersection: Enabled	Input.Graphic.Intersection.Visible			True	-	-	-	-	-
	Intersection: Size	Input.Graphic.Intersection.Size			16	1024	4	4	0	-
	Intersection: Line Thickness	Input.Graphic.Intersection.StrokeWidth			2	64	1	2	0	-
	Intersection: Pass Color: Enabled	Input.Graphic.Intersection.ColorPass.Visible			True	-	-	-	-	-
	Intersection: Pass Color: Red	Input.Graphic.Intersection.ColorPass.Red			9	255	0	3	0	-
	Intersection: Pass Color: Green	Input.Graphic.Intersection.ColorPass.Green			139	255	0	3	0	-
	Intersection: Pass Color: Blue	Input.Graphic.Intersection.ColorPass.Blue			126	255	0	3	0	-
	Intersection: Fail Color: Enabled	Input.Graphic.Intersection.ColorFail.Visible			True	-	-	-	-	-
	Intersection: Fail Color: Red	Input.Graphic.Intersection.ColorFail.Red			245	255	0	3	0	-
	Intersection: Fail Color: Green	Input.Graphic.Intersection.ColorFail.Green			63	255	0	3	0	-
	Intersection: Fail Color: Blue	Input.Graphic.Intersection.ColorFail.Blue			8	255	0	3	0	-
	Center: Enabled	Input.Graphic.Center.Visible			True	-	-	-	-	-
	Center: Size	Input.Graphic.Center.Size			16	1024	4	4	0	-
	Center: Line Thickness	Input.Graphic.Center.StrokeWidth			2	64	1	2	0	-
	Center: Pass Color: Enabled	Input.Graphic.Center.ColorPass.Visible			True	-	-	-	-	-
	Center: Pass Color: Red	Input.Graphic.Center.ColorPass.Red			9	255	0	3	0	-
	Center: Pass Color: Green	Input.Graphic.Center.ColorPass.Green			139	255	0	3	0	-
	Center: Pass Color: Blue	Input.Graphic.Center.ColorPass.Blue			126	255	0	3	0	-
	Center: Fail Color: Enabled	Input.Graphic.Center.ColorFail.Visible			True	-	-	-	-	-
	Center: Fail Color: Red	Input.Graphic.Center.ColorFail.Red			245	255	0	3	0	-
	Center: Fail Color: Green	Input.Graphic.Center.ColorFail.Green			63	255	0	3	0	-
	Center: Fail Color: Blue	Input.Graphic.Center.ColorFail.Blue			8	255	0	3	0	-
	Result Display: Display Center Point X: Enabled	Input.Graphic.Center.Position.X.Visible			False	-	-	-	-	-
	Result Display: Display Center Point Y: Enabled	Input.Graphic.Center.Position.Y.Visible			False	-	-	-	-	-
	Result Display: Character(s): Size	Input.Graphic.Center.Font.Size			12	256	6	3	0	-

Midpoint of Points

#O049

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Detection Target	Specify Point (1st): Position X	Input.Target1.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Point (1st): Position Y	Input.Target1.Position.Y			0.000	99999.999	-99999.999	5	3	✓
	Specify Point (2nd): Position X	Input.Target2.Position.X			0.000	99999.999	-99999.999	5	3	✓
	Specify Point (2nd): Position Y	Input.Target2.Position.Y			0.000	99999.999	-99999.999	5	3	✓
Judgment Conditions	Midpoint X: Upper Limit Enabled	Input.Limit.Position.X.Max.Enable			False	-	-	-	-	-
	Midpoint X: Upper Limit	Input.Limit.Position.X.Max			Current Value	99999.999	-99999.999	5	3	✓
	Midpoint X: Lower Limit Enabled	Input.Limit.Position.X.Min.Enable			False	-	-	-	-	-
	Midpoint X: Lower Limit	Input.Limit.Position.X.Min			Current Value	99999.999	-99999.999	5	3	✓
	Midpoint Y: Upper Limit Enabled	Input.Limit.Position.Y.Max.Enable			False	-	-	-	-	-
	Midpoint Y: Upper Limit	Input.Limit.Position.Y.Max			Current Value	99999.999	-99999.999	5	3	✓
	Midpoint Y: Lower Limit Enabled	Input.Limit.Position.Y.Min.Enable			False	-	-	-	-	-
	Midpoint Y: Lower Limit	Input.Limit.Position.Y.Min			Current Value	99999.999	-99999.999	5	3	✓
Display Settings	Detected Points: Enabled	Input.Graphic.Target.Visible			True	-	-	-	-	-
	Detected Points: Size	Input.Graphic.Target.Size			16	1024	4	4	0	-
	Detected Points: Line Thickness	Input.Graphic.Target.StrokeWidth			2	64	1	2	0	-
	Detected Points: Pass Color: Enabled	Input.Graphic.Target.ColorPass.Visible			True	-	-	-	-	-
	Detected Points: Pass Color: Red	Input.Graphic.Target.ColorPass.Red			135	255	0	3	0	-
	Detected Points: Pass Color: Green	Input.Graphic.Target.ColorPass.Green			187	255	0	3	0	-
	Detected Points: Pass Color: Blue	Input.Graphic.Target.ColorPass.Blue			12	255	0	3	0	-
	Detected Points: Fail Color: Enabled	Input.Graphic.Target.ColorFail.Visible			True	-	-	-	-	-
	Detected Points: Fail Color: Red	Input.Graphic.Target.ColorFail.Red			135	255	0	3	0	-
	Detected Points: Fail Color: Green	Input.Graphic.Target.ColorFail.Green			187	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Points: Fail Color: Blue	Input.Graphic.Target.ColorFail.Blue			12	255	0	3	0	-
	Auxiliary Line: Enabled	Input.Graphic.AuxiliaryLine.Visible			True	-	-	-	-	-
	Auxiliary Line: Line Thickness	Input.Graphic.AuxiliaryLine.StrokeWidth			2	64	1	2	0	-
	Auxiliary Line: Pass Color: Enabled	Input.Graphic.AuxiliaryLine.ColorPass.Visible			True	-	-	-	-	-
	Auxiliary Line: Pass Color: Red	Input.Graphic.AuxiliaryLine.ColorPass.Red			9	255	0	3	0	-
	Auxiliary Line: Pass Color: Green	Input.Graphic.AuxiliaryLine.ColorPass.Green			139	255	0	3	0	-
	Auxiliary Line: Pass Color: Blue	Input.Graphic.AuxiliaryLine.ColorPass.Blue			126	255	0	3	0	-
	Auxiliary Line: Fail Color: Enabled	Input.Graphic.AuxiliaryLine.ColorFail.Visible			True	-	-	-	-	-
	Auxiliary Line: Fail Color: Red	Input.Graphic.AuxiliaryLine.ColorFail.Red			245	255	0	3	0	-
	Auxiliary Line: Fail Color: Green	Input.Graphic.AuxiliaryLine.ColorFail.Green			63	255	0	3	0	-
	Auxiliary Line: Fail Color: Blue	Input.Graphic.AuxiliaryLine.ColorFail.Blue			8	255	0	3	0	-
	Midpoint: Enabled	Input.Graphic.Midpoint.Visible			True	-	-	-	-	-
	Midpoint: Size	Input.Graphic.Midpoint.Size			16	1024	4	4	0	-
	Midpoint: Line Thickness	Input.Graphic.Midpoint.StrokeWidth			2	64	1	2	0	-
	Midpoint: Pass Color: Enabled	Input.Graphic.Midpoint.ColorPass.Visible			True	-	-	-	-	-
	Midpoint: Pass Color: Red	Input.Graphic.Midpoint.ColorPass.Red			9	255	0	3	0	-
	Midpoint: Pass Color: Green	Input.Graphic.Midpoint.ColorPass.Green			139	255	0	3	0	-
	Midpoint: Pass Color: Blue	Input.Graphic.Midpoint.ColorPass.Blue			126	255	0	3	0	-
	Midpoint: Fail Color: Enabled	Input.Graphic.Midpoint.ColorFail.Visible			True	-	-	-	-	-
	Midpoint: Fail Color: Red	Input.Graphic.Midpoint.ColorFail.Red			245	255	0	3	0	-
	Midpoint: Fail Color: Green	Input.Graphic.Midpoint.ColorFail.Green			63	255	0	3	0	-
	Midpoint: Fail Color: Blue	Input.Graphic.Midpoint.ColorFail.Blue			8	255	0	3	0	-
	Result Display: Display Center Point X: Enabled	Input.Graphic.Midpoint.Position.X.Visible			False	-	-	-	-	-
	Result Display: Display Center Point Y: Enabled	Input.Graphic.Midpoint.Position.Y.Visible			False	-	-	-	-	-
	Result Display: Character(s): Size	Input.Graphic.Midpoint.Font.Size			12	256	6	3	0	-

Shared Region

#O050

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-

Image Region (Current Image)

#O051

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-

Image Region (Model Image)

#O052

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Detection Point	Specify Individually	Input.DetectedPoint.Individual			False	-	-	-	-	-
	Reference Tool	Input.DetectedPoint.ID	None	0	None	-	-	-	-	-
			Referenceable tool							
	X	Input.DetectedPoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.DetectedPoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.DetectedPoint.Angle			0.000	359.999	0.000	3	3	✓
Reference Position	X	Input.ReferencePoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.ReferencePoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.ReferencePoint.Angle			0.000	359.999	0.000	3	3	✓
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-

Shared Pattern (ShapeTrax3A)

#O143

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Region	Region	Input.Region	Refer to "Region".							
Color Extraction	Color Extraction	Input.ColorExtraction	Refer to "Color Extraction".							
Image Enhance	Image Enhance	Input.ImageEnhancement	Refer to "Image Enhance".							
Detection Conditions	Fine Search Accuracy	Input.FineSearchAccuracy	Detailed	0	Detailed	-	-	-	-	✓
			Fast	1						
	Reverse Detection	Input.ReverseDetection	False	0	False	-	-	-	-	✓
			True	1						
Rotation Direction-Added Search	Rotation Direction-Added Search	Input.RotationDirectionAddedSearch			-	-	-	-	-	-
	Enable Rotation Direction-Added Search	Input.RotationDirectionAddedSearch.Enable			False	-	-	-	-	-
	Region N	Input.RotationDirectionAddedSearch.Region[N]			-	-	-	-	-	-
	Shape	Input.RotationDirectionAddedSearch.Region[N].Type	Rectangle	2	Rectangle	-	-	-	-	-
			Circle	3						
			Oval	4						
			Ring	5						
			Arc	6						
			Polygon	7						
	(Various Region Parameters) Width	Input.RotationDirectionAddedSearch.Region[N].Width			201	16383	1	5	0	✓
	(Various Region Parameters) Height	Input.RotationDirectionAddedSearch.Region[N].Height			161	16383	1	5	0	✓
	(Various Region Parameters) Center X	Input.RotationDirectionAddedSearch.Region[N].Center.X			260.000	16382.000	-16382.000	5	3	✓
	(Various Region Parameters) Center Y	Input.RotationDirectionAddedSearch.Region[N].Center.Y			240.000	16382.000	-16382.000	5	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Rotation Direction-Added Search	(Various Region Parameters) Rotation Angle	Input.RotationDirectionAddedSearch.Region[N].Angle			0.000	359.999	0.000	3	3	✓
	(Various Region Parameters) Radius 1	Input.RotationDirectionAddedSearch.Region[N].Radius1			120	9600	0	4	0	✓
	(Various Region Parameters) Radius 2	Input.RotationDirectionAddedSearch.Region[N].Radius2			120	9600	0	4	0	✓
	Mask	Input.RotationDirectionAddedSearch.Region[N].Mask			False	-	-	-	-	-
	Reference Selection Settings: Reference	Input.RotationDirectionAddedSearch.RotationCenter.Mode	Specified Point	0	Specified Point	-	-	-	-	-
			Center of Gravity	1						
	Reference Selection Settings: Offset X	Input.RotationDirectionAddedSearch.RotationCenter.Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Reference Selection Settings: Offset Y	Input.RotationDirectionAddedSearch.RotationCenter.Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Condition	Input.RotationDirectionAddedSearch.RotationMode	Whole Circumference	0	Whole Circumference	-	-	-	-	-
			180° Rotation	1						
			Polygon	2						
	Polygon Setting	Input.RotationDirectionAddedSearch.PolygonPoints			6	16	3	2	0	✓
	Follow Angle Range of Detection Conditions	Input.RotationDirectionAddedSearch.FollowAngleRange			False	-	-	-	-	-
	Rotation Feature Densification	Input.RotationDirectionAddedSearch.FeatureDensification			True	-	-	-	-	✓
Options	Detection Point Reference Selection	Input.DetectionPoint.Mode	Specified Point	0	Specified Point	-	-	-	-	-
			Center of Gravity	1						
Feature Extraction Conditions	Display Feature	Input.DisplayFeature	Coarse	0	Coarse	-	-	-	-	-
			Fine	1						
	Feature Extraction Settings	Input.FeatureExtraction	Automatic	0	Automatic	-	-	-	-	-
			Automatic (Low Contrast)	1						
			Custom	2						
	Search Sensitivity	Input.Sensitivity	Fast	0	Standard	-	-	-	-	-
			Standard	1						
			Detailed	2						
			Custom	3						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Feature Extraction Conditions	Coarse: Registered Feature Intensity Lower Limit (Coarse Feat.)	Input.CoarseFeature.Registered.MinimumIntensity			30	255	1	3	0	✓
	Coarse: Coarse Search Image Reduction	Input.CoarseFeature.ImageReduction			4	10	0	2	0	✓
	Coarse: Coarse Search Feature Reduction	Input.CoarseFeature.FeatureReduction			4	10	0	2	0	✓
	Fine: Registered Feature Intensity Lower Limit (Fine Feat.)	Input.FineFeature.Registered.MinimumIntensity			30	255	1	3	0	✓
	Fine: Fine Search Image Reduction	Input.FineFeature.ImageReduction			0	4	0	1	0	✓
	Feature Densification	Input.FeatureDensification	None	0	Automatic	-	-	-	-	✓
			Low	1						
			Medium	2						
			High	3						
			Automatic	4						
	Large Area Search Mode	Input.LargeAreaSearchMode.Enable			False	-	-	-	-	-
Eraser Tool	Enable Eraser Tool	Input.Eraser.Enable			False	-	-	-	-	-
Display Settings	Feature Point Display: Pattern Region Display: Enabled	Input.Graphic.PrimaryTarget.PatternRegion.Visible			True	-	-	-	-	-
	Feature Point Display: Registered Feature	Input.Graphic.PrimaryTarget.TrainedFeature	Fine Feature	0	Fine Feature	-	-	-	-	-
			Coarse Feature	1						
	Rotation Feature Region: Line Thickness	Input.Graphic.PrimaryTarget.RotationFeatureRegion.StrokeWidth			2	64	1	2	0	-
	Rotation Feature Region: Color: Enabled	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorPass.Visible			True	-	-	-	-	-
	Rotation Feature Region: Color: Red	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorPass.Red			255	255	0	3	0	-
	Rotation Feature Region: Color: Green	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorPass.Green			255	255	0	3	0	-
	Rotation Feature Region: Color: Blue	Input.Graphic.PrimaryTarget.RotationFeatureRegion.ColorPass.Blue			0	255	0	3	0	-

Shared Image Enhance

#O053

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-
	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-

Subtraction Filter

#O054

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Color Extraction	Color Extraction	Input.ColorExtraction	See "Color Extraction"							
Image Enhance	Image Enhance	Input.ImageEnhancement	See "Image Enhance"							
Detection Point	Specify Individually	Input.DetectedPoint.Individual			False	-	-	-	-	-
	Reference Tool	Input.DetectedPoint.ID	None	0	None	-	-	-	-	-
			Referenceable tool							
	X	Input.DetectedPoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.DetectedPoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.DetectedPoint.Angle			0.000	359.999	0.000	3	3	✓
Reference Position	X	Input.ReferencePoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.ReferencePoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.ReferencePoint.Angle			0.000	359.999	0.000	3	3	✓
Masking	Masking	Input.Masking			2	9	0	1	0	✓
Extract Tone	Extract Tone	Input.ToneExtraction	Bright & Dark	0	Bright & Dark	-	-	-	-	✓
			Bright	1						
			Dark	2						
Display Settings	Inspection Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Inspection Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Inspection Region: Color: Enabled	Input.Graphic.Region.ColorPass.Visible			True	-	-	-	-	-
	Inspection Region: Color: Red	Input.Graphic.Region.ColorPass.Red			42	255	0	3	0	-
	Inspection Region: Color: Green	Input.Graphic.Region.ColorPass.Green			86	255	0	3	0	-
	Inspection Region: Color: Blue	Input.Graphic.Region.ColorPass.Blue			175	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Mask Region: Enabled	Input.Graphic.Region.Mask.Visible			True	-	-	-	-	-
	Mask Region: Line Thickness	Input.Graphic.Region.Mask.StrokeWidth			2	64	1	2	0	-
	Mask Region: Color: Enabled	Input.Graphic.Region.Mask.ColorPass.Visible			True	-	-	-	-	-
	Mask Region: Color: Red	Input.Graphic.Region.Mask.ColorPass.Red			245	255	0	3	0	-
	Mask Region: Color: Green	Input.Graphic.Region.Mask.ColorPass.Green			124	255	0	3	0	-
	Mask Region: Color: Blue	Input.Graphic.Region.Mask.ColorPass.Blue			177	255	0	3	0	-

Image Position Adjustment

#O055

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Region	Region	Input.Region	See "Region"							
Detection Point	Specify Individually	Input.DetectedPoint.Individual			False	-	-	-	-	-
	Position	Input.DetectedPoint.ID	None	0	None	-	-	-	-	-
			Referenceable tool							
	X	Input.DetectedPoint.X			0.000	16383.000	-16383.000	5	3	✓
	Y	Input.DetectedPoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Angle	Input.DetectedPoint.Angle			0.000	359.999	0.000	3	3	✓
Reference Position	Reference Position X	Input.ReferencePoint.X			0.000	16383.000	-16383.000	5	3	✓
	Reference Position Y	Input.ReferencePoint.Y			0.000	16383.000	-16383.000	5	3	✓
	Reference Position Angle	Input.ReferencePoint.Angle			0.000	359.999	0.000	3	3	✓
Processing Outside Capture Area	Processing Type	Input.Outside.ProcessingType	Fill	0	Fill	-	-	-	-	✓
			Extended Image	1						
	Fill Pixel Value	Input.Outside.FillPixelValue			0	255	0	3	0	✓
Display Settings	Region: Enabled	Input.Graphic.Region.Visible			True	-	-	-	-	-
	Region: Line Thickness	Input.Graphic.Region.StrokeWidth			2	64	1	2	0	-
	Region: Color: Enabled	Input.Graphic.Region.Color.Visible			True	-	-	-	-	-
	Region: Color: Red	Input.Graphic.Region.Color.Red			42	255	0	3	0	-
	Region: Color: Green	Input.Graphic.Region.Color.Green			86	255	0	3	0	-
	Region: Color: Blue	Input.Graphic.Region.Color.Blue			175	255	0	3	0	-

Calibration (Robot)

#O056

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Calibration	Detection Tool: Specify Individually	Input.DetectedPoint.Individual			False	-	-	-	-	-
	Detection Tool: Specify	Input.DetectedPoint.ID	None	0	None	-	-	-	-	-
			Referenceable tool	-						
	Detection Tool: X	Input.DetectedPoint.X			0.000	16383.000	-16383.000	5	3	✓
	Detection Tool: Y	Input.DetectedPoint.Y			0.000	16383.000	-16383.000	5	3	✓
	File Name	Input.FileName				-	-	-	-	-

Pick/Place

#O057

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Calibration	Calibration Data: Specify	Input.Calibration.ID			No Transformation	-	-	-	-	-
	Calibration Data: Differing Height Correction: Correct Height Difference	Input.Calibration.Plane.HeightDifference.Enable			False	-	-	-	-	-
	Calibration Data: Differing Height Correction: Height Difference with Calibration Plane	Input.Calibration.Plane.HeightDifference			0.000	999.9	-999.9	3	1	✓
	Calibration Data: Differing Height Correction: Calibration Plane Z Coordinate	Input.Calibration.Plane.CoordinateZ			0.000	9999.999	-9999.999	4	3	-
Detection	Detection Position Settings: Specify Individually	Input.Position.Individual			False	-	-	-	-	-
	Detection Position Settings: Specify	Input.Position.ID			None	-	-	-	-	-
	Detection Position Settings: X	Input.Position.X			0.000	16383.000	-16383.000	5	3	✓
	Detection Position Settings: Y	Input.Position.Y			0.000	16383.000	-16383.000	5	3	✓
	Detection Position Settings: Angle Calculation	Input.Position.Angle.Enable			True	-	-	-	-	-
	Detection Position Settings: Angle (Rz)	Input.Position.Angle			0.000	359.999	0.000	3	3	✓
	Multiple Detection	Input.Count.Enable			False	-	-	-	-	-
	Detection Count	Input.Count			1	9999	1	4	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Reference Registration	Detected Position Coordinates	Input.DetectedPositionType	Camera Coordinates	0	Camera Coordinates	-	-	-	-	-
			Robot Coordinates	1						
	Camera Installation Position	Input.CameraPositionType	Fixed	0	Fixed	-	-	-	-	-
			On-Hand	1						
	Update Capture Position at Each Measurement	Input.DifferentCaputurePose			False	-	-	-	-	-
	Set to the Same as Detection Position Settings	Input.ReferencePositionAuto.Enable			True	-	-	-	-	-
	Reference Detection Position: Specify Individually	Input.ReferencePosition.Individual			False	-	-	-	-	-
	Reference Detection Position: Specify	Input.ReferencePosition.ID			None	-	-	-	-	-
	Registered Value X	Input.RegisterPosition.X			0.000	16383.000	-16383.000	5	3	-
	Registered Value Y	Input.RegisterPosition.Y			0.000	16383.000	-16383.000	5	3	-
	Registered Value Rz	Input.RegisterPosition.Rz			0.000	359.999	0.000	3	3	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Post-Transformation Shift from Reference: Post-Transformation X Shift from Reference: Upper Limit: Enabled	Input.Limit.Position.GapX.Max.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation X Shift from Reference: Upper Limit	Input.Limit.Position.GapX.Max			Current Value	9999.999	-9999.999	4	3	✓
	Post-Transformation Shift from Reference: Post-Transformation X Shift from Reference: Lower Limit Enabled	Input.Limit.Position.GapX.Min.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation X Shift from Reference: Lower Limit	Input.Limit.Position.GapX.Min			Current Value	9999.999	-9999.999	4	3	✓
	Post-Transformation Shift from Reference: Post-Transformation Y Shift from Reference: Upper Limit Enabled	Input.Limit.Position.GapY.Max.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation Y Shift from Reference: Upper Limit	Input.Limit.Position.GapY.Max			Current Value	9999.999	-9999.999	4	3	✓
	Post-Transformation Shift from Reference: Post-Transformation Y Shift from Reference: Lower Limit Enabled	Input.Limit.Position.GapY.Min.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation Y Shift from Reference: Lower Limit	Input.Limit.Position.GapY.Min			Current Value	9999.999	-9999.999	4	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Post-Transformation Shift from Reference: Post-Transformation Angle Shift from Reference (Rz): Upper Limit: Enabled	Input.Limit.Position.GapRz.Max.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation Angle Shift from Reference (Rz): Upper Limit	Input.Limit.Position.GapRz.Max			Current Value	180.000	-180.000	3	3	✓
	Post-Transformation Shift from Reference: Post-Transformation Angle Shift from Reference (Rz): Lower Limit Enabled	Input.Limit.Position.GapRz.Min.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation Angle Shift from Reference (Rz): Lower Limit	Input.Limit.Position.GapRz.Min			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate X: Upper Limit Enabled	Input.Limit.RobotPose.Position.X.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate X: Upper Limit	Input.Limit.RobotPose.Position.X.Max			Current Value	9999.999	-9999.999	4	3	✓
	Robot Coordinates: Robot Coordinate X: Lower Limit Enabled	Input.Limit.RobotPose.Position.X.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate X: Lower Limit	Input.Limit.RobotPose.Position.X.Min			Current Value	9999.999	-9999.999	4	3	✓
	Robot Coordinates: Robot Coordinate Y: Upper Limit Enabled	Input.Limit.RobotPose.Position.Y.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Y: Upper Limit	Input.Limit.RobotPose.Position.Y.Max			Current Value	9999.999	-9999.999	4	3	✓
	Robot Coordinates: Robot Coordinate Y: Lower Limit Enabled	Input.Limit.RobotPose.Position.Y.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Y: Lower Limit	Input.Limit.RobotPose.Position.Y.Min			Current Value	9999.999	-9999.999	4	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Robot Coordinates: Robot Coordinate Z: Upper Limit Enabled	Input.Limit.RobotPose.Position.Z.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Z: Upper Limit	Input.Limit.RobotPose.Position.Z.Max			Current Value	9999.999	-9999.999	4	3	✓
	Robot Coordinates: Robot Coordinate Z: Lower Limit Enabled	Input.Limit.RobotPose.Position.Z.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Z: Lower Limit	Input.Limit.RobotPose.Position.Z.Min			Current Value	9999.999	-9999.999	4	3	✓
	Robot Coordinates: Robot Coordinate Rx: Upper Limit Enabled	Input.Limit.RobotPose.Orientation.X.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Rx: Upper Limit	Input.Limit.RobotPose.Orientation.X.Max			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate Rx: Lower Limit Enabled	Input.Limit.RobotPose.Orientation.X.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Rx: Lower Limit	Input.Limit.RobotPose.Orientation.X.Min			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate Ry: Upper Limit Enabled	Input.Limit.RobotPose.Orientation.Y.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Ry: Upper Limit	Input.Limit.RobotPose.Orientation.Y.Max			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate Ry: Lower Limit Enabled	Input.Limit.RobotPose.Orientation.Y.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Ry: Lower Limit	Input.Limit.RobotPose.Orientation.Y.Min			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate Rz: Upper Limit Enabled	Input.Limit.RobotPose.Orientation.Z.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Rz: Upper Limit	Input.Limit.RobotPose.Orientation.Z.Max			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate Rz: Lower Limit Enabled	Input.Limit.RobotPose.Orientation.Z.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Rz: Lower Limit	Input.Limit.RobotPose.Orientation.Z.Min			Current Value	180.000	-180.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Detected Position: Enabled	Input.Graphic.TargetPosition.Visible			True	-	-	-	-	-
	Detected Position: Shape	Input.Graphic.TargetPosition.Shape	Cross	1	Cross	-	-	-	-	-
			Circle	4						
	Detected Position: Size	Input.Graphic.TargetPosition.Size			16	1024	4	4	0	-
	Detected Position: Line Thickness	Input.Graphic.TargetPosition.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.TargetPosition.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.TargetPosition.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.TargetPosition.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.TargetPosition.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.TargetPosition.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.TargetPosition.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.TargetPosition.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.TargetPosition.ColorFail.Blue			12	255	0	3	0	-
	Reference Detection Position: Enabled	Input.Graphic.TargetPosition.Reference.Visible			True	-	-	-	-	-
	Reference Detection Position: Shape	Input.Graphic.TargetPosition.Reference.Shape	Cross	1	Cross	-	-	-	-	-
			Circle	4						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Reference Detection Position: Size	Input.Graphic.TargetPosition.Reference.Size			16	1024	4	4	0	-
	Reference Detection Position: Line Thickness	Input.Graphic.TargetPosition.Reference.StrokeWidth			2	64	1	2	0	-
	Reference Detection Position: Pass Color: Enabled	Input.Graphic.TargetPosition.Reference.ColorPass.Visible			True	-	-	-	-	-
	Reference Detection Position: Pass Color: Red	Input.Graphic.TargetPosition.Reference.ColorPass.Red			221	255	0	3	0	-
	Reference Detection Position: Pass Color: Green	Input.Graphic.TargetPosition.Reference.ColorPass.Green			182	255	0	3	0	-
	Reference Detection Position: Pass Color: Blue	Input.Graphic.TargetPosition.Reference.ColorPass.Blue			14	255	0	3	0	-
	Reference Detection Position: Fail Color: Enabled	Input.Graphic.TargetPosition.Reference.ColorFail.Visible			True	-	-	-	-	-
	Reference Detection Position: Fail Color: Red	Input.Graphic.TargetPosition.Reference.ColorFail.Red			221	255	0	3	0	-
	Reference Detection Position: Fail Color: Green	Input.Graphic.TargetPosition.Reference.ColorFail.Green			182	255	0	3	0	-
	Reference Detection Position: Fail Color: Blue	Input.Graphic.TargetPosition.Reference.ColorFail.Blue			14	255	0	3	0	-
	Operation Direction Vector: Enabled	Input.Graphic.TargetPosition.Arrow.Visible			True	-	-	-	-	-
	Operation Direction Vector: Line Thickness	Input.Graphic.TargetPosition.Arrow.StrokeWidth			2	64	1	2	0	-
	Operation Direction Vector: Pass Color: Enabled	Input.Graphic.TargetPosition.Arrow.ColorPass			True	-	-	-	-	-
	Operation Direction Vector: Pass Color: Red	Input.Graphic.TargetPosition.Arrow.ColorPass.Red			9	255	0	3	0	-
	Operation Direction Vector: Pass Color: Green	Input.Graphic.TargetPosition.Arrow.ColorPass.Green			138	255	0	3	0	-
	Operation Direction Vector: Pass Color: Blue	Input.Graphic.TargetPosition.Arrow.ColorPass.Blue			126	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Operation Direction Vector: Fail Color: Enabled	Input.Graphic.TargetPosition.Arrow.ColorFail.Visible			True	-	-	-	-	-
	Operation Direction Vector: Fail Color: Red	Input.Graphic.TargetPosition.Arrow.ColorFail.Red			245	255	0	3	0	-
	Operation Direction Vector: Fail Color: Green	Input.Graphic.TargetPosition.Arrow.ColorFail.Green			63	255	0	3	0	-
	Operation Direction Vector: Fail Color: Blue	Input.Graphic.TargetPosition.Arrow.ColorFail.Blue			8	255	0	3	0	-
	Reference Pick/Place Position: Enabled	Input.Graphic.TargetPosition.RobotPose.Visible			True	-	-	-	-	-
	Reference Pick/Place Position: Shape	Input.Graphic.TargetPosition.RobotPose.Shape	Cross	1	Cross	-	-	-	-	-
			Circle	4						
	Reference Pick/Place Position: Size	Input.Graphic.TargetPosition.RobotPose.Size			16	1024	4	4	1	-
	Reference Pick/Place Position: Line Thickness	Input.Graphic.TargetPosition.RobotPose.StrokeWidth			2	64	1	2	0	-
	Reference Pick/Place Position: Pass Color: Enabled	Input.Graphic.TargetPosition.RobotPose.ColorPass.Visible			True	-	-	-	-	-
	Reference Pick/Place Position: Pass Color: Red	Input.Graphic.TargetPosition.RobotPose.ColorPass.Red			245	255	0	3	0	-
	Reference Pick/Place Position: Pass Color: Green	Input.Graphic.TargetPosition.RobotPose.ColorPass.Green			124	255	0	3	0	-
	Reference Pick/Place Position: Pass Color: Blue	Input.Graphic.TargetPosition.RobotPose.ColorPass.Blue			177	255	0	3	0	-
	Reference Pick/Place Position: Fail Color: Enabled	Input.Graphic.TargetPosition.RobotPose.ColorFail.Visible			True	-	-	-	-	-
	Reference Pick/Place Position: Fail Color: Red	Input.Graphic.TargetPosition.RobotPose.ColorFail.Red			245	255	0	3	0	-
	Reference Pick/Place Position: Fail Color: Green	Input.Graphic.TargetPosition.RobotPose.ColorFail.Green			124	255	0	3	0	-
	Reference Pick/Place Position: Fail Color: Blue	Input.Graphic.TargetPosition.RobotPose.ColorFail.Blue			177	255	0	3	0	-

Grip Shift Correction

#O058

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Calibration	Calibration Data: Specify	Input.Calibration.ID			None	-	-	-	-	-
	Calibration Data: Differing Height Correction: Correct Height Difference	Input.Calibration.Plane.HeightDifference.Enable			False	-	-	-	-	-
	Calibration Data: Differing Height Correction: Height Difference with Calibration Plane	Input.Calibration.Plane.HeightDifference			0.0	999.9	-999.9	3	1	✓
	Calibration Data: Differing Height Correction: Calibration Plane Z Coordinate	Input.Calibration.Plane.CoordinateZ			0.000	9999.999	-9999.999	4	3	-
Detection	Detection Position Settings: Specify Individually	Input.Position.Individual			False	-	-	-	-	-
	Detection Position Settings: Specify	Input.Position.ID			None	-	-	-	-	-
	Detection Position Settings: X	Input.Position.X			0.000	16383.000	-16383.000	5	3	✓
	Detection Position Settings: Y	Input.Position.Y			0.000	16383.000	-16383.000	5	3	✓
	Detection Position Settings: Angle Calculation	Input.Position.Angle.Enable			True	-	-	-	-	-
	Detection Position Settings: Angle (Rz)	Input.Position.Angle			0.000	359.999	0.000	3	3	✓
	Multiple Detection	Input.Count.Enable			False	-	-	-	-	-
	Detection Count	Input.Count			1	9999	1	4	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Reference Registration	Detected Position Coordinates	Input.DetectedPositionType	Camera Coordinates	0	Camera Coordinates	-	-	-	-	-
			Robot Coordinates	1						
	Update Capture Position at Each Measurement	Input.DifferentCaputurePose			False	-	-	-	-	-
	Set to the Same as Detection Position Settings	Input.ReferencePositionAuto.Enable			True	-	-	-	-	-
	Reference Detection Position: Specify Individually	Input.ReferencePosition.Individual			False	-	-	-	-	-
	Reference Detection Position: Specify	Input.ReferencePosition.ID			None	-	-	-	-	-
	Registered Value X	Input.RegisterPosition.X			0.000	16383.000	-16383.000	5	3	-
	Registered Value Y	Input.RegisterPosition.Y			0.000	16383.000	-16383.000	5	3	-
	Registered Value Rz	Input.RegisterPosition.Rz			0.000	359.999	0.000	3	3	-
	Add Shift Amount to Reference Place Position Coordinates	Input.PlacePositionCorrection.Enable			False	-	-	-	-	-
Judgment Conditions	Post-Transformation Shift from Reference: Post-Transformation X Shift from Reference: Upper Limit: Enabled	Input.Limit.Position.GapX.Max.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation X Shift from Reference: Upper Limit	Input.Limit.Position.GapX.Max			Current Value	9999.999	-9999.999	4	3	✓
	Post-Transformation Shift from Reference: Post-Transformation X Shift from Reference: Lower Limit Enabled	Input.Limit.Position.GapX.Min.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation X Shift from Reference: Lower Limit	Input.Limit.Position.GapX.Min			Current Value	9999.999	-9999.999	4	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Post-Transformation Shift from Reference: Post-Transformation Y Shift from Reference: Upper Limit Enabled	Input.Limit.Position.GapY.Max.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation Y Shift from Reference: Upper Limit	Input.Limit.Position.GapY.Max			Current Value	9999.999	-9999.999	4	3	✓
	Post-Transformation Shift from Reference: Post-Transformation Y Shift from Reference: Lower Limit Enabled	Input.Limit.Position.GapY.Min.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation Y Shift from Reference: Lower Limit	Input.Limit.Position.GapY.Min			Current Value	9999.999	-9999.999	4	3	✓
	Post-Transformation Shift from Reference: Post-Transformation Angle Shift from Reference (Rz): Upper Limit: Enabled	Input.Limit.Position.GapRz.Max.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation Angle Shift from Reference (Rz): Upper Limit	Input.Limit.Position.GapRz.Max			Current Value	180.000	-180.000	3	3	✓
	Post-Transformation Shift from Reference: Post-Transformation Angle Shift from Reference (Rz): Lower Limit Enabled	Input.Limit.Position.GapRz.Min.Enable			False	-	-	-	-	-
	Post-Transformation Shift from Reference: Post-Transformation Angle Shift from Reference (Rz): Lower Limit	Input.Limit.Position.GapRz.Min			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate X: Upper Limit Enabled	Input.Limit.RobotPose.Position.X.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate X: Upper Limit	Input.Limit.RobotPose.Position.X.Max			Current Value	9999.999	-9999.999	4	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Robot Coordinates: Robot Coordinate X: Lower Limit Enabled	Input.Limit.RobotPose.Position.X.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate X: Lower Limit	Input.Limit.RobotPose.Position.X.Min			Current Value	9999.999	-9999.999	4	3	✓
	Robot Coordinates: Robot Coordinate Y: Upper Limit Enabled	Input.Limit.RobotPose.Position.Y.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Y: Upper Limit	Input.Limit.RobotPose.Position.Y.Max			Current Value	9999.999	-9999.999	4	3	✓
	Robot Coordinates: Robot Coordinate Y: Lower Limit Enabled	Input.Limit.RobotPose.Position.Y.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Y: Lower Limit	Input.Limit.RobotPose.Position.Y.Min			Current Value	9999.999	-9999.999	4	3	✓
	Robot Coordinates: Robot Coordinate Z: Upper Limit Enabled	Input.Limit.RobotPose.Position.Z.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Z: Upper Limit	Input.Limit.RobotPose.Position.Z.Max			Current Value	9999.999	-9999.999	4	3	✓
	Robot Coordinates: Robot Coordinate Z: Lower Limit Enabled	Input.Limit.RobotPose.Position.Z.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Z: Lower Limit	Input.Limit.RobotPose.Position.Z.Min			Current Value	9999.999	-9999.999	4	3	✓
	Robot Coordinates: Robot Coordinate Rx: Upper Limit Enabled	Input.Limit.RobotPose.Orientation.X.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Rx: Upper Limit	Input.Limit.RobotPose.Orientation.X.Max			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate Rx: Lower Limit Enabled	Input.Limit.RobotPose.Orientation.X.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Rx: Lower Limit	Input.Limit.RobotPose.Orientation.X.Min			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate Ry: Upper Limit Enabled	Input.Limit.RobotPose.Orientation.Y.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Ry: Upper Limit	Input.Limit.RobotPose.Orientation.Y.Max			Current Value	180.000	-180.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Judgment Conditions	Robot Coordinates: Robot Coordinate Ry: Lower Limit Enabled	Input.Limit.RobotPose.Orientation.Y.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Ry: Lower Limit	Input.Limit.RobotPose.Orientation.Y.Min			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate Rz: Upper Limit Enabled	Input.Limit.RobotPose.Orientation.Z.Max.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Rz: Upper Limit	Input.Limit.RobotPose.Orientation.Z.Max			Current Value	180.000	-180.000	3	3	✓
	Robot Coordinates: Robot Coordinate Rz: Lower Limit Enabled	Input.Limit.RobotPose.Orientation.Z.Min.Enable			False	-	-	-	-	-
	Robot Coordinates: Robot Coordinate Rz: Lower Limit	Input.Limit.RobotPose.Orientation.Z.Min			Current Value	180.000	-180.000	3	3	✓
Display Settings	Detected Position: Enabled	Input.Graphic.TargetPosition.Visible			True	-	-	-	-	-
	Detected Position: Shape	Input.Graphic.TargetPosition.Shape	Cross	1	Cross	-	-	-	-	-
			Circle	4						
	Detected Position: Size	Input.Graphic.TargetPosition.Size			16	1024	4	4	0	-
	Detected Position: Line Thickness	Input.Graphic.TargetPosition.StrokeWidth			2	64	1	2	0	-
	Detected Position: Pass Color: Enabled	Input.Graphic.TargetPosition.ColorPass.Visible			True	-	-	-	-	-
	Detected Position: Pass Color: Red	Input.Graphic.TargetPosition.ColorPass.Red			135	255	0	3	0	-
	Detected Position: Pass Color: Green	Input.Graphic.TargetPosition.ColorPass.Green			187	255	0	3	0	-
	Detected Position: Pass Color: Blue	Input.Graphic.TargetPosition.ColorPass.Blue			12	255	0	3	0	-
	Detected Position: Fail Color: Enabled	Input.Graphic.TargetPosition.ColorFail.Visible			True	-	-	-	-	-
	Detected Position: Fail Color: Red	Input.Graphic.TargetPosition.ColorFail.Red			135	255	0	3	0	-
	Detected Position: Fail Color: Green	Input.Graphic.TargetPosition.ColorFail.Green			187	255	0	3	0	-
	Detected Position: Fail Color: Blue	Input.Graphic.TargetPosition.ColorFail.Blue			12	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Reference Detection Position: Enabled	Input.Graphic.TargetPosition.Reference.Visible			True	-	-	-	-	-
	Reference Detection Position: Shape	Input.Graphic.TargetPosition.Reference.Shape	Cross	1	Cross	-	-	-	-	-
			Circle	4						
	Reference Detection Position: Size	Input.Graphic.TargetPosition.Reference.Size			16	1024	4	4	0	-
	Reference Detection Position: Line Thickness	Input.Graphic.TargetPosition.Reference.StrokeWidth			2	64	1	2	0	-
	Reference Detection Position: Pass Color: Enabled	Input.Graphic.TargetPosition.Reference.ColorPass.Visible			True	-	-	-	-	-
	Reference Detection Position: Pass Color: Red	Input.Graphic.TargetPosition.Reference.ColorPass.Red			221	255	0	3	0	-
	Reference Detection Position: Pass Color: Green	Input.Graphic.TargetPosition.Reference.ColorPass.Green			182	255	0	3	0	-
	Reference Detection Position: Pass Color: Blue	Input.Graphic.TargetPosition.Reference.ColorPass.Blue			14	255	0	3	0	-
	Reference Detection Position: Fail Color: Enabled	Input.Graphic.TargetPosition.Reference.ColorFail.Visible			True	-	-	-	-	-
	Reference Detection Position: Fail Color: Red	Input.Graphic.TargetPosition.Reference.ColorFail.Red			221	255	0	3	0	-
	Reference Detection Position: Fail Color: Green	Input.Graphic.TargetPosition.Reference.ColorFail.Green			182	255	0	3	0	-
	Reference Detection Position: Fail Color: Blue	Input.Graphic.TargetPosition.Reference.ColorFail.Blue			14	255	0	3	0	-
	Operation Direction Vector: Enabled	Input.Graphic.TargetPosition.Arrow.Visible			True	-	-	-	-	-
	Operation Direction Vector: Line Thickness	Input.Graphic.TargetPosition.Arrow.StrokeWidth			2	64	1	2	0	-
	Operation Direction Vector: Pass Color: Enabled	Input.Graphic.TargetPosition.Arrow.ColorPass.Visible			True	-	-	-	-	-
	Operation Direction Vector: Pass Color: Red	Input.Graphic.TargetPosition.Arrow.ColorPass.Red			9	255	0	3	0	-
	Operation Direction Vector: Pass Color: Green	Input.Graphic.TargetPosition.Arrow.ColorPass.Green			139	255	0	3	0	-
	Operation Direction Vector: Pass Color: Blue	Input.Graphic.TargetPosition.Arrow.ColorPass.Blue			126	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Operation Direction Vector: Fail Color: Enabled	Input.Graphic.TargetPosition.Arrow.ColorFail.Visible			True	-	-	-	-	-
	Operation Direction Vector: Fail Color: Red	Input.Graphic.TargetPosition.Arrow.ColorFail.Red			245	255	0	3	0	-
	Operation Direction Vector: Fail Color: Green	Input.Graphic.TargetPosition.Arrow.ColorFail.Green			63	255	0	3	0	-
	Operation Direction Vector: Fail Color: Blue	Input.Graphic.TargetPosition.Arrow.ColorFail.Blue			8	255	0	3	0	-
	Reference Capture Position: Enabled	Input.Graphic.TargetPosition.RobotPose.Visible			True	-	-	-	-	-
	Reference Capture Position: Shape	Input.Graphic.TargetPosition.RobotPose.Shape	Cross	1	Cross	-	-	-	-	-
			Circle	4						
	Reference Capture Position: Size	Input.Graphic.TargetPosition.RobotPose.Size			16	1024	4	4	0	-
	Reference Capture Position: Line Thickness	Input.Graphic.TargetPosition.RobotPose.StrokeWidth			2	64	1	2	0	-
	Reference Capture Position: Pass Color: Enabled	Input.Graphic.TargetPosition.RobotPose.ColorPass.Visible			True	-	-	-	-	-
	Reference Capture Position: Pass Color: Red	Input.Graphic.TargetPosition.RobotPose.ColorPass.Red			245	255	0	3	0	-
	Reference Capture Position: Pass Color: Green	Input.Graphic.TargetPosition.RobotPose.ColorPass.Green			124	255	0	3	0	-
	Reference Capture Position: Pass Color: Blue	Input.Graphic.TargetPosition.RobotPose.ColorPass.Blue			177	255	0	3	0	-
	Reference Capture Position: Fail Color: Enabled	Input.Graphic.TargetPosition.RobotPose.ColorFail.Visible			True	-	-	-	-	-
	Reference Capture Position: Fail Color: Red	Input.Graphic.TargetPosition.RobotPose.ColorFail.Red			245	255	0	3	0	-
	Reference Capture Position: Fail Color: Green	Input.Graphic.TargetPosition.RobotPose.ColorFail.Green			124	255	0	3	0	-
	Reference Capture Position: Fail Color: Blue	Input.Graphic.TargetPosition.RobotPose.ColorFail.Blue			177	255	0	3	0	-

Robot Coordinate Transformation

#O059

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Transformation	Edit Calibration: Specify	Input.Calibration.ID			None	-	-	-	-	-
	Edit Calibration: Correct Height Difference	Input.Calibration.Plane.HeightDifference.Enable			False	-	-	-	-	-
	Edit Calibration: Height Difference with Calibration Plane	Input.Calibration.Plane.HeightDifference			0.0	999.9	-999.9	3	1	✓
	Edit Calibration: Calibration Plane Z Coordinate	Input.Calibration.Plane.CoordinateZ			0.000	9999.999	-9999.999	4	3	-
	Edit Calibration: Transformation Direction	Input.Transformation	Camera Coordinates→Robot Coordinates	0	Camera Coordinates→Robot Coordinates	-	-	-	-	-
			Robot Coordinates→Camera Coordinates	1						
	Transformation Target: Specify Individually	Input.InputPosition.Individual			False	-	-	-	-	-
	Transformation Target: Tool ID	Input.InputPosition.ID			None	-	-	-	-	-
	Transformation Target: Position X	Input.InputPosition.X			0.000	16383.000	-16383.000	5	3	✓
	Transformation Target: Position Y	Input.InputPosition.Y			0.000	16383.000	-16383.000	5	3	✓
	Transformation Target: Angle	Input.InputPosition.Angle			0.000	359.999	0.000	3	3	✓
	Transformation Target: Multiple Detection	Input.Count.Enable			False	-	-	-	-	-
	Transformation Target: Detection Count	Input.Count			1	9999	1	4	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Transformation	Camera/Object Movement Correction: Correction Type	Input.Correction	No Correction	0	No Correction	-	-	-	-	-
			Camera Movement Correction	1						
			Object Movement Correction	2						
	Camera/Object Movement Correction: Correction Type: Camera Movement Correction: Calculation Method	Input.CameraMoveOffsetSelection	Calculate from Current Position	1	Calculate from Current Position	-	-	-	-	-
			Specify Directly	2						
	Camera/Object Movement Correction: Correction Type: Camera Movement Correction: Specify Directly: X Correction Value (mm)	Input.CameraMoveOffset.X			0.000	9999999.999	-9999999.999	7	3	✓
	Camera/Object Movement Correction: Correction Type: Camera Movement Correction: Specify Directly: Y Correction Value (mm)	Input.CameraMoveOffset.Y			0.000	9999999.999	-9999999.999	7	3	✓
	Camera/Object Movement Correction: Correction Type: Camera Movement Correction: Specify Directly: Angle Correction Value (°)	Input.CameraMoveOffset.Angle			0.000	180.000	-180.000	3	3	✓
	Camera/Object Movement Correction: Correction Type: Camera Movement Correction: Calculate from Current Position: Current Position X (mm)	Input.CameraCurrentPosition.X			0.000	9999999.999	-9999999.999	7	3	✓
	Camera/Object Movement Correction: Correction Type: Camera Movement Correction: Calculate from Current Position: Current Position Y (mm)	Input.CameraCurrentPosition.Y			0.000	9999999.999	-9999999.999	7	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Transformation	Camera/Object Movement Correction: Correction Type: Camera Movement Correction: Calculate from Current Position: Current Position Angle (°)	Input.CameraCurrentPosition.Angle			0.000	180.000	-180.000	3	3	✓
	Camera/Object Movement Correction: Correction Type: Object Movement Correction: Specify Directly: X Correction Value (mm)	Input.WorkMoveOffset.X			0.000	9999999.999	-9999999.999	7	3	✓
	Camera/Object Movement Correction: Correction Type: Object Movement Correction: Specify Directly: Y Correction Value (mm)	Input.WorkMoveOffset.Y			0.000	9999999.999	-9999999.999	7	3	✓
	Camera/Object Movement Correction: Correction Type: Object Movement Correction: Specify Directly: Angle Correction Value (°)	Input.WorkMoveOffset.Angle			0.000	180.000	-180.000	3	3	✓
	Camera/Object Movement Correction: Correction Type: Object Movement Correction: Calculate from Current Position: Current Position X (mm)	Input.WorkCurrentPosition.X			0.000	9999999.999	-9999999.999	7	3	✓
	Camera/Object Movement Correction: Correction Type: Object Movement Correction: Calculate from Current Position: Current Position Y (mm)	Input.WorkCurrentPosition.Y			0.000	9999999.999	-9999999.999	7	3	✓
	Camera/Object Movement Correction: Correction Type: Object Movement Correction: Calculate from Current Position: Current Position Angle (°)	Input.WorkCurrentPosition.Angle			0.000	180.000	-180.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Display Settings	Transformation Target: Enabled	Input.Graphic.TargetPosition.Visible			True	-	-	-	-	-
	Transformation Target: Shape	Input.Graphic.TargetPosition.Shape	Cross	1	Cross	-	-	-	-	-
			Circle	4						
	Transformation Target: Size	Input.Graphic.TargetPosition.Size			16	1024	4	4	0	-
	Transformation Target: Line Thickness	Input.Graphic.TargetPosition.StrokeWidth			2	64	1	2	0	-
	Transformation Target: Color: Enabled	Input.Graphic.TargetPosition.Color.Visible			True	-	-	-	-	-
	Transformation Target: Color: Red	Input.Graphic.TargetPosition.Color.Red			135	255	0	3	0	-
	Transformation Target: Color: Green	Input.Graphic.TargetPosition.Color.Green			187	255	0	3	0	-
	Transformation Target: Color: Blue	Input.Graphic.TargetPosition.Color.Blue			12	255	0	3	0	-
	Post-Transformation Coordinates: Enabled	Input.Graphic.TargetPosition.TransformedPosition.Visible			True	-	-	-	-	-
	Post-Transformation Coordinates: Shape	Input.Graphic.TargetPosition.TransformedPosition.Shape	Cross	1	Cross	-	-	-	-	-
			Circle	4						
	Post-Transformation Coordinates: Size	Input.Graphic.TargetPosition.TransformedPosition.Size			16	1024	4	4	0	-
	Post-Transformation Coordinates: Line Thickness	Input.Graphic.TargetPosition.TransformedPosition.StrokeWidth			2	64	1	2	0	-
	Post-Transformation Coordinates: Color: Enabled	Input.Graphic.TargetPosition.TransformedPosition.Color.Visible			True	-	-	-	-	-
	Post-Transformation Coordinates: Color: Red	Input.Graphic.TargetPosition.TransformedPosition.Color.Red			135	255	0	3	0	-
	Post-Transformation Coordinates: Color: Green	Input.Graphic.TargetPosition.TransformedPosition.Color.Green			187	255	0	3	0	-
	Post-Transformation Coordinates: Color: Blue	Input.Graphic.TargetPosition.TransformedPosition.Color.Blue			12	255	0	3	0	-

Data Input (Industrial Ethernet)

#O060

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Input Data	Input Data Settings[n]: Data Type	Input.Field[n].Type	Bit		32-bit Integer	-	-	-	-	-
			8-bit Integer							
			8-bit Unsigned Integer							
			16-bit Integer							
			16-bit Unsigned Integer							
			32-bit Integer							
			64-bit Integer							
			32-bit Floating-point Number							
			String							
	Input Data Settings[n]: Size (Can be entered only when the data type is [String].)	Input.Field[n].Size			4	9999	1	4	0	-
	Input Data Settings[n]: Initial Value	Input.Field[n].Default.Value			0 (NULL)	-	-	-	-	-
	Input Data Settings: Update Initial Value Upon Saving	Input.Field.EnableSaveDefaultValue			True	-	-	-	-	-
	Input Data Settings: Input Address Offset	Input.Field.AddressOffset			-	-	-	-	-	-
	Input Data Settings: Input Source	Input.Field.ProtocolType	Disable		Disable	-	-	-	-	-
			EtherNet/IP							
			PROFINET							

Data Input (Non-Procedural)

#O061

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Input Data	Input Data Settings[n]: Data Type	Input.Field[n].Type	Logical Value		Integer	-	-	-	-	-
			Integer							
			Floating-point							
			String							
	Input Data Settings[n]: Size (Can be entered only when the data type is [String].)	Input.Field[n].Size			4	-	-	-	-	-
	Input Data Settings[n]: Initial Value	Input.Field[n].Default.Value			0: (NULL)	-	-	-	-	-
	Maximum Number of Child Elements	Input.Field.Length			100	100	100	0	0	-
	Input Data Settings: Update Initial Value Upon Saving	Input.Field.EnableSaveDefaultValue			True	-	-	-	-	-
	Input Data Settings: Delimiter	Input.Field.Separator	Comma		Comma	-	-	-	-	-
			Tab							
			Space							
			ASCII Code							
Options	Clear Data After Reading	Input.Field.ClearBufferAfterLoading			True	-	-	-	-	-
	Timeout for Input Tool Execution	Input.Field.TimeOut			6000	6000	0	4	0	-

Data Output (Industrial Ethernet)

#O062

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							-
Bit Data Output	Output Settings: Bit Data[n]: Output Items	Input.OutputResult.BitData[n].Data			-	-	-	-	-	✓
	Address	-			-	9999.9	0.0	4	1	-
Byte Data Output	Byte Data[n]: Output Items	Input.OutputResult.Data[n].Data			-	-	-	-	-	✓
	Address	-			-	9999.9	0.0	4	1	-
	Array Data Detailed Settings: Array-type Data Starting Index	Input.OutputResult.Data[n].ArrayData.StartIndex			Selected index	9998	0	-	-	-
	Array Data Detailed Settings: Array-type Data Count	Input.OutputResult.Data[n].ArrayData.Count			No. of elements in the array to be output	9999	1	-	-	-
	Data Type Detailed Settings: Data Type	Input.OutputResult.Data[n].Format.DataType	Bit	0	Bit	-	-	-	-	-
			8-bit Integer	1						
			8-bit Unsigned Integer	2						
			16-bit Integer	3						
			16-bit Unsigned Integer	4						
			32-bit Integer	5						
			64-bit Integer	6						
			32-bit Floating-point Number	7						
			String	8						
	Data Type Size	-			-	-	-	-	-	-
	Data Type Detailed Settings: Size	Input.OutputResult.Data[n].Format.Size			1	512	1	3	0	-
	Data Type Detailed Settings: Add Terminating Character	Input.OutputResult.Data[n].Format.AddTerminatingCode			False	-	-	-	-	-
	Occupied Size	-			-	-	-	-	-	-
	Output Address Offset	Input.OutputResult.AddressOffset			0	9996	0	4	0	-
Destination	Destination	Input.OutputResult.ProtocolType			-	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Options	Handling of Result Data of Unexecuted Tool: Number	Input.OutputResult.UnexecutedItem.Value			0x00	0xFFFFFFFF	0x00	8	0	-
	Handling of Result Data of Unexecuted Tool: Character	Input.OutputResult.UnexecutedItem.Character	Space	0	Space	-	-	-	-	-
			-	1						
			*	2						
			?	3						
			ASCII Code	4						
	Handling of Result Data of Unexecuted Tool: Character: ASCII Code	Input.OutputResult.UnexecutedItem.Character.Code			0x20	0x7F	0x00	-	-	-

Data Output (Non-Procedural)

#O063

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Output Data	Output Settings: Output Data[n]: Output Items	Input.OutputResult.Data[n].Data			-	-	-	-	-	✓
	No.	-			-	256.0	1.0	3	1	-
	Output Settings: Output Data[n]: Array Data Detailed Settings: Array-type Data Starting Index	Input.OutputResult.Data[n].ArrayData.StartIndex			Selected index	9998	0	-	-	-
	Output Settings: Output Data[n]: Array Data Detailed Settings: Array-type Data Count	Input.OutputResult.Data[n].ArrayData.Count			No. of elements in the array to be output	9999	1	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: Customize Format	Input.OutputResult.Data[n].Format.Customize			False	-	-	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: Integer Digits	Input.OutputResult.Data[n].Format.IntegerDigits			5	19	1	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: Decimal Digits	Input.OutputResult.Data[n].Format.DecimalDigits			3	6	0	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: + Sign	Input.OutputResult.Data[n].Format.Sign			True	-	-	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: Zero Suppress	Input.OutputResult.Data[n].Format.ZeroSuppress			True	-	-	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: Size	Input.OutputResult.Data[n].Format.Number			8	512	1	3	0	-
	Data Type	Input.OutputResult.Data[n].Type	Number		Number	-	-	-	-	-
			String							

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Output Data	Output Settings: Delimiter	Input.OutputResult.Separator	Comma	0	Comma	-	-	-	-	-
			Tab	1						
			Space	2						
			None	3						
			ASCII Code	4						
	Output Settings: ASCII Code	"Input.OutputResult.SeparatorASCII	"		0x01	0x7F	0x00	-	-	-
Options	Handling of Result Data of Unexecuted Tool	Input.OutputResult.UnexecutedItem	Output the Following Value	0	Output the Following Value	-	-	-	-	-
			Do Not Output	1						
	Handling of Result Data of Unexecuted Tool: Number	Input.OutputResult.UnexecutedItem.Value			0x00	0xFFFFFFFF	0x00	8	0	-
	Handling of Result Data of Unexecuted Tool: Character	Input.OutputResult.UnexecutedItem.Character	Space	0	Space (0x20)	-	-	-	-	-
			-	1						
			*	2						
			?	3						
			ASCII Code	4						
	Handling of Result Data of Unexecuted Tool: Character: ASCII Code	Input.OutputResult.UnexecutedItem.Character.Code			0x20	0x7F	0x00	-	-	-

Data Output (FTP/Storage)

#O064

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Output Data	Output Settings: Output Data[n]: Output Items	Input.OutputResult.Data[n].Data			-	-	-	-	-	✓
	No.	-			-	256.0	1.0	3	1	-
	Output Settings: Output Data[n]: Array Data Detailed Settings: Array-type Data Starting Index	Input.OutputResult.Data[n].ArrayData.StartIndex			Selected index	9998	0	-	-	-
	Output Settings: Output Data[n]: Array Data Detailed Settings: Array-type Data Count	Input.OutputResult.Data[n].ArrayData.Count			No. of elements in the array to be output	9999	1	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: Customize Format	Input.OutputResult.Data[n].Format.Customize			False	-	-	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: Integer Digits	Input.OutputResult.Data[n].Format.IntegerDigits			5	19	1	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: Decimal Digits	Input.OutputResult.Data[n].Format.DecimalDigits			3	6	0	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: + Sign	Input.OutputResult.Data[n].Format.Sign			True	-	-	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: Zero Suppress	Input.OutputResult.Data[n].Format.ZeroSuppress			True	-	-	-	-	-
	Output Settings: Output Data[n]: Output Format Settings: Size	Input.OutputResult.Data[n].Format.Number	Number		8	512	1	3	0	-
			String							
	Output Settings: Delimiter	Input.OutputResult.Separator	Comma	0	Comma	-	-	-	-	-
			Tab	1						
			Space	2						
			None	3						
			ASCII Code	4						
	Output Settings: ASCII Code	Input.OutputResult.SeparatorASCII			0x01	0x7F	0x00	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Destination	Destination	Input.OutputResult.Destination	FTP1	0	FTP1	-	-	-	-	-
			FTP2	1						
			SD Card	2						
	Save Destination Folder	-			-	-	-	-	-	-
	(Destination)	-			-	-	-	-	-	-
	Save Destination Folder Path	Input.OutputResult.SavingFolder			-	-	-	-	-	-
	Save Destination Folder Path: File Settings: Naming Rule	Input.OutputResult.NamingRule.Type	Auto	0	Auto	-	-	-	-	-
			Custom	1						
	Save Destination Folder Path: File Settings: Custom File Name	Input.OutputResult.NamingRule.CustomName			-	-	-	-	-	-
Options	Handling of Result Data of Unexecuted Tool	Input.OutputResult.UnexecutedItem	Output the Following Value	0	Output the Following Value	-	-	-	-	-
			Do Not Output	1						
	Handling of Result Data of Unexecuted Tool: Number	Input.OutputResult.UnexecutedItem.Value			0x00	0xFFFFFFFF	0x00	8	0	-
	Handling of Result Data of Unexecuted Tool: Character	Input.OutputResult.UnexecutedItem.Character	Space	0	Space	-	-	-	-	-
			-	1						
			*	2						
			?	3						
			ASCII Code	4						
	Handling of Result Data of Unexecuted Tool: Character: ASCII Code	Input.OutputResult.UnexecutedItem.Character.Code			0x20	0x7F	0x00	-	-	-

Data Output (Terminal)

#O154

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Output Data	Output Settings	Input.OutputResultTerminal								
	Result Data A: Output Items	Input.OutputResultTerminal.ResultDataA.Data			-	-	-	-	-	✓
	Result Data A: Output Bit Count	Input.OutputResultTerminal.ResultDataA.Bit			0	31	0	2	0	-
	Result Data B: Output Items	Input.OutputResultTerminal.ResultDataB.Data			-	-	-	-	-	✓
	Result Data B: Output Bit Count	Input.OutputResultTerminal.ResultDataB.Bit			0	31	0	2	0	-
	Result Data C: Output Items	Input.OutputResultTerminal.ResultDataC.Data			-	-	-	-	-	✓
	Result Data C: Output Bit Count	Input.OutputResultTerminal.ResultDataC.Bit			0	31	0	2	0	-
	Result Data D: Output Items	Input.OutputResultTerminal.ResultDataD.Data			-	-	-	-	-	✓
	Result Data D: Output Bit Count	Input.OutputResultTerminal.ResultDataD.Bit			0	31	0	2	0	-
	Result Data E: Output Items	Input.OutputResultTerminal.ResultDataE.Data			-	-	-	-	-	✓
	Result Data E: Output Bit Count	Input.OutputResultTerminal.ResultDataE.Bit			0	31	0	2	0	-
Options	Handling of Result Data of Unexecuted Tool	Input.OutputResultTerminal.UnexecutedItem	Output "OFF"	0	Output "OFF"	-	-	-	-	-
			Output "ON"	1						

Image Output (FTP/Storage)

#O065

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Output Settings	Output Image: Output Image[n]: Image[n]	Input.OutputImage.Image[n].OutputTarget			-	-	-	-	-	-
	Output Image: Output Image[n]: Graphic Output[m]	Input.OutputImage.Image[n].Graphic[m]			-	-	-	-	-	-
	Output Image: Output Image[n]: File Format	Input.OutputImage.OutputFileType	PNG	0	BMP	-	-	-	-	-
			BMP	1						
			JPG	2						
	Output Image: Buffered Images	Input.OutputImage.BufferNum			5	1000	1	4	0	-
	Output Image: Destination	Input.OutputImage.OutputDevice	FTP1	0	FTP1	-	-	-	-	-
			FTP2	1						
			SD Card	3						
	Output Image: File Name: Naming Rule: File Naming Rule	Input.OutputImage.OutputFile.NamingRule.Type	Auto	0	Auto	-	-	-	-	-
			Custom	1						
	Output Image: File Name: Naming Rule: Custom File Name	Input.OutputImage.OutputFile.NamingRule.CustomName			-	-	-	-	-	✓
	Output Image: File Name: Add Image Identifier	Input.OutputImage.OutputFile.AddImageName	False	0	True	-	-	-	-	-
			True	1						
	Output Image: Behavior When Buffer Full	Input.OutputImage.OutputBufferFull	Skip Output of New Images	0	Skip Output of New Images	-	-	-	-	-
			Wait for Buffer Availability	1						

Image Output with Graphics (FTP/Storage)

#O144

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Image Output	Output Image: Image Source	Input.Image.Background		-	-	-	-	-	-	✓
	Output Image: Graphic	Input.Image.OutputGraphic			False	-	-	-	-	-
	Graphics and Processed Layer[n]: Graphics and Processed Layer	Input.Image[n].OutputTarget			-	-	-	-	-	–
	Graphics and Processed Layer[n]: Display Image	Input.Image[n].OutputType	Graphics Only	0	Graphics Only	-	-	-	-	-
			Filtered Image	1						
			Contrast Image	2						
Destination	Output Settings: File Format	Input.OutputImage.OutputFileType	PNG	0	BMP	-	-	-	-	-
			BMP	1						
			JPG	2						
	Output Settings: Buffered Images	Input.OutputImage.BufferNum			5	1000	1	4	0	-
	Output Settings: Destination	Input.OutputImage.OutputDevice	FTP1	0	FTP1	-	-	-	-	-
			FTP2	1						
			SD Card	3						
	File Name: File Naming Rule	Input.OutputImage.OutputFile.NamingRule.Type	Auto	0	Auto	-	-	-	-	-
			Custom	1						
	File Name: Custom File Name	Input.OutputImage.OutputFile.NamingRule.CustomName			-	-	-	-	-	✓
Options	Behavior When Buffer Full	Input.OutputImage.OutputBufferFull	Skip Output of New Images	0	Skip Output of New Images	-	-	-	-	-
			Wait for Buffer Availability	1						

Graphics Display

#O066

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Region	Region	Input.Region		-	-	-	-	-	-	-
Position Adjustment	Position Adjustment	Input.Region.PositionAdjustment	Refer to "Region".							
Graphic Part	Graphic Part: Type	Input.Parts[n].Type	Rectangle	1	-	-	-	-	-	-
			Circle	2						
			Oval	4						
			Ring	3						
			Arc	5						
			Point	6						
			Line	7						
			Horizontal Line	10						
			Vertical Line	11						
			String	8						
			Number	9						
	Graphic Part: Name	Input.Parts[n].Name			Graphic Part	-	-	-	-	-
	Graphic Part: Enabled	Input.Parts[n].Enable			True	-	-	-	-	-
Graphic Part (Rectangle) - Settings	Count	Input.Parts[n].Number			1	30000	0	5	0	✓
	Width	Input.Parts[n].Width			200.000	16383.000	1.000	5	3	✓
	Height	Input.Parts[n].Height			160.000	16383.000	1.000	5	3	✓
	Center X	Input.Parts[n].Center.X			260.000	16383.000	-16383.000	5	3	✓
	Center Y	Input.Parts[n].Center.Y			240.000	16383.000	-16383.000	5	3	✓
	Angle	Input.Parts[n].Angle			0.000	360.000	0.000	3	3	✓
	Fill	Input.Parts[n].Fill			False	-	-	-	-	-
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Rectangle) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓
Graphic Part (Circle) - Settings	Count	Input.Parts[n].Number			1.000	30000	0	5	0	✓
	Center X	Input.Parts[n].Center.X			260.000	16383.000	-16383.000	5	3	✓
	Center Y	Input.Parts[n].Center.Y			240.000	16383.000	-16383.000	5	3	✓
	Radius	Input.Parts[n].Radius			120.000	9600.000	0.000	4	3	✓
	Fill	Input.Parts[n].Fill			False	-	-	-	-	-
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						
Graphic Part (Circle) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓
Graphic Part (Oval) - Settings	Count	Input.Parts[n].Number			1.000	30000	0	5	0	✓
	Center X	Input.Parts[n].Center.X			260.000	16383.000	-16383.000	5	3	✓
	Center Y	Input.Parts[n].Center.Y			240.000	16383.000	-16383.000	5	3	✓
	Radius 1	Input.Parts[n].Radius1			120.000	2580.000	8.000	4	3	✓
	Radius 2	Input.Parts[n].Radius2			180.000	2580.000	8.000	4	3	✓
	Angle	Input.Parts[n].Angle			0.000	360.000	0.000	3	3	✓
	Fill	Input.Parts[n].Fill			False	-	-	-	-	-
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Oval) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓
Graphic Part (Ring) - Settings	Count	Input.Parts[n].Number			1	30000	0	5	0	✓
	Center X	Input.Parts[n].Center.X			260.000	16383.000	-16383.000	5	3	✓
	Center Y	Input.Parts[n].Center.Y			240.000	16383.000	-16383.000	5	3	✓
	Radius 1	Input.Parts[n].Radius1			120.000	9600.000	0.000	4	3	✓
	Radius 2	Input.Parts[n].Radius2			60.000	9600.000	0.000	4	3	✓
	Fill	Input.Parts[n].Fill			False	-	-	-	-	-
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						
Graphic Part (Ring) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓
Graphic Part (Arc) - Settings	Count	Input.Parts[n].Number			1	30000	0	5	0	✓
	Center X	Input.Parts[n].Center.X			260.000	16383.000	-16383.000	5	3	✓
	Center Y	Input.Parts[n].Center.Y			240.000	16383.000	-16383.000	5	3	✓
	Radius 1	Input.Parts[n].Radius1			120.000	9600.000	0.000	4	3	✓
	Radius 2	Input.Parts[n].Radius2			30.000	9600.000	0.000	4	3	✓
	Starting Angle	Input.Parts[n].Angle1			45.000	360.000	0.000	3	3	✓
	Ending Angle	Input.Parts[n].Angle2			315.000	360.000	0.000	3	3	✓
	Fill	Input.Parts[n].Fill			False	-	-	-	-	-
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Arc) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓
Graphic Part (Point) - Settings	Count	Input.Parts[n].Number			1	30000	0	5	0	✓
	Center X	Input.Parts[n].Center.X			260.000	16383.000	-16383.000	5	3	✓
	Center Y	Input.Parts[n].Center.Y			240.000	16383.000	-16383.000	5	3	✓
	Angle	Input.Parts[n].Angle			0.000	360.000	0.000	3	3	✓
	Zoom Link	Input.Parts[n].Resize			False	-	-	-	-	-
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						
Graphic Part (Point) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Line) - Settings	Count	Input.Parts[n].Number			1	30000	0	5	0	✓
	Specification Method	Input.Parts[n].SettingMethod	Specify 2 Points		Specify 2 Points	-	-	-	-	-
			Specify ρ,θ							
			Specify X/Y/ Angle							
	Start Point X	Input.Parts[n].StartPosition.X			260.000	16383.000	-16383.000	5	3	✓
	Start Point Y	Input.Parts[n].StartPosition.Y			200.000	16383.000	-16383.000	5	3	✓
	End Point X	Input.Parts[n].EndPosition.X			300.000	16383.000	-16383.000	5	3	✓
	End Point Y	Input.Parts[n].EndPosition.Y			240.000	16383.000	-16383.000	5	3	✓
	Line Style	Input.Parts[n].LineType	Line Segment		Line Segment	-	-	-	-	-
			Line							
	Arrowheads: Start Point Arrow	Input.Parts[n].Arrow.Start			False	-	-	-	-	-
	Arrowheads: End Point Arrow	Input.Parts[n].Arrow.End			False	-	-	-	-	-
	ρ	Input.Parts[n].Rho			240.000	16383.000	-16383.000	5	3	✓
	θ	Input.Parts[n].Theta			0.000	360.000	0.000	3	3	✓
	X	Input.Parts[n].X			260.000	16383.000	-16383.000	5	3	✓
	Y	Input.Parts[n].Y			200.000	16383.000	-16383.000	5	3	✓
	Angle	Input.Parts[n].Angle			0.000	360.000	0.000	3	3	✓
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						
Graphic Part (Line) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓
Graphic Part (Horizontal Line) - Settings	Count	Input.Parts[n].Number			1	30000	0	5	0	✓
	Position X	Input.Parts[n].Position.X			260.000	16383.000	-16383.000	5	3	✓
	Position Y	Input.Parts[n].Position.Y			200.000	16383.000	-16383.000	5	3	✓
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Horizontal Line) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓
Graphic Part (Vertical Line) - Settings	Count	Input.Parts[n].Number			1	30000	0	5	0	✓
	Position X	Input.Parts[n].Position.X			260.000	16383.000	-16383.000	5	3	✓
	Position Y	Input.Parts[n].Position.Y			200.000	16383.000	-16383.000	5	3	✓
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						
Graphic Part (Vertical Line) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓
Graphic Part (String) - Settings	Count	Input.Parts[n].Number			1	30000	0	5	0	✓
	String	Input.Parts[n].Text			Blank	128byte	0	-	-	✓
	Position X	Input.Parts[n].Position.X			260.000	16383.000	-16383.000	5	3	✓
	Position Y	Input.Parts[n].Position.Y			240.000	16383.000	-16383.000	5	3	✓
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						
Graphic Part (String) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Number) - Settings	Count	Input.Parts[n].Number			1	30000	0	5	0	✓
	Value Specification	Input.Parts[n].Value			0.000000	10000000000.000000	-10000000000.000000	11	6	✓
	Position X	Input.Parts[n].Position.X			260.000	16383.000	-16383.000	5	3	✓
	Position Y	Input.Parts[n].Position.Y			240.000	16383.000	-16383.000	5	3	✓
	Integer Digits	Input.Parts[n].NumberDigits			7	11	1	2	0	-
	Decimal Digits	Input.Parts[n].DecimalPlaces			3	6	0	1	0	-
	Zero Suppress	Input.Parts[n].ZeroSuppression			True	-	-	-	-	-
	+ Sign	Input.Parts[n].PlusPrefix			False	-	-	-	-	-
	Display Type	Input.Parts[n].ViewType	Display Type 0	0	Display Type 1	-	-	-	-	✓
			Display Type 1	1						
Graphic Part (Number) - Advanced Settings	Offset X	Input.Parts[n].Offset.X			0.000	16383.000	-16383.000	5	3	✓
	Offset Y	Input.Parts[n].Offset.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center X	Input.Parts[n].Rotation.Center.X			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Center Y	Input.Parts[n].Rotation.Center.Y			0.000	16383.000	-16383.000	5	3	✓
	Rotation Center: Rotation Angle	Input.Parts[n].Rotation.Angle			0.000	360.000	0.000	3	3	✓

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Rectangle) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Line Thickness	Input.Graphic.Parts[n].Preset0.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 0: Fill: Enabled	Input.Graphic.Parts[n].Preset0.Fill.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Fill: Red	Input.Graphic.Parts[n].Preset0.Fill.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Fill: Green	Input.Graphic.Parts[n].Preset0.Fill.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Fill: Blue	Input.Graphic.Parts[n].Preset0.Fill.Color.Blue			8	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Line Thickness	Input.Graphic.Parts[n].Preset1.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-
	Part: Display Type 1: Fill: Enabled	Input.Graphic.Parts[n].Preset1.Fill.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Fill: Red	Input.Graphic.Parts[n].Preset1.Fill.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Fill: Green	Input.Graphic.Parts[n].Preset1.Fill.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Fill: Blue	Input.Graphic.Parts[n].Preset1.Fill.Color.Blue			2	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Circle) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Line Thickness	Input.Graphic.Parts[n].Preset0.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 0: Fill: Enabled	Input.Graphic.Parts[n].Preset0.Fill.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Fill: Red	Input.Graphic.Parts[n].Preset0.Fill.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Fill: Green	Input.Graphic.Parts[n].Preset0.Fill.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Fill: Blue	Input.Graphic.Parts[n].Preset0.Fill.Color.Blue			8	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Line Thickness	Input.Graphic.Parts[n].Preset1.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-
	Part: Display Type 1: Fill: Enabled	Input.Graphic.Parts[n].Preset1.Fill.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Fill: Red	Input.Graphic.Parts[n].Preset1.Fill.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Fill: Green	Input.Graphic.Parts[n].Preset1.Fill.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Fill: Blue	Input.Graphic.Parts[n].Preset1.Fill.Color.Blue			2	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Oval) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Line Thickness	Input.Graphic.Parts[n].Preset0.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 0: Fill: Enabled	Input.Graphic.Parts[n].Preset0.Fill.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Fill: Red	Input.Graphic.Parts[n].Preset0.Fill.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Fill: Green	Input.Graphic.Parts[n].Preset0.Fill.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Fill: Blue	Input.Graphic.Parts[n].Preset0.Fill.Color.Blue			8	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Line Thickness	Input.Graphic.Parts[n].Preset1.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-
	Part: Display Type 1: Fill: Enabled	Input.Graphic.Parts[n].Preset1.Fill.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Fill: Red	Input.Graphic.Parts[n].Preset1.Fill.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Fill: Green	Input.Graphic.Parts[n].Preset1.Fill.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Fill: Blue	Input.Graphic.Parts[n].Preset1.Fill.Color.Blue			2	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Ring) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Line Thickness	Input.Graphic.Parts[n].Preset0.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 0: Fill: Enabled	Input.Graphic.Parts[n].Preset0.Fill.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Fill: Red	Input.Graphic.Parts[n].Preset0.Fill.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Fill: Green	Input.Graphic.Parts[n].Preset0.Fill.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Fill: Blue	Input.Graphic.Parts[n].Preset0.Fill.Color.Blue			8	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Line Thickness	Input.Graphic.Parts[n].Preset1.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-
	Part: Display Type 1: Fill: Enabled	Input.Graphic.Parts[n].Preset1.Fill.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Fill: Red	Input.Graphic.Parts[n].Preset1.Fill.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Fill: Green	Input.Graphic.Parts[n].Preset1.Fill.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Fill: Blue	Input.Graphic.Parts[n].Preset1.Fill.Color.Blue			2	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Arc) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Line Thickness	Input.Graphic.Parts[n].Preset0.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 0: Fill: Enabled	Input.Graphic.Parts[n].Preset0.Fill.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Fill: Red	Input.Graphic.Parts[n].Preset0.Fill.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Fill: Green	Input.Graphic.Parts[n].Preset0.Fill.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Fill: Blue	Input.Graphic.Parts[n].Preset0.Fill.Color.Blue			8	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Line Thickness	Input.Graphic.Parts[n].Preset1.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-
	Part: Display Type 1: Fill: Enabled	Input.Graphic.Parts[n].Preset1.Fill.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Fill: Red	Input.Graphic.Parts[n].Preset1.Fill.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Fill: Green	Input.Graphic.Parts[n].Preset1.Fill.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Fill: Blue	Input.Graphic.Parts[n].Preset1.Fill.Color.Blue			2	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Point) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Shape	Input.Graphic.Parts[n].Preset0.Shape	Cross		Cross	-	-	-	-	-
			L-shaped Cross							
			Circle							
	Part: Display Type 0: Size	Input.Graphic.Parts[n].Preset0.Size			16	1024	4	4	0	-
	Part: Display Type 0: Line Thickness	Input.Graphic.Parts[n].Preset0.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 0: Border Color: Enabled	Input.Graphic.Parts[n].Preset0.Border.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Border Color: Red	Input.Graphic.Parts[n].Preset0.Border.Color.Red			0	255	0	3	0	-
	Part: Display Type 0: Border Color: Green	Input.Graphic.Parts[n].Preset0.Border.Color.Green			0	255	0	3	0	-
	Part: Display Type 0: Border Color: Blue	Input.Graphic.Parts[n].Preset0.Border.Color.Blue			0	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Shape	Input.Graphic.Parts[n].Preset1.Shape	Cross		Cross	-	-	-	-	-
			L-shaped Cross							
			Circle							
	Part: Display Type 1: Size	Input.Graphic.Parts[n].Preset1.Size			32	1024	4	4	0	-
	Part: Display Type 1: Line Thickness	Input.Graphic.Parts[n].Preset1.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Point) - Display Settings	Part: Display Type 1: Border Color: Enabled	Input.Graphic.Parts[n].Preset1.Border.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Border Color: Red	Input.Graphic.Parts[n].Preset1.Border.Color.Red			0	255	0	3	0	-
	Part: Display Type 1: Border Color: Green	Input.Graphic.Parts[n].Preset1.Border.Color.Green			0	255	0	3	0	-
	Part: Display Type 1: Border Color: Blue	Input.Graphic.Parts[n].Preset1.Border.Color.Blue			0	255	0	3	0	-
Graphic Part (Line) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Line Thickness	Input.Graphic.Parts[n].Preset0.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Line Thickness	Input.Graphic.Parts[n].Preset1.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Horizontal Line) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Line Thickness	Input.Graphic.Parts[n].Preset0.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Line Thickness	Input.Graphic.Parts[n].Preset1.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Vertical Line) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Line Thickness	Input.Graphic.Parts[n].Preset0.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Line Thickness	Input.Graphic.Parts[n].Preset1.StrokeWidth			2	64	1	2	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (String) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Font Size	Input.Graphic.Parts[n].Preset0.Font.Size			16	64	1	2	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 0: Border Color: Enabled	Input.Graphic.Parts[n].Preset0.Border.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Border Color: Red	Input.Graphic.Parts[n].Preset0.Border.Color.Red			0	255	0	3	0	-
	Part: Display Type 0: Border Color: Green	Input.Graphic.Parts[n].Preset0.Border.Color.Green			0	255	0	3	0	-
	Part: Display Type 0: Border Color: Blue	Input.Graphic.Parts[n].Preset0.Border.Color.Blue			0	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Font Size	Input.Graphic.Parts[n].Preset1.Font.Size			2	64	1	2	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-
	Part: Display Type 1: Border Color: Enabled	Input.Graphic.Parts[n].Preset1.Border.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Border Color: Red	Input.Graphic.Parts[n].Preset1.Border.Color.Red			0	255	0	3	0	-
	Part: Display Type 1: Border Color: Green	Input.Graphic.Parts[n].Preset1.Border.Color.Green			0	255	0	3	0	-
	Part: Display Type 1: Border Color: Blue	Input.Graphic.Parts[n].Preset1.Border.Color.Blue			0	255	0	3	0	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
Graphic Part (Number) - Display Settings	Part: Display Type 0: Enabled	Input.Graphic.Parts[n].Preset0.Visible			True	-	-	-	-	-
	Part: Display Type 0: Font Size	Input.Graphic.Parts[n].Preset0.Font.Size			16	256	12	3	0	-
	Part: Display Type 0: Color: Enabled	Input.Graphic.Parts[n].Preset0.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Color: Red	Input.Graphic.Parts[n].Preset0.Color.Red			245	255	0	3	0	-
	Part: Display Type 0: Color: Green	Input.Graphic.Parts[n].Preset0.Color.Green			63	255	0	3	0	-
	Part: Display Type 0: Color: Blue	Input.Graphic.Parts[n].Preset0.Color.Blue			8	255	0	3	0	-
	Part: Display Type 0: Border Color: Enabled	Input.Graphic.Parts[n].Preset0.Border.Color.Visible			True	-	-	-	-	-
	Part: Display Type 0: Border Color: Red	Input.Graphic.Parts[n].Preset0.Border.Color.Red			0	255	0	3	0	-
	Part: Display Type 0: Border Color: Green	Input.Graphic.Parts[n].Preset0.Border.Color.Green			0	255	0	3	0	-
	Part: Display Type 0: Border Color: Blue	Input.Graphic.Parts[n].Preset0.Border.Color.Blue			0	255	0	3	0	-
	Part: Display Type 1: Enabled	Input.Graphic.Parts[n].Preset1.Visible			True	-	-	-	-	-
	Part: Display Type 1: Font Size	Input.Graphic.Parts[n].Preset1.Font.Size			16	256	12	3	0	-
	Part: Display Type 1: Color: Enabled	Input.Graphic.Parts[n].Preset1.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Color: Red	Input.Graphic.Parts[n].Preset1.Color.Red			135	255	0	3	0	-
	Part: Display Type 1: Color: Green	Input.Graphic.Parts[n].Preset1.Color.Green			187	255	0	3	0	-
	Part: Display Type 1: Color: Blue	Input.Graphic.Parts[n].Preset1.Color.Blue			2	255	0	3	0	-
	Part: Display Type 1: Border Color: Enabled	Input.Graphic.Parts[n].Preset1.Border.Color.Visible			True	-	-	-	-	-
	Part: Display Type 1: Border Color: Red	Input.Graphic.Parts[n].Preset1.Border.Color.Red			0	255	0	3	0	-
	Part: Display Type 1: Border Color: Green	Input.Graphic.Parts[n].Preset1.Border.Color.Green			0	255	0	3	0	-
	Part: Display Type 1: Border Color: Blue	Input.Graphic.Parts[n].Preset1.Border.Color.Blue			0	255	0	3	0	-

Statistics

#O067

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Statistics	Statistics Target[n]: Target	Input.Data[n].Data			-	-	-	-	-	-
	Statistics Target[n]: Label	Input.Data[n].Name			-	-	-	-	-	-

Yield Rate

#O068

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Statistics	Statistics Target[n]: Target	Input.Data[n].Data			-	-	-	-	-	-
	Statistics Target[n]: Label	Input.Data[n].Name			-	-	-	-	-	-

Data History

#O069

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
	Data Count	Input.Field.DepthCount			10	5000	1	4	0	-
Archive Objects	Archive Objects[n]: Archive Objects	Input.Field[n].Path			-	-	-	-	-	-
	Archive Objects[n]: Item Name	Input.Field[n].Name			-	-	-	-	-	-
	Archive Objects[n]: Data Type	Input.Field[n].Type			-	-	-	-	-	-

Change Program Setting (PL)

#O070

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
		Input.Storage	Internal Storage	0	Internal Storage	-	-	-	-	-
			SD Card	1						
		Input.ProgramNumber			0	9999	0	4	0	-
	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Save Settings (PS)

#O071

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Issue Soft Event (SEI)

#O072

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
	Soft Event No.	Input.SoftEventId			0	31	0	2	0	-
	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Clear Error (ERC)

#O073

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
	Error Type	Input.ErrorType	Error0	0	Error0	-	-	-	-	-
			Error1	1						
	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Clear Tool Buffer (TBC)

#O145

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Command Settings	Tool Type	Input.ToolType	Image Output Tool	0	Image Output Tool	-	-	-	-	✓
			Data Output Tool	1						
			Statistics Tool	2						
			Yield Rate Tool	3						
			Data History Tool	4						
			Data Input (Non-Procedural) Tool	5						
			All Tool Types	6						
	Tool No.	Input.ToolID			0	1999	0	4	0	✓
Execution Order	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Reset (RS)

#O074

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Initialize Output Data (RSOD)

#O146

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Execution Order	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Disable Output (OD)

#O075

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
	Image Output, Data Output	Input.ImageDataOutput	Disable	0	Disable	-	-	-	-	-
			Enable	1						
	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Disable Trigger Input (TD)

#O076

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
	Trigger Input	Input.TriggerInput	Disable	0	Disable	-	-	-	-	-
			Enable	1						
	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Register Model Image (MG)

#O077

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Command Settings	Tool No.	Input.ToolID			0	9999	0	4	0	-
	Model Image No.	Input.ModelImageNumber			0	999	0	3	0	-
Execution Order	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool			-	-	-	-	-	-

Change Model Image (MS)

#O078

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
	Tool No.	Input.ToolID			0	1999	0	4	0	-
	Model Image No.	Input.ModelImageNumber			0	999	0	3	0	-
	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Update Pattern Information (PDU)

#O079

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
	Tool No.	Input.ToolID			0	1999	0	4	0	-
	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Update Position Adjustment Reference Value (RPU)

#O080

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
	Tool No.	Input.ToolID			0	1999	0	4	0	-
	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Update Registered String (JSU)

#O081

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Command Settings	Tool No.	Input.ToolID			0	9999	0	4	0	-
Execution Order	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool			-	-	-	-	-	-

Update Collation Pattern (CRU)

#O082

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	See "Common to Tools"							
Command Settings	Tool No.	Input.ToolID			0	9999	0	4	0	-
Execution Order	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool			-	-	-	-	-	-

Copy Cell Value (CCV)

#O147

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools".							
Command Settings	(Copy Source Start Cell Address)	Input.SrcCellStartAddress	A1 to CV1000		A1	CV1000	A1	-	-	-
	(Copy Source End Cell Address)	Input.SrcCellEndAddress	A1 to CV1000		A1	CV1000	A1	-	-	-
	(Copy Destination Cell Address)	Input.DstCellAddress	A1 to CV1000		B2	CV1000	A1	-	-	-
Execution Order	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Export Cell Values (CEV)

#O148

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools"							
Command Settings	File No.	Input.FileNumber			0	0	99	2	0	✓
	(Export Source Start Cell Address)	Input.SrcCellStartAddress	A1 to CV1000		A1	CV1000	A1	-	-	-
	(Export Source End Cell Address)	Input.SrcCellEndAddress	A1 to CV1000		A1	CV1000	A1	-	-	-
Execution Order	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Import Cell Values (CIV)

#O149

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
General	General	Input.General	Refer to "Common to Tools"							
Command Settings	File No.	Input.FileNumber			0	0	99	2	0	✓
	Import Destination Cell	Input.DstCellAddress	A1-CV1000		A1	CV1000	A1	-	-	-
Execution Order	Execution Timing Specification	Input.ExecutionTiming	Resolve Automatically	0	Resolve Automatically	-	-	-	-	-
			Execute After Specified Tool	1						
	Execute After the Following Tool	Input.SpecifiedTool		-	-	-	-	-	-	-

Common to Program Setting

#O150

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
SD Card	(Image Output) SD Card: Output Destination Path	OutputCommon.Input.SDCardImage.Folder.Path								✓
	(Image Output) SD Card: New Folder Rule	OutputCommon.Input.SDCardImage.Folder.NewFolderRule	None	None	Number	-	-	-	-	-
			Date	Date						
			Number of Images	Number						
	(Image Output) SD Card: Specified Number of Images	OutputCommon.Input.SDCardImage.Folder.NewFolderNumber			1000	10000	1	5	0	-
	(Image Output) SD Card: Apply Program Setting Name	OutputCommon.Input.SDCardImage.Folder.ProgramFolder			TRUE	-	-	-	-	-
FTP1	(Image Output) FTP1: Output Destination Path	OutputCommon.Input.Ftp1Image.Folder.Path								✓
	(Image Output) FTP1: New Folder Rule	OutputCommon.Input.Ftp1Image.Folder.NewFolderRule	None	None	Number	-	-	-	-	-
			Date	Date						
			Number of Images	Number						
	(Image Output) FTP1: Specified Number of Images	OutputCommon.Input.Ftp1Image.Folder.NewFolderNumber			1000	10000	1	5	0	-
	(Image Output) FTP1: Apply Program Setting Name	OutputCommon.Input.Ftp1Image.Folder.ProgramFolder			TRUE	-	-	-	-	-
FTP2	(Image Output) FTP2: Output Destination Path	OutputCommon.Input.Ftp2Image.Folder.Path								✓
	(Image Output) FTP2: New Folder Rule	OutputCommon.Input.Ftp2Image.Folder.NewFolderRule	None	None	Number	-	-	-	-	-
			Date	Date						
			Number of Images	Number						
	(Image Output) FTP2: Specified Number of Images	OutputCommon.Input.Ftp2Image.Folder.NewFolderNumber			1000	10000	1	5	0	-
	(Image Output) FTP2: Apply Program Setting Name	OutputCommon.Input.Ftp2Image.Folder.ProgramFolder			TRUE	-	-	-	-	-

Category	Setting Items	Name	Options		Initial Value	Upper Limit Value	Lower Limit Value	Number Format		Referenceable
			Label	Number				Integer Digits	Decimal Digits	
SD Card	(Image Output with Graphics) SD Card: Output Destination Path	OutputCommon.Input.SDCardGraphicImage.Folder.Path								✓
	(Image Output with Graphics) SD Card: New Folder Rule	OutputCommon.Input.SDCardGraphicImage.Folder.NewFolderRule	None	None	Number	-	-	-	-	-
			Date	Date						
			Number of Images	Number						
	(Image Output with Graphics) SD Card: Specified Number of Images	OutputCommon.Input.SDCardGraphicImage.Folder.NewFolderNumber			1000	10000	1	5	0	-
	(Image Output with Graphics) SD Card: Apply Program Setting Name	OutputCommon.Input.SDCardGraphicImage.Folder.ProgramFolder			TRUE	-	-	-	-	-
FTP1	(Image Output with Graphics) FTP1: Output Destination Path	OutputCommon.Input.Ftp1GraphicImage.Folder.Path								✓
	(Image Output with Graphics) FTP1: New Folder Rule	OutputCommon.Input.Ftp1GraphicImage.Folder.NewFolderRule	None	None	Number	-	-	-	-	-
			Date	Date						
			Number of Images	Number						
	(Image Output with Graphics) FTP1: Specified Number of Images	OutputCommon.Input.Ftp1GraphicImage.Folder.NewFolderNumber			1000	10000	1	5	0	-
	(Image Output with Graphics) FTP1: Apply Program Setting Name	OutputCommon.Input.Ftp1GraphicImage.Folder.ProgramFolder			TRUE	-	-	-	-	-
FTP2	(Image Output with Graphics) FTP2: Output Destination Path	OutputCommon.Input.Ftp2GraphicImage.Folder.Path								✓
	(Image Output with Graphics) FTP2: New Folder Rule	OutputCommon.Input.Ftp2GraphicImage.Folder.NewFolderRule	None	None	Number	-	-	-	-	-
			Date	Date						
			Number of Images	Number						
	(Image Output with Graphics) FTP2: Specified Number of Images	OutputCommon.Input.Ftp2GraphicImage.Folder.NewFolderNumber			1000	10000	1	5	0	-
	(Image Output with Graphics) FTP2: Apply Program Setting Name	OutputCommon.Input.Ftp2GraphicImage.Folder.ProgramFolder			TRUE	-	-	-	-	-

Results Data List

This section describes the name and the number format of the results data.
In the following tables, the results data with a ? mark in the “[Results] View Target” column are results data that can be displayed even if the [Display Full Results] toggle switch is turned off in the [Results] view. If the [Display Full Results] toggle switch is turned on, all results data will be displayed.

Tasks

#O083

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Judgment (True = Pass)	Output.General.Pass	Unsigned	1	0	✓	–
Judgment (True = Fail)	Output.General.Fail	Unsigned	1	0	–	–
Execution Count	Output.General.ProcessingCount	Unsigned	10	0	–	–
Pass Count	Output.General.PassCount	Unsigned	10	0	–	–
Fail Count	Output.General.FailCount	Unsigned	10	0	–	–
Execution Time	Output.General.ExecutionTime	Unsigned	7	3	–	–
Error	Output.General.Error	Unsigned	1	0	-	-
Error Code	Output.General.ErrorCode	Unsigned	10	0	-	-
Execution	Output.General.Execution	Unsigned	1	0	-	-
Non-execution	Output.General.NonExecution	Unsigned	1	0	-	-

System Property

#O084

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Count	Output.TotalCount	Unsigned	10	0	–	–
Pass Count	Output.TotalPassCount	Unsigned	10	0	–	–
Fail Count	Output.TotalFailCount	Unsigned	10	0	–	–
Trigger Interval	Output.TriggerInterval	Unsigned	7	3	–	–
Program Time	Output.ProgramTime	Unsigned	7	3	–	–
Program Setting Storage	Output.ProgramStorage	Unsigned	–	–	–	–
Program No.	Output.ProgramNumber	Unsigned	5	0	–	–
Program Name	Output.ProgramName	Unsigned	–	–	–	–
Task ID	Output.TaskID	Unsigned	3	0	-	-
Capture Start Date (Year)	Output.CaptureDate.Year	Unsigned	4	0	–	–
Capture Start Date (Month)	Output.CaptureDate.Month	Unsigned	2	0	–	–
Capture Start Date (Day)	Output.CaptureDate.Day	Unsigned	2	0	–	–
Capture Start Time (Hour)	Output.CpatureTime.Hour	Unsigned	2	0	–	–
Capture Start Time (Minute)	Output.CaptureTime.Minute	Unsigned	2	0	–	–
Capture Start Time (Second)	Output.CaptureTime.Second	Unsigned	2	0	–	–
Operation Status	Output.RunStatus	Unsigned	1	0	-	-
Total Pass Judgment	Output.TotalPass	Unsigned	1	0	–	–
Total Fail Judgment	Output.TotalFail	Unsigned	1	0	–	–
Tool Execution Error	Output.ToolExecutionError	Unsigned	1	0	–	–

Common to Tools

#O085

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Judgment (True = Pass)	Output.General.Pass	Unsigned	1	0	✓	–
Judgment (True = Fail)	Output.General.Fail	Unsigned	1	0	–	–
Execution Count	Output.General.ProcessingCount	Unsigned	10	0	–	–
Pass Count	Output.General.PassCount	Unsigned	10	0	–	–
Fail Count	Output.General.FailCount	Unsigned	10	0	–	–
Execution Time	Output.General.ExecutionTime	Unsigned	7	3	–	–
Error	Output.General.Error	Unsigned	1	0	–	–
Error Code	Output.General.ErrorCode	Unsigned	10	0	–	–
Execute	Output.General.Execution	Unsigned	1	0	–	–
Unexecuted	Output.General.NonExecution	Unsigned	1	0	–	–

Inspection Region (Common to Tools)

#O086

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
(Rectangle) Width	Output.Region.Shape.Width	Unsigned	5	0	-	-
(Rectangle) Width.Absolute Measured Value	Output.Region.Shape.Width.Abs	Unsigned	5	0	-	-
(Rectangle) Height	Output.Region.Shape.Height	Unsigned	5	0	-	-
(Rectangle) Height.Absolute Measured Value	Output.Region.Shape.Height.Abs	Unsigned	5	0	-	-
(Rectangle) Center X	Output.Region.Shape.Center.X	Signed	5	0	-	X
(Rectangle) Center X.Absolute Measured Value	Output.Region.Shape.Center.X.Abs	Signed	5	0	-	-
(Rectangle) Center Y	Output.Region.Shape.Center.Y	Signed	5	0	-	Y
(Rectangle) Center Y.Absolute Measured Value	Output.Region.Shape.Center.Y.Abs	Signed	5	0	-	-
(Rectangle) Rotation Angle	Output.Region.Shape.Angle	Unsigned	3	3	-	-
(Rectangle) Rotation Angle.Absolute Measured Value	Output.Region.Shape.Angle.Abs	Unsigned	3	3	-	-
(Circle) Center X	Output.Region.Shape.Center.X	Signed	5	0	-	X
(Circle) Center X.Absolute Measured Value	Output.Region.Shape.Center.X.Abs	Signed	5	0	-	-
(Circle) Center Y	Output.Region.Shape.Center.Y	Signed	5	0	-	Y
(Circle) Center Y.Absolute Measured Value	Output.Region.Shape.Center.Y.Abs	Signed	5	0	-	-
(Circle) Radius	Output.Region.Shape.Radius	Unsigned	4	0	-	-
(Circle) Radius.Absolute Measured Value	Output.Region.Shape.Radius.Abs	Unsigned	4	0	-	-
(Oval) Center X	Output.Region.Shape.Center.X	Signed	5	0	-	X
(Oval) Center X.Absolute Measured Value	Output.Region.Shape.Center.X.Abs	Signed	5	0	-	-
(Oval) Center Y	Output.Region.Shape.Center.Y	Signed	5	0	-	Y
(Oval) Center Y.Absolute Measured Value	Output.Region.Shape.Center.Y.Abs	Signed	5	0	-	-
(Oval) Radius 1	Output.Region.Shape.Radius1	Unsigned	4	0	-	-
(Oval) Radius 1.Absolute Measured Value	Output.Region.Shape.Radius1.Abs	Unsigned	4	0	-	-
(Oval) Radius 2	Output.Region.Shape.Radius2	Unsigned	4	0	-	-
(Oval) Radius 2.Absolute Measured Value	Output.Region.Shape.Radius2.Abs	Unsigned	4	0	-	-
(Oval) Rotation Angle	Output.Region.Shape.Angle	Unsigned	3	3	-	-
(Oval) Rotation Angle.Absolute Measured Value	Output.Region.Shape.Angle.Abs	Unsigned	3	3	-	-
(Ring) Center X	Output.Region.Shape.Center.X	Signed	5	0	-	X
(Ring) Center X.Absolute Measured Value	Output.Region.Shape.Center.X.Abs	Signed	5	0	-	-
(Ring) Center Y	Output.Region.Shape.Center.Y	Signed	5	0	-	Y
(Ring) Center Y.Absolute Measured Value	Output.Region.Shape.Center.Y.Abs	Signed	5	0	-	-

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
(Ring) Radius 1	Output.Region.Shape.Radius1	Unsigned	4	0	-	-
(Ring) Radius 1.Absolute Measured Value	Output.Region.Shape.Radius1.Abs	Unsigned	4	0	-	-
(Ring) Radius 2	Output.Region.Shape.Radius2	Unsigned	4	0	-	-
(Ring) Radius 2.Absolute Measured Value	Output.Region.Shape.Radius2.Abs	Unsigned	4	0	-	-
(Arc) Center X	Output.Region.Shape.Center.X	Signed	5	0	-	X
(Arc) Center X.Absolute Measured Value	Output.Region.Shape.Center.X.Abs	Signed	5	0	-	-
(Arc) Center Y	Output.Region.Shape.Center.Y	Signed	5	0	-	Y
(Arc) Center Y.Absolute Measured Value	Output.Region.Shape.Center.Y.Abs	Signed	5	0	-	-
(Arc) Radius 1	Output.Region.Shape.Radius1	Unsigned	4	0	-	-
(Arc) Radius 1.Absolute Measured Value	Output.Region.Shape.Radius1.Abs	Unsigned	4	0	-	-
(Arc) Radius 2	Output.Region.Shape.Radius2	Unsigned	4	0	-	-
(Arc) Radius 2.Absolute Measured Value	Output.Region.Shape.Radius2.Abs	Unsigned	4	0	-	-
(Arc) Starting Angle	Output.Region.Shape.StartingAngle	Unsigned	3	3	-	-
(Arc) Starting Angle.Absolute Measured Value	Output.Region.Shape.StartingAngle.Abs	Unsigned	3	3	-	-
(Arc) Ending Angle	Output.Region.Shape.EndAngle	Unsigned	3	3	-	-
(Arc) Ending Angle.Absolute Measured Value	Output.Region.Shape.EndAngle.Abs	Unsigned	3	3	-	-
(Polygon) Vertex Position X	Output.Region.Shape.Node[n].Position.X	Signed	5	0	-	X
(Polygon) Vertex Position X.Absolute Measured Value	Output.Region.Shape.Node[n].Position.X.Abs	Signed	5	0	-	-
(Polygon) Vertex Position Y	Output.Region.Shape.Node[n].Position.Y	Signed	5	0	-	Y
(Polygon) Vertex Position Y.Absolute Measured Value	Output.Region.Shape.Node[n].Position.Y.Abs	Signed	5	0	-	-
Mask Region[n]	Output.Region.Mask[n]					
The mnemonics for each shape of Mask Region[n] are the same as for the region.	Output.Region.Mask[n].~					

Capture

#O087

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
General	Tool[n].Output.General	Refer to "Common to Tools".				
Execution Time	Tool[n].Output.General.ExecutionTime	Unsigned	7	3	–	–
Execution Time[n]	Tool[n][n].Output.General.ExecutionTime	Unsigned	7	3	✓	–
Error Code	Tool[n][n].Output.General.ErrorCode	Unsigned	7	0	✓	–
Camera Attitude X[n]	Tool[n][n].Output.Camera[n].Common.AngleAxis.X	Signed	3	1	✓	–
Camera Attitude Y[n]	Tool[n][n].Output.Camera[n].Common.AngleAxis.Y	Signed	3	1	✓	–
Camera Attitude Z[n]	Tool[n][n].Output.Camera[n].Common.AngleAxis.Z	Signed	3	1	✓	–
Post-move Image Detected Count[n]	Tool[n][n].Output.Camera[n].TrackObject[0].Count	Unsigned	2	0	✓	–
Post-move Image Detected Position X[n]	Tool[n][n].Output.Camera[n].TrackObject[0].Position.X	Unsigned	5	3	✓	–
Post-move Image Detected Position X[n].Absolute Measured Value	Tool[n][n].Output.Camera[n].TrackObject[0].Position.X.Abs	Signed	5	3	✓	–
Post-move Image Detected Position Y[n]	Tool[n][n].Output.Camera[n].TrackObject[0].Position.Y	Signed	5	3	✓	–
Post-move Image Detected Position Y[n].Absolute Measured Value	Tool[n][n].Output.Camera[n].TrackObject[0].Position.Y.Abs	Signed	5	3	✓	–
Post-move Image Detected Position Angle[n]	Tool[n][n].Output.Camera[n].TrackObject[0].Position.Angle	Signed	3	3	✓	–
Post-move Image Detected Position Angle[n].Absolute Measured Value	Tool[n][n].Output.Camera[n].TrackObject[0].Position.Angle.Abs	Signed	3	3	✓	–
Post-move Image Match %[n]	Tool[n][n].Output.Camera[n].TrackObject[0].Match	Unsigned	2	3	✓	–
In-motion Image Detected Count[n]	Tool[n][n].Output.Camera[n].TrackObject[1].Count	Unsigned	2	0	✓	–
In-motion Image Detected PositionX[n]	Tool[n][n].Output.Camera[n].TrackObject[1].Position.X	Signed	5	3	✓	–
In-motion Image Detected PositionX[n].Absolute Measured Value	Tool[n][n].Output.Camera[n].TrackObject[1].Position.X.Abs	Signed	5	3	✓	–
In-motion Image Detected PositionY[n]	Tool[n][n].Output.Camera[n].TrackObject[1].Position.Y	Signed	5	3	✓	–
In-motion Image Detected PositionY[n].Absolute Measured Value	Tool[n][n].Output.Camera[n].TrackObject[1].Position.Y.Abs	Signed	5	3	✓	–
In-motion Image Detected Position Angle[n]	Tool[n][n].Output.Camera[n].TrackObject[1].Position.Angle	Signed	3	3	✓	–
In-motion Image Detected Position Angle[n].Absolute Measured Value	Tool[n][n].Output.Camera[n].TrackObject[1].Position.Angle.Abs	Signed	3	3	✓	–
In-motion Image Match %[n]	Tool[n][n].Output.Camera[n].TrackObject[1].Match	Unsigned	2	3	✓	–

Calibration

#O088

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
General	Tool[n].Output.General	Refer to "Common to Tools".				
Scale	Output.Scale	Signed	4	6	✓	-
X	Output.X	Signed	4	6	–	-
Y	Output.Y	Signed	4	6	–	-
Length	Output.Length	Signed	4	6	–	-
Origin X Before Adjustment	Output.BeforeCorrectionOriginX	Signed	5	3	✓	-
Origin Y Before Adjustment	Output.BeforeCorrectionOriginY	Signed	5	3	✓	-
Origin X After Adjustment	Output.AfterCorrectionOriginX	Signed	5	3	✓	-
Origin Y After Adjustment	Output.AfterCorrectionOriginY	Signed	5	3	✓	-
Pattern Interval After Adjustment	Output.AfterCorrectionPixelSpacing	Unsigned	5	3	–	-
Corrected Angle	Output.CorrectedAngle	Unsigned	3	3	–	-

Scaling

#O089

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
General	Output.General	Refer to "Common to Tools".				
Scale	Output.Scale	Signed	4	6	✓	–
Scale (X)	Output.X	Signed	4	6	✓	–
Scale (Y)	Output.Y	Signed	4	6	✓	–
Scale (Lengthwise)	Output.Length	Signed	4	6	✓	–

Area

#O090

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Area	Output.Area	Unsigned	8	3	✓	–
Area.Judged Value OK	Output.Area.Pass	Unsigned	–	–	–	–
Area.Judged Value Fail	Output.Area.Fail	Unsigned	–	–	–	–

Intensity

#O091

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Gray Intensity Average	Output.Average	Unsigned	3	3	✓	–
Gray Intensity Average.Judged Value OK	Output.Average.Pass	Unsigned	–	–	–	–
Gray Intensity Average.Judged Value Fail	Output.Average.Fail	Unsigned	–	–	–	–
Intensity Deviation	Output.Deviation	Unsigned	3	3	✓	–
Intensity Deviation.Judged Value OK	Output.Deviation.Pass	Unsigned	–	–	–	–
Intensity Deviation.Judged Value Fail	Output.Deviation.Fail	Unsigned	–	–	–	–
Maximum Intensity	Output.MaximumIntensity	Unsigned	3	0	✓	–
Maximum Intensity.Judged Value OK	Output.MaximumIntensity.Pass	Unsigned	–	–	–	–
Maximum Intensity.Judged Value Fail	Output.MaximumIntensity.Fail	Unsigned	–	–	–	–
Minimum Intensity	Output.MinimumIntensity	Unsigned	3	0	✓	–
Minimum Intensity.Judged Value OK	Output.MinimumIntensity.Pass	Unsigned	–	–	–	–
Minimum Intensity.Judged Value Fail	Output.MinimumIntensity.Fail	Unsigned	–	–	–	–

Color Detection

#O092

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Average Red Intensity	Output.Average.Red	Unsigned	3	3	✓	–
Average Red Intensity.Judged Value OK	Output.Average.Red.Pass	Unsigned	1	0	–	–
Average Red Intensity.Judged Value Fail	Output.Average.Red.Fail	Unsigned	1	0	–	–
Average Green Intensity	Output.Average.Green	Unsigned	3	3	✓	–
Average Green Intensity.Judged Value OK	Output.Average.Green.Pass	Unsigned	1	0	–	–
Average Green Intensity.Judged Value Fail	Output.Average.Green.Fail	Unsigned	1	0	–	–
Average Blue Intensity	Output.Average.Blue	Unsigned	3	3	✓	–
Average Blue Intensity.Judged Value OK	Output.Average.Blue.Pass	Unsigned	1	0	–	–
Average Blue Intensity.Judged Value Fail	Output.Average.Blue.Fail	Unsigned	1	0	–	–
Red Intensity Deviation	Output.Deviation.Red	Unsigned	3	3	✓	–
Red Intensity Deviation.Judged Value OK	Output.Deviation.Red.Pass	Unsigned	1	0	–	–
Red Intensity Deviation.Judged Value Fail	Output.Deviation.Red.Fail	Unsigned	1	0	–	–
Green Intensity Deviation	Output.Deviation.Green	Unsigned	3	3	✓	–
Green Intensity Deviation.Judged Value OK	Output.Deviation.Green.Pass	Unsigned	1	0	–	–
Green Intensity Deviation.Judged Value Fail	Output.Deviation.Green.Fail	Unsigned	1	0	–	–
Blue Intensity Deviation	Output.Deviation.Blue	Unsigned	3	3	✓	–
Blue Intensity Deviation.Judged Value OK	Output.Deviation.Blue.Pass	Unsigned	1	0	–	–
Blue Intensity Deviation.Judged Value Fail	Output.Deviation.Blue.Fail	Unsigned	1	0	–	–
Maximum Red Intensity	Output.MaximumIntensity.Red	Unsigned	3	0	✓	–
Maximum Red Intensity.Judged Value OK	Output.MaximumIntensity.Red.Pass	Unsigned	1	0	–	–
Maximum Red Intensity.Judged Value Fail	Output.MaximumIntensity.Red.Fail	Unsigned	1	0	–	–
Minimum Red Intensity	Output.MinimumIntensity.Red	Unsigned	3	0	✓	–
Minimum Red Intensity.Judged Value OK	Output.MinimumIntensity.Red.Pass	Unsigned	1	0	–	–
Minimum Red Intensity.Judged Value Fail	Output.MinimumIntensity.Red.Fail	Unsigned	1	0	–	–
Maximum Green Intensity	Output.MaximumIntensity.Green	Unsigned	3	0	✓	–
Maximum Green Intensity.Judged Value OK	Output.MaximumIntensity.Green.Pass	Unsigned	1	0	–	–
Maximum Green Intensity.Judged Value Fail	Output.MaximumIntensity.Green.Fail	Unsigned	1	0	–	–
Minimum Green Intensity	Output.MinimumIntensity.Green	Unsigned	3	0	✓	–
Minimum Green Intensity.Judged Value OK	Output.MinimumIntensity.Green.Pass	Unsigned	1	0	–	–
Minimum Green Intensity.Judged Value Fail	Output.MinimumIntensity.Green.Fail	Unsigned	1	0	–	–
Maximum Blue Intensity	Output.MaximumIntensity.Blue	Unsigned	3	0	✓	–
Maximum Blue Intensity.Judged Value OK	Output.MaximumIntensity.Blue.Pass	Unsigned	1	0	–	–
Maximum Blue Intensity.Judged Value Fail	Output.MaximumIntensity.Blue.Fail	Unsigned	1	0	–	–
Minimum Blue Intensity	Output.MinimumIntensity.Blue	Unsigned	3	0	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Minimum Blue Intensity.Judged Value OK	Output.MinimumIntensity.Blue.Pass	Unsigned	1	0	–	–
Minimum Blue Intensity.Judged Value Fail	Output.MinimumIntensity.Blue.Fail	Unsigned	1	0	–	–
Average Hue Intensity	Output.Average.Hue	Unsigned	3	3	✓	–
Average Hue Intensity.Judged Value OK	Output.Average.Hue.Pass	Unsigned	1	0	–	–
Average Hue Intensity.Judged Value Fail	Output.Average.Hue.Fail	Unsigned	1	0	–	–
Average Saturation Intensity	Output.Average.Saturation	Unsigned	3	3	✓	–
Average Saturation Intensity.Judged Value OK	Output.Average.Saturation.Pass	Unsigned	1	0	–	–
Average Saturation Intensity.Judged Value Fail	Output.Average.Saturation.Fail	Unsigned	1	0	–	–
Average Brightness Intensity	Output.Average.Brightness	Unsigned	3	3	✓	–
Average Brightness IntensityJudged Value OK	Output.Average.Brightness.Pass	Unsigned	1	0	–	–
Average Brightness Intensity.Judged Value Fail	Output.Average.Brightness.Fail	Unsigned	1	0	–	–
Hue Intensity Deviation	Output.Deviation.Hue	Unsigned	3	3	✓	–
Hue Intensity Deviation.Judged Value OK	Output.Deviation.Hue.Pass	Unsigned	1	0	–	–
Hue Intensity Deviation.Judged Value Fail	Output.Deviation.Hue.Fail	Unsigned	1	0	–	–
Saturation Intensity Deviation	Output.Deviation.Saturation	Unsigned	3	3	✓	–
Saturation Intensity Deviation.Judged Value OK	Output.Deviation.Saturation.Pass	Unsigned	1	0	–	–
Saturation Intensity Deviation.Judged Value Fail	Output.Deviation.Saturation.Fail	Unsigned	1	0	–	–
Brightness Intensity Deviation	Output.Deviation.Brightness	Unsigned	3	3	✓	–
Brightness Intensity Deviation.Judged Value OK	Output.Deviation.Brightness.Pass	Unsigned	1	0	–	–
Brightness Intensity Deviation.Judged Value Fail	Output.Deviation.Brightness.Fail	Unsigned	1	0	–	–
Maximum Hue Intensity	Output.MaximumIntensity.Hue	Unsigned	3	0	✓	–
Maximum Hue Intensity.Judged Value OK	Output.MaximumIntensity.Hue.Pass	Unsigned	1	0	–	–
Maximum Hue Intensity.Judged Value Fail	Output.MaximumIntensity.Hue.Fail	Unsigned	1	0	–	–
Minimum Hue Intensity	Output.MinimumIntensity.Hue	Unsigned	3	0	✓	–
Minimum Hue Intensity.Judged Value OK	Output.MinimumIntensity.Hue.Pass	Unsigned	1	0	–	–
Minimum Hue Intensity.Judged Value Fail	Output.MinimumIntensity.Hue.Fail	Unsigned	1	0	–	–
Maximum Saturation Intensity	Output.MaximumIntensity.Saturation	Unsigned	3	0	✓	–
Maximum Saturation Intensity.Judged Value OK	Output.MaximumIntensity.Saturation.Pass	Unsigned	1	0	–	–
Maximum Saturation Intensity.Judged Value Fail	Output.MaximumIntensity.Saturation.Fail	Unsigned	1	0	–	–
Minimum Saturation Intensity	Output.MinimumIntensity.Saturation	Unsigned	3	0	✓	–
Minimum Saturation Intensity.Judged Value OK	Output.MinimumIntensity.Saturation.Pass	Unsigned	1	0	–	–
Minimum Saturation Intensity.Judged Value Fail	Output.MinimumIntensity.Saturation.Fail	Unsigned	1	0	–	–
Maximum Brightness Intensity	Output.MaximumIntensity.Brightness	Unsigned	3	0	✓	–
Maximum Brightness Intensity.Judged Value OK	Output.MaximumIntensity.Brightness.Pass	Unsigned	1	0	–	–
Maximum Brightness Intensity.Judged Value Fail	Output.MaximumIntensity.Brightness.Fail	Unsigned	1	0	–	–
Minimum Brightness Intensity	Output.MinimumIntensity.Brightness	Unsigned	3	0	✓	–
Minimum Brightness Intensity.Judged Value OK	Output.MinimumIntensity.Brightness.Pass	Unsigned	1	0	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Minimum Brightness Intensity.Judged Value Fail	Output.MinimumIntensity.Brightness.Fail	Unsigned	1	0	–	–
Average UV Intensity	Output.Average.UltraViolet	Unsigned	3	3	✓	–
Average UV Intensity.Judged Value OK	Output.Average.UltraViolet.Pass	Unsigned	1	0	–	–
Average UV Intensity.Judged Value Fail	Output.Average.UltraViolet.Fail	Unsigned	1	0	–	–
Average Blue Intensity	Output.AverageIntensity.Blue	Unsigned	3	3	✓	–
Average Blue Intensity.Judged Value OK	Output.AverageIntensity.Blue.Pass	Unsigned	1	0	–	–
Average Blue Intensity.Judged Value Fail	Output.AverageIntensity.Blue.Fail	Unsigned	1	0	–	–
Average Green Intensity	Output.AverageIntensity.Green	Unsigned	3	3	✓	–
Average Green Intensity.Judged Value OK	Output.AverageIntensity.Green.Pass	Unsigned	1	0	–	–
Average Green Intensity.Judged Value Fail	Output.AverageIntensity.Green.Fail	Unsigned	1	0	–	–
Average AM Intensity	Output.AverageIntensity.Amber	Unsigned	3	3	✓	–
Average AM Intensity.Judged Value OK	Output.AverageIntensity.Amber.Pass	Unsigned	1	0	–	–
Average AM Intensity.Judged Value Fail	Output.AverageIntensity.Amber.Fail	Unsigned	1	0	–	–
Average Red Intensity	Output.AverageIntensity.Red	Unsigned	3	3	✓	–
Average Red Intensity Value OK	Output.AverageIntensity.Red.Pass	Unsigned	1	0	–	–
Average Red Intensity Value Fail	Output.AverageIntensity.Red.Fail	Unsigned	1	0	–	–
Average FR Intensity	Output.AverageIntensity.FarRed	Unsigned	3	3	✓	–
Average FR Intensity.Judged Value OK	Output.AverageIntensity.FarRed.Pass	Unsigned	1	0	–	–
Average FR Intensity.Judged Value Fail	Output.AverageIntensity.FarRed.Fail	Unsigned	1	0	–	–
Average IR Intensity	Output.AverageIntensity.Infrared	Unsigned	3	3	✓	–
Average IR Intensity.Judged Value OK	Output.AverageIntensity.Infrared.Pass	Unsigned	1	0	–	–
Average IR Intensity.Judged Value Fail	Output.AverageIntensity.Infrared.Fail	Unsigned	1	0	–	–
Average W Intensity	Output.AverageIntensity.White	Unsigned	3	3	✓	–
Average W Intensity.Judged Value OK	Output.AverageIntensity.White.Pass	Unsigned	1	0	–	–
Average W Intensity.Judged Value Fail	Output.AverageIntensity.White.Fail	Unsigned	1	0	–	–
UV Intensity Deviation	Output.IntensityDeviation.UltraViolet	Unsigned	3	3	✓	–
UV Intensity Deviation.Judged Value OK	Output.IntensityDeviation.UltraViolet.Pass	Unsigned	1	0	–	–
UV Intensity Deviation.Judged Value Fail	Output.IntensityDeviation.UltraViolet.Fail	Unsigned	1	0	–	–
Blue Intensity Deviation	Output.IntensityDeviation.Blue	Unsigned	3	3	✓	–
Blue Intensity Deviation.Judged Value OK	Output.IntensityDeviation.Blue.Pass	Unsigned	1	0	–	–
Blue Intensity Deviation.Judged Value Fail	Output.IntensityDeviation.Blue.Fail	Unsigned	1	0	–	–
Green Intensity Deviation	Output.IntensityDeviation.Green	Unsigned	3	3	✓	–
Green Intensity Deviation.Judged Value OK	Output.IntensityDeviation.Green.Pass	Unsigned	1	0	–	–
Green Intensity Deviation.Judged Value Fail	Output.IntensityDeviation.Green.Fail	Unsigned	1	0	–	–
AM Intensity Deviation	Output.IntensityDeviation.Amber	Unsigned	3	3	✓	–
AM Intensity Deviation.Judged Value OK	Output.IntensityDeviation.Amber.Pass	Unsigned	1	0	–	–
AM Intensity Deviation.Judged Value Fail	Output.IntensityDeviation.Amber.Fail	Unsigned	1	0	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Red Intensity Deviation	Output.IntensityDeviation.Red	Unsigned	3	3	✓	–
Red Intensity Deviation.Judged Value OK	Output.IntensityDeviation.Red.Pass	Unsigned	1	0	–	–
Red Intensity Deviation.Judged Value Fail	Output.IntensityDeviation.Red.Fail	Unsigned	1	0	–	–
FR Intensity Deviation	Output.IntensityDeviation.FarRed	Unsigned	3	3	✓	–
FR Intensity Deviation.Judged Value OK	Output.IntensityDeviation.FarRed.Pass	Unsigned	1	0	–	–
FR Intensity Deviation.Judged Value Fail	Output.IntensityDeviation.FarRed.Fail	Unsigned	1	0	–	–
IR Intensity Deviation	Output.IntensityDeviation.Infrared	Unsigned	3	3	✓	–
IR Intensity Deviation.Judged Value OK	Output.IntensityDeviation.Infrared.Pass	Unsigned	1	0	–	–
IR Intensity Deviation.Judged Value Fail	Output.IntensityDeviation.Infrared.Fail	Unsigned	1	0	–	–
W Intensity Deviation	Output.IntensityDeviation.White	Unsigned	3	3	✓	–
W Intensity Deviation.Judged Value OK	Output.IntensityDeviation.White.Pass	Unsigned	1	0	–	–
W Intensity Deviation.Judged Value Fail	Output.IntensityDeviation.White.Fail	Unsigned	1	0	–	–
Maximum UV Intensity	Output.MaximumIntensity.UltraViolet	Unsigned	3	0	✓	–
Maximum UV Intensity.Judged Value OK	Output.MaximumIntensity.UltraViolet.Pass	Unsigned	1	0	–	–
Maximum UV Intensity.Judged Value Fail	Output.MaximumIntensity.UltraViolet.Fail	Unsigned	1	0	–	–
Maximum Blue Intensity	Output.MaximumIntensity.Blue	Unsigned	3	0	✓	–
Maximum Blue Intensity.Judged Value OK	Output.MaximumIntensity.Blue.Pass	Unsigned	1	0	–	–
Maximum Blue Intensity.Judged Value Fail	Output.MaximumIntensity.Blue.Fail	Unsigned	1	0	–	–
Maximum Green Intensity	Output.MaximumIntensity.Green	Unsigned	3	0	✓	–
Maximum Green Intensity.Judged Value OK	Output.MaximumIntensity.Green.Pass	Unsigned	1	0	–	–
Maximum Green Intensity.Judged Value Fail	Output.MaximumIntensity.Green.Fail	Unsigned	1	0	–	–
Maximum AM Intensity	Output.MaximumIntensity.Amber	Unsigned	3	0	✓	–
Maximum AM Intensity.Judged Value OK	Output.MaximumIntensity.Amber.Pass	Unsigned	1	0	–	–
Maximum AM Intensity.Judged Value Fail	Output.MaximumIntensity.Amber.Fail	Unsigned	1	0	–	–
Maximum Red Intensity	Output.MaximumIntensity.Red	Unsigned	3	0	✓	–
Maximum Red Intensity.Judged Value OK	Output.MaximumIntensity.Red.Pass	Unsigned	1	0	–	–
Maximum Red Intensity.Judged Value Fail	Output.MaximumIntensity.Red.Fail	Unsigned	1	0	–	–
Maximum FR Intensity	Output.MaximumIntensity.FarRed	Unsigned	3	0	✓	–
Maximum FR Intensity.Judged Value OK	Output.MaximumIntensity.FarRed.Pass	Unsigned	1	0	–	–
Maximum FR Intensity.Judged Value Fail	Output.MaximumIntensity.FarRed.Fail	Unsigned	1	0	–	–
Maximum IR Intensity	Output.MaximumIntensity.Infrared	Unsigned	3	0	✓	–
Maximum IR Intensity.Judged Value OK	Output.MaximumIntensity.Infrared.Pass	Unsigned	1	0	–	–
Maximum IR Intensity.Judged Value Fail	Output.MaximumIntensity.Infrared.Fail	Unsigned	1	0	–	–
Maximum W Intensity	Output.MaximumIntensity.White	Unsigned	3	0	✓	–
Maximum W Intensity.Judged Value OK	Output.MaximumIntensity.White.Pass	Unsigned	1	0	–	–
Maximum W Intensity.Judged Value Fail	Output.MaximumIntensity.White.Fail	Unsigned	1	0	–	–
Minimum UV Intensity	Output.MinimumIntensity.UltraViolet	Unsigned	3	0	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Minimum UV Intensity.Judged Value OK	Output.MinimumIntensity.UltraViolet.Pass	Unsigned	1	0	–	–
Minimum UV Intensity.Judged Value Fail	Output.MinimumIntensity.UltraViolet.Fail	Unsigned	1	0	–	–
Minimum Blue Intensity	Output.MinimumIntensity.Blue	Unsigned	3	0	✓	–
Minimum Blue Intensity.Judged Value OK	Output.MinimumIntensity.Blue.Pass	Unsigned	1	0	–	–
Minimum Blue Intensity.Judged Value Fail	Output.MinimumIntensity.Blue.Fail	Unsigned	1	0	–	–
Minimum Green Intensity	Output.MinimumIntensity.Green	Unsigned	3	0	✓	–
Minimum Green Intensity.Judged Value OK	Output.MinimumIntensity.Green.Pass	Unsigned	1	0	–	–
Minimum Green Intensity.Judged Value Fail	Output.MinimumIntensity.Green.Fail	Unsigned	1	0	–	–
Minimum AM Intensity	Output.MinimumIntensity.Amber	Unsigned	3	0	✓	–
Minimum AM Intensity.Judged Value OK	Output.MinimumIntensity.Amber.Pass	Unsigned	1	0	–	–
Minimum AM Intensity.Judged Value Fail	Output.MinimumIntensity.Amber.Fail	Unsigned	1	0	–	–
Minimum Red Intensity	Output.MinimumIntensity.Red	Unsigned	3	0	✓	–
Minimum Red Intensity.Judged Value OK	Output.MinimumIntensity.Red.Pass	Unsigned	1	0	–	–
Minimum Red Intensity.Judged Value Fail	Output.MinimumIntensity.Red.Fail	Unsigned	1	0	–	–
Minimum FR Intensity	Output.MinimumIntensity.FarRed	Unsigned	3	0	✓	–
Minimum FR Intensity.Judged Value OK	Output.MinimumIntensity.FarRed.Pass	Unsigned	1	0	–	–
Minimum FR Intensity.Judged Value Fail	Output.MinimumIntensity.FarRed.Fail	Unsigned	1	0	–	–
Minimum IR Intensity	Output.MinimumIntensity.Infrared	Unsigned	3	0	✓	–
Minimum IR Intensity.Judged Value OK	Output.MinimumIntensity.Infrared.Pass	Unsigned	1	0	–	–
Minimum IR Intensity.Judged Value Fail	Output.MinimumIntensity.Infrared.Fail	Unsigned	1	0	–	–
Minimum W Intensity	Output.MinimumIntensity.White	Unsigned	3	0	✓	–
Minimum W Intensity.Judged Value OK	Output.MinimumIntensity.White.Pass	Unsigned	1	0	–	–
Minimum W Intensity.Judged Value Fail	Output.MinimumIntensity.White.Fail	Unsigned	1	0	–	–

Pattern Search

#O093

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Count	Output.Count	Unsigned	2	0	✓	–
Count.Judged Value OK	Output.Count.Pass	Unsigned	1	0	–	–
Count.Judged Value Fail	Output.Count.Fail	Unsigned	1	0	–	–
Position X	Output.Position.X	Signed	5	3	✓	X
Position X.Absolute Measured Value	Output.Position.X.Abs	Signed	5	3	–	–
Position X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Position X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Position Y	Output.Position.Y	Signed	5	3	✓	Y
Position Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	5	3	–	–
Position Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Position Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Angle	Output.Position.Angle	Signed	3	3	✓	–
Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	–	–
Angle.Judged Value OK	Output.Position.Angle.Pass	Unsigned	1	0	–	–
Angle.Judged Value Fail	Output.Position.Angle.Fail	Unsigned	1	0	–	–
Match %	Output.Match	Unsigned	2	3	✓	–
Match %.Judged Value OK	Output.Match.Pass	Unsigned	1	0	–	–
Match %.Judged Value Fail	Output.Match.Fail	Unsigned	1	0	–	–
Position X[n]	Output.Array.Position.X[n]	Signed	5	3	✓	X
Position X[n].Absolute Measured Value	Output.Array.Position.X[n].Abs	Signed	5	3	–	–
Position Y[n]	Output.Array.Position.Y[n]	Signed	5	3	✓	Y
Position Y[n].Absolute Measured Value	Output.Array.Position.Y[n].Abs	Signed	5	3	–	–
Angle[n]	Output.Array.Position.Angle[n]	Signed	3	3	✓	–
Angle[n].Absolute Measured Value	Output.Array.Position.Angle[n].Abs	Signed	3	3	–	–
Match %[n]	Output.Array.Match[n]	Unsigned	2	3	✓	–

ShapeTrax3A

#O094

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Count	Output.Count	Unsigned	4	0	✓	–
Count.Judged Value OK	Output.Count.Pass	Unsigned	1	0	–	–
Count.Judged Value Fail	Output.Count.Fail	Unsigned	1	0	–	–
Number of Unselected	Output.NonSelectCount	Unsigned	4	0	–	-
Position X	Output.Position.X	Signed	5	3	✓	X
Position X.Absolute Measured Value	Output.Position.X.Abs	Signed	5	3	–	–
Position X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Position X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Position Y	Output.Position.Y	Signed	5	3	✓	Y
Position Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	5	3	–	–
Position Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Position Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Angle	Output.Position.Angle	Signed	3	3	✓	–
Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	–	–
Angle.Judged Value OK	Output.Position.Angle.Pass	Unsigned	1	0	–	–
Angle.Judged Value Fail	Output.Position.Angle.Fail	Unsigned	1	0	–	–
Match %	Output.Match	Unsigned	2	3	✓	–
Match %.Judged Value OK	Output.Match.Pass	Unsigned	1	0	–	–
Match %.Judged Value Fail	Output.Match.Fail	Unsigned	1	0	–	–
Scale	Output.Scale	Unsigned	1	3	✓	–
Scale.Judged Value OK	Output.Scale.Pass	Unsigned	1	0	–	–
Scale.Judged Value Fail	Output.Scale.Fail	Unsigned	1	0	–	–
Feature Pixel Count 1	Output.FeaturePixelCount1	Unsigned	6	0	✓	–
Feature Pixel Count 1.Judged Value OK	Output.FeaturePixelCount1.Pass	Unsigned	1	0	–	–
Feature Pixel Count 1.Judged Value Fail	Output.FeaturePixelCount1.Fail	Unsigned	1	0	–	–
Feature Pixel Count 2	Output.FeaturePixelCount2	Unsigned	6	0	✓	–
Feature Pixel Count 2.Judged Value OK	Output.FeaturePixelCount2.Pass	Unsigned	1	0	–	–
Feature Pixel Count 2.Judged Value Fail	Output.FeaturePixelCount2.Fail	Unsigned	1	0	–	–
Position X[n]	Output.Array.Position.X[n]	Signed	5	3	✓	X
Position X[n].Absolute Measured Value	Output.Array.Position.X[n].Abs	Signed	5	3	–	–
Position Y[n]	Output.Array.Position.Y[n]	Signed	5	3	✓	Y
Position Y[n].Absolute Measured Value	Output.Array.Position.Y[n].Abs	Signed	5	3	–	–
Angle[n]	Output.Array.Position.Angle[n]	Signed	3	3	✓	–
Angle[n].Absolute Measured Value	Output.Array.Position.Angle[n].Abs	Signed	3	3	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Match %[n]	Output.Array.Match[n]	Unsigned	2	3	✓	–
Scale[n]	Output.Array.Scale[n]	Unsigned	1	3	✓	–
Feature Pixel Count 1[n]	Output.Array.FeaturePixelCount1[n]	Unsigned	6	0	✓	–
Feature Pixel Count 2[n]	Output.Array.FeaturePixelCount2[n]	Unsigned	6	0	✓	–

Edge Position

#O095

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Number of Detected Edges	Output.Count	Unsigned	4	0	✓	–
Number of Detected Edges.Judged Value OK	Output.Count.Pass	Unsigned	1	0	–	–
Number of Detected Edges.Judged Value Fail	Output.Count.Fail	Unsigned	1	0	–	–
Position X	Output.Position.X	Signed	5	3	✓	X
Position X.Absolute Measured Value	Output.Position.X.Abs	Signed	5	3	–	–
Position X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Position X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Position Y	Output.Position.Y	Signed	5	3	✓	Y
Position Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	5	3	–	–
Position Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Position Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Angle	Output.Position.Angle	Signed	3	3	✓	–
Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	–	–
Angle.Judged Value OK	Output.Position.Angle.Pass	Unsigned	1	0	–	–
Angle.Judged Value Fail	Output.Position.Angle.Fail	Unsigned	1	0	–	–
Distance	Output.Distance	Unsigned	5	3	–	L
Distance.Absolute Measured Value	Output.Distance.Abs	Unsigned	5	3	–	–
Intensity	Output.Intensity	Unsigned	3	3	–	–
Intensity.Absolute Measured Value	Output.Intensity.Abs	Unsigned	3	3	–	–
Position X[n]	Output.Array.Position.X[n]	Signed	5	3	✓	X
Position X[n].Absolute Measured Value	Output.Array.Position.X[n].Abs	Signed	5	3	–	–
Position Y[n]	Output.Array.Position.Y[n]	Signed	5	3	✓	Y
Position Y[n].Absolute Measured Value	Output.Array.Position.Y[n].Abs	Signed	5	3	–	–
Angle[n]	Output.Array.Position.Angle[n]	Signed	5	3	✓	–
Angle[n].Absolute Measured Value	Output.Array.Position.Angle[n].Abs	Signed	3	3	–	–
Distance[n]	Output.Array.Distance[n]	Unsigned	5	3	–	L
Distance[n].Absolute Measured Value	Output.Array.Distance[n].Abs	Unsigned	5	3	–	–
Intensity[n]	Output.Array.Intensity[n]	Unsigned	3	3	–	–
Intensity[n].Absolute Measured Value	Output.Array.Intensity[n].Abs	Unsigned	3	3	–	–

Edge Width

#O096

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Pair Count	Output.Count	Unsigned	2	0	–	–
Edge Width	Output.Width	Unsigned	5	3	✓	–
Edge Width.Judged Value OK	Output.Width.Pass	Unsigned	1	0	–	–
Edge Width.Judged Value Fail	Output.Width.Fail	Unsigned	1	0	–	–
Edge Width.Absolute Measured Value	Output.Width.Abs	Signed	5	3	–	–
Position 1X.Measured Value	Output.Position1.X	Signed	5	3	–	X
Position 1X.Absolute Measured Value	Output.Position1.X.Abs	Signed	5	3	–	–
Position 1Y.Measured Value	Output.Position1.Y	Signed	5	3	–	Y
Position 1Y.Absolute Measured Value	Output.Position1.Y.Abs	Signed	5	3	–	–
Angle 1.Measured Value	Output.Position1.Angle	Unsigned	3	3	–	–
Angle 1.Absolute Measured Value	Output.Position1.Angle.Abs	Unsigned	3	3	–	–
Distance 1.Measured Value	Output.Distance1	Unsigned	5	3	–	L
Distance 1.Absolute Measured Value	Output.Distance1.Abs	Unsigned	5	3	–	–
Intensity 1.Measured Value	Output.EdgeIntensity1	Unsigned	3	3	–	–
Position 2X.Measured Value	Output.Position2.X	Signed	5	3	–	X
Position 2X.Absolute Measured Value	Output.Position2.X.Abs	Signed	5	3	–	–
Position 2Y.Measured Value	Output.Position2.Y	Signed	5	3	–	Y
Position 2Y.Absolute Measured Value	Output.Position2.Y.Abs	Signed	5	3	–	–
Angle 2.Measured Value	Output.Position2.Angle	Unsigned	3	3	–	–
Angle 2.Absolute Measured Value	Output.Position2.Angle.Abs	Unsigned	3	3	–	–
Distance 2.Measured Value	Output.Distance2	Unsigned	5	3	–	L
Distance 2.Absolute Measured Value	Output.Distance2.Abs	Unsigned	5	3	–	–
Intensity 2.Measured Value	Output.EdgeIntensity2	Unsigned	3	3	–	–

Edge Pitch

#O097

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Pitch Count	Output.Count	Unsigned	4	0	✓	–
Pitch Count.Judged Value OK	Output.Count.Pass	Unsigned	1	0	–	–
Pitch Count.Judged Value Fail	Output.Count.Fail	Unsigned	1	0	–	–
Pitch.Maximum	Output.PitchMax	Unsigned	5	3	✓	L
Pitch.Maximum.Judged Value OK	Output.PitchMax.Pass	Unsigned	1	0	–	–
Pitch.Maximum.Judged Value Fail	Output.PitchMax.Fail	Unsigned	1	0	–	–
Pitch.Maximum.Absolute Measured Value	Output.PitchMax.Abs	Unsigned	5	3	–	–
Pitch.Minimum	Output.PitchMin	Unsigned	5	3	✓	L
Pitch.Minimum.Judged Value OK	Output.PitchMin.Pass	Unsigned	1	0	–	–
Pitch.Minimum.Judged Value Fail	Output.PitchMin.Fail	Unsigned	1	0	–	–
Pitch.Minimum.Absolute Measured Value	Output.PitchMin.Abs	Unsigned	5	3	–	–
Pitch.Average	Output.AveragePitch	Unsigned	5	3	✓	L
Pitch.Average.Absolute Measured Value	Output.AveragePitch.Abs	Unsigned	5	3	–	–
Pitch[n]	Output.Array.Pitch[n]	Unsigned	5	3	✓	L
Pitch[n].Absolute Measured Value	Output.Array.Pitch[n].Abs	Unsigned	5	3	–	–
Position 1X[n].Measured Value	Output.Array.Position1.X[n]	Signed	5	3	–	X
Position 1X[n].Absolute Measured Value	Output.Array.Position1.X[n].Abs	Signed	5	3	–	–
Position 1Y[n].Measured Value	Output.Array.Position1.Y[n]	Signed	5	3	–	Y
Position 1Y[n].Absolute Measured Value	Output.Array.Position1.Y[n].Abs	Signed	5	3	–	–
Angle 1[n].Measured Value	Output.Array.Position1.Angle[n]	Unsigned	3	3	–	–
Angle 1[n].Absolute Measured Value	Output.Array.Position1.Angle[n].Abs	Unsigned	3	3	–	–
Distance 1[n].Measured Value	Output.Array.Distance1[n]	Unsigned	5	3	–	L
Distance 1[n].Absolute Measured Value	Output.Array.Distance1[n].Abs	Unsigned	5	3	–	–
Intensity 1[n].Measured Value	Output.Array.EdgeIntensity1[n]	Unsigned	3	3	–	–
Position 2X[n].Measured Value	Output.Array.Position2.X[n]	Signed	5	3	–	X
Position 2X[n].Absolute Measured Value	Output.Array.Position2.X[n].Abs	Signed	5	3	–	–
Position 2Y[n].Measured Value	Output.Array.Position2.Y[n]	Signed	5	3	–	Y
Position 2Y[n].Absolute Measured Value	Output.Array.Position2.Y[n].Abs	Signed	5	3	–	–
Angle 2[n].Measured Value	Output.Array.Position2.Angle[n]	Unsigned	3	3	–	–
Angle 2[n].Absolute Measured Value	Output.Array.Position2.Angle[n].Abs	Unsigned	3	3	–	–
Distance 2[n].Measured Value	Output.Array.Distance2[n]	Unsigned	5	3	–	L
Distance 2[n].Absolute Measured Value	Output.Array.Distance2[n].Abs	Unsigned	5	3	–	–
Intensity 2[n].Measured Value	Output.Array.EdgeIntensity2[n]	Unsigned	3	3	–	–

Edge Pairs

#O098

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Pair Count	Output.Count	Unsigned	4	0	✓	–
Pair Count.Judged Value OK	Output.Count.Pass	Unsigned	1	0	–	–
Pair Count.Judged Value Fail	Output.Count.Fail	Unsigned	1	0	–	–
Pair Width.Maximum	Output.WidthMax	Unsigned	5	3	✓	L
Pair Width.Maximum.Judged Value OK	Output.WidthMax.Pass	Unsigned	1	0	–	–
Pair Width.Maximum.Judged Value Fail	Output.WidthMax.Fail	Unsigned	1	0	–	–
Pair Width.Maximum.Absolute Measured Value	Output.WidthMax.Abs	Unsigned	5	3	–	–
Pair Width.Minimum	Output.WidthMin	Unsigned	5	3	✓	L
Pair Width.Minimum.Judged Value OK	Output.WidthMin.Pass	Unsigned	1	0	–	–
Pair Width.MinimumJudged Value Fail	Output.WidthMin.Fail	Unsigned	1	0	–	–
Pair Width.Minimum.Absolute Measured Value	Output.WidthMin.Abs	Unsigned	5	3	–	–
Pair Width.Average	Output.WidthAvg	Unsigned	3	3	✓	L
Pair Width.Average.Absolute Measured Value	Output.WidthAvg.Abs	Unsigned	5	3	–	–
Pair Width	Output.Width	Unsigned	5	3	✓	–
Pair Width.Judged Value OK	Output.Width.Pass	Unsigned	1	0	–	–
Pair Width.Judged Value Fail	Output.Width.Fail	Unsigned	1	0	–	L
Pair Width.Absolute Measured Value	Output.Width.Abs	Unsigned	5	3	–	–
Position 1X.Measured Value	Output.Position1.X	Signed	5	3	–	X
Position 1X.Absolute Measured Value	Output.Position1.X.Abs	Signed	5	3	–	–
Position 1Y.Measured Value	Output.Position1.Y	Signed	5	3	–	Y
Position 1Y.Absolute Measured Value	Output.Position1.Y.Abs	Signed	5	3	–	–
Angle 1.Measured Value	Output.Position1.Angle	Unsigned	3	3	–	–
Angle 1.Absolute Measured Value	Output.Position1.Angle.Abs	Unsigned	3	3	–	–
Distance 1.Measured Value	Output.Distance1	Unsigned	5	3	–	L
Distance 1.Absolute Measured Value	Output.Distance1.Abs	Unsigned	5	3	–	–
Intensity 1.Measured Value	Output.Intensity1	Unsigned	3	3	–	–
Position 2X.Measured Value	Output.Position2.X	Signed	5	3	–	X
Position 2X.Absolute Measured Value	Output.Position2.X.Abs	Signed	5	3	–	–
Position 2Y.Measured Value	Output.Position2.Y	Signed	5	3	–	Y
Position 2Y.Absolute Measured Value	Output.Position2.Y.Abs	Signed	5	3	–	–
Angle 2.Measured Value	Output.Position2.Angle	Unsigned	3	3	–	–
Angle 2.Absolute Measured Value	Output.Position2.Angle.Abs	Unsigned	3	3	–	–
Distance 2.Measured Value	Output.Distance2	Unsigned	5	3	–	L
Distance 2.Absolute Measured Value	Output.Distance2.Abs	Unsigned	5	3	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Intensity 2.Measured Value	Output.Intensity2	Unsigned	3	3	–	–
Pair Width[n]	Output.Array.Width[n]	Unsigned	5	3	✓	L
Pair Width[n].Absolute Measured Value	Output.Array.Width[n].Abs	Unsigned	5	3	✓	–
Position 1X[n].Measured Value	Output.Array.Position1.X[n]	Signed	5	3	–	X
Position 1X[n].Absolute Measured Value	Output.Array.Position1.X[n].Abs	Signed	5	3	–	–
Position 1Y[n].Measured Value	Output.Array.Position1.Y[n]	Signed	5	3	–	Y
Position 1Y[n].Absolute Measured Value	Output.Array.Position1.Y[n].Abs	Signed	5	3	–	–
Angle 1[n].Measured Value	Output.Array.Position1.Angle[n]	Unsigned	3	3	–	–
Angle 1[n].Absolute Measured Value	Output.Array.Position1.Angle[n].Abs	Unsigned	3	3	–	–
Distance 1[n].Measured Value	Output.Array.Distance1[n]	Unsigned	5	3	–	L
Distance 1[n].Absolute Measured Value	Output.Array.Distance1[n].Abs	Unsigned	5	3	–	–
Intensity 1[n].Measured Value	Output.Array.Intensity1[n]	Unsigned	3	3	–	–
Position 2X[n].Measured Value	Output.Array.Position2.X[n]	Signed	5	3	–	X
Position 2X[n].Absolute Measured Value	Output.Array.Position2.X[n].Abs	Signed	5	3	–	–
Position 2Y[n].Measured Value	Output.Array.Position2.Y[n]	Signed	5	3	–	Y
Position 2Y[n].Absolute Measured Value	Output.Array.Position2.Y[n].Abs	Signed	5	3	–	–
Angle 2[n].Measured Value	Output.Array.Position2.Angle[n]	Unsigned	3	3	–	–
Angle 2[n].Absolute Measured Value	Output.Array.Position2.Angle[n].Abs	Unsigned	3	3	–	–
Distance 2[n].Measured Value	Output.Array.Distance2[n]	Unsigned	5	3	–	L
Distance 2[n].Absolute Measured Value	Output.Array.Distance2[n].Abs	Unsigned	5	3	–	–
Intensity 2[n].Measured Value	Output.Array.Intensity2[n]	Unsigned	3	3	–	–

Profile Position

#O099

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Number of Segments	Output.Segments	Unsigned	5	0	✓	-
Number of Detected Segments	Output.DetectedSegments	Unsigned	5	0	✓	-
Number of Detected Segments.Judged Value OK	Output.DetectedSegments.Pass	Unsigned	1	0	-	-
Number of Detected Segments.Judged Value Fail	Output.DetectedSegments.Fail	Unsigned	1	0	-	-
Number of Detected Edges	Output.EdgeCount	Unsigned	5	0	-	-
Number of Detected Edges Maximum	Output.EdgeCount.Maximum	Unsigned	5	0	-	-
Number of Detected Edges Minimum	Output.EdgeCount.Minimum	Unsigned	5	0	-	-
Position X	Output.Position.X	Signed	5	3	-	X
Position X.Absolute Measured Value	Output.Position.X.Abs	Signed	5	3	-	-
Position X Maximum	Output.Position.MaxX	Signed	5	3	-	X
Position X Maximum.Absolute Measured Value	Output.Position.MaxX.Abs	Signed	5	3	-	-
Position X Average	Output.Position.AverageX	Signed	5	3	-	X
Position X Average.Absolute Measured Value	Output.Position.AverageX.Abs	Signed	5	3	-	-
Position X Minimum	Output.Position.MinX	Signed	5	3	-	X
Position X Minimum.Absolute Measured Value	Output.Position.MinX.Abs	Signed	5	3	-	-
Position Y	Output.Position.Y	Signed	5	3	-	Y
Position Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	5	3	-	-
Position Y Maximum	Output.Position.MaxY	Signed	5	3	-	Y
Position Y Maximum.Absolute Measured Value	Output.Position.MaxY.Abs	Signed	5	3	-	-
Position Y Average	Output.Position.AverageY	Signed	5	3	-	Y
Position Y Average.Absolute Measured Value	Output.Position.AverageY.Abs	Signed	5	3	-	-
Position Y Minimum	Output.Position.MinY	Signed	5	3	-	Y
Position Y Minimum.Absolute Measured Value	Output.Position.MinY.Abs	Signed	5	3	-	-
Angle	Output.Position.Angle	Signed	3	3	-	-
Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	-	-
Angle Maximum	Output.Position.MaxAngle	Signed	3	3	-	-
Angle Maximum.Absolute Measured Value	Output.Position.MaxAngle.Abs	Signed	3	3	-	-
Angle Minimum	Output.Position.MinAngle	Signed	3	3	-	-
Angle Minimum.Absolute Measured Value	Output.Position.MinAngle.Abs	Signed	3	3	-	-
Distance	Output.Distance	Unsigned	5	3	✓	L
Distance.Absolute Measured Value	Output.Distance.Abs	Unsigned	5	3	-	-
Distance.Judged Value OK	Output.Distance.Pass	Unsigned	1	0	-	-
Distance.Judged Value Fail	Output.Distance.Fail	Unsigned	1	0	-	-
Distance Maximum	Output.MaxDistance	Unsigned	5	3	✓	L

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Distance Maximum.Absolute Measured Value	Output.MaxDistance.Abs	Unsigned	5	3	-	-
Distance Maximum.Judged Value OK	Output.MaxDistance.Pass	Unsigned	1	0	-	-
Distance Maximum.Judged Value Fail	Output.MaxDistance.Fail	Unsigned	1	0	-	-
Distance Minimum	Output.MinDistance	Unsigned	5	3	✓	L
Distance Minimum.Absolute Measured Value	Output.MinDistance.Abs	Unsigned	5	3	-	-
Distance Minimum.Judged Value OK	Output.MinDistance.Pass	Unsigned	1	0	-	-
Distance Minimum.Judged Value Fail	Output.MinDistance.Fail	Unsigned	1	0	-	-
Distance Average	Output.Distance.Average	Unsigned	5	3	-	L
Distance Average.Absolute Measured Value	Output.Distance.Average.Abs	Unsigned	5	3	-	-
Radius	Output.Radius	Unsigned	5	3	✓	L
Radius.Absolute Measured Value	Output.Radius.Abs	Unsigned	5	3	-	-
Radius.Judged Value OK	Output.Radius.Pass	Unsigned	1	0	-	-
Radius.Judged Value Fail	Output.Radius.Fail	Unsigned	1	0	-	-
Radius Maximum	Output.MaxRadius	Unsigned	5	3	✓	L
Radius Maximum.Absolute Measured Value	Output.MaxRadius.Abs	Unsigned	5	3	-	-
Radius Maximum.Judged Value OK	Output.MaxRadius.Pass	Unsigned	1	0	-	-
Radius Maximum.Judged Value Fail	Output.MaxRadius.Fail	Unsigned	1	0	-	-
Radius Minimum	Output.MinRadius	Unsigned	5	3	✓	L
Radius Minimum.Absolute Measured Value	Output.MinRadius.Abs	Unsigned	5	3	-	-
Radius Minimum.Judged Value OK	Output.MinRadius.Pass	Unsigned	1	0	-	-
Radius Minimum.Judged Value Fail	Output.MinRadius.Fail	Unsigned	1	0	-	-
Radius Average	Output.Radius.Average	Unsigned	5	3	-	L
Radius Average.Absolute Measured Value	Output.Radius.Average.Abs	Unsigned	5	3	-	-
Intensity	Output.EdgeIntensity	Unsigned	3	3	-	-
Intensity Maximum	Output.EdgeIntensity.Maximum	Unsigned	3	3	-	-
Intensity Minimum	Output.EdgeIntensity.Minimum	Unsigned	3	3	-	-
Detected Circle Center X	Output.DetectedCircle.Center.X	Signed	5	3	✓	X
Detected Circle Center X.Absolute Measured Value	Output.DetectedCircle.Center.X.Abs	Signed	5	3	-	-
Detected Circle Center X.Judged Value OK	Output.DetectedCircle.Center.X.Pass	Unsigned	1	0	-	-
Detected Circle Center X.Judged Value Fail	Output.DetectedCircle.Center.X.Fail	Unsigned	1	0	-	-
Detected Circle Center Y	Output.DetectedCircle.Center.Y	Signed	5	3	✓	Y
Detected Circle Center Y.Absolute Measured Value	Output.DetectedCircle.Center.Y.Abs	Signed	5	3	-	-
Detected Circle Center Y.Judged Value OK	Output.DetectedCircle.Center.Y.Pass	Unsigned	1	0	-	-
Detected Circle Center Y.Judged Value Fail	Output.DetectedCircle.Center.Y.Fail	Unsigned	1	0	-	-
Detected Circle Radius	Output.DetectedCircle.Radius	Unsigned	5	3	✓	L
Detected Circle Radius.Absolute Measured Value	Output.DetectedCircle.Radius.Abs	Unsigned	5	3	-	-
Detected Circle Radius.Judged Value OK	Output.DetectedCircle.Radius.Pass	Unsigned	1	0	-	-

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detected Circle Radius.Judged Value Fail	Output.DetectedCircle.Radius.Fail	Unsigned	1	0	-	-
Detected Circle Diameter	Output.DetectedCircle.Diameter	Unsigned	5	3	✓	L
Detected Circle Diameter.Absolute Measured Value	Output.DetectedCircle.Diameter.Abs	Unsigned	5	3	-	-
Detected Circle Diameter.Judged Value OK	Output.DetectedCircle.Diameter.Pass	Unsigned	1	0	-	-
Detected Circle Diameter.Judged Value Fail	Output.DetectedCircle.Diameter.Fail	Unsigned	1	0	-	-
Detected Circle Count	Output.DetectedCircle.Count	Unsigned	1	0	✓	-
Detected Circle Count.Judged Value OK	Output.DetectedCircle.Count.Pass	Unsigned	1	0	-	-
Detected Circle Count.Judged Value Fail	Output.DetectedCircle.Count.Fail	Unsigned	1	0	-	-
Detected Line Center X	Output.DetectedLine.Center.X	Signed	5	3	✓	X
Detected Line Center X.Absolute Measured Value	Output.DetectedLine.Center.X.Abs	Signed	5	3	-	-
Detected Line Center Y	Output.DetectedLine.Center.Y	Signed	5	3	✓	Y
Detected Line Center Y.Absolute Measured Value	Output.DetectedLine.Center.Y.Abs	Signed	5	3	-	-
Detected Line Angle (+/-180°)	Output.DetectedLine.Angle	Signed	3	3	✓	-
Detected Line Angle (+/-180°).Absolute Measured Value	Output.DetectedLine.Angle.Abs	Signed	3	3	-	-
Detected Line Angle (+/-180°).Judged Value OK	Output.DetectedLine.Angle.Pass	Unsigned	1	0	-	-
Detected Line Angle (+/-180°).Judged Value Fail	Output.DetectedLine.Angle.Fail	Unsigned	1	0	-	-
Detected Line X	Output.DetectionLine.Position.X	Signed	5	3	✓	X
Detected Line X.Absolute Measured Value	Output.DetectionLine.Position.X.Abs	Signed	5	3	-	-
Detected Line Y	Output.DetectionLine.Position.Y	Signed	5	3	✓	Y
Detected Line Y.Absolute Measured Value	Output.DetectionLine.Position.Y.Abs	Signed	5	3	-	-
Detected Line Angle	Output.DetectionLine.Position.Angle	Signed	3	3	✓	-
Detected Line Angle.Absolute Measured Value	Output.DetectionLine.Position.Angle.Abs	Signed	3	3	-	-
Detected Line Angle.Judged Value OK	Output.DetectionLine.Position.Angle.Pass	Unsigned	1	0	-	-
Detected Line Angle.Judged Value Fail	Output.DetectionLine.Position.Angle.Fail	Unsigned	1	0	-	-
Detected Line Count	Output.DetectedLine.Count	Unsigned	1	0	✓	-
Detected Line Count.Judged Value OK	Output.DetectedLine.Count.Pass	Unsigned	1	0	-	-
Detected Line Count.Judged Value Fail	Output.DetectedLine.Count.Fail	Unsigned	1	0	-	-
Detected Line X1	Output.DetectionLine.Point1.Position.X	Signed	5	3	-	X
Detected Line X1.Absolute Measured Value	Output.DetectionLine.Point1.Position.X.Abs	Signed	5	3	-	-
Detected Line Y1	Output.DetectionLine.Point1.Position.Y	Signed	5	3	-	Y
Detected Line Y1.Absolute Measured Value	Output.DetectionLine.Point1.Position.Y.Abs	Signed	5	3	-	-
Detected Line X2	Output.DetectionLine.Point2.Position.X	Signed	5	3	-	X
Detected Line X2.Absolute Measured Value	Output.DetectionLine.Point2.Position.X.Abs	Signed	5	3	-	-
Detected Line Y2	Output.DetectionLine.Point2.Position.Y	Signed	5	3	-	Y
Detected Line Y2.Absolute Measured Value	Output.DetectionLine.Point2.Position.Y.Abs	Signed	5	3	-	-
Detected Line ρ	Output.DetectedLine.Rho	Signed	5	3	-	L

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
ρ of Detected Line.Absolute Measured Value	Output.DetectedLine.Rho.Abs	Signed	5	3	-	-
Detected Line θ	Output.DetectedLine.Theta	Signed	5	3	-	-
θ of Detected Line.Absolute Measured Value	Output.DetectedLine.Theta.Abs	Signed	5	3	-	-
Maximum Segment No.	Output.SegmentNumber.Maximum	Unsigned	5	0	-	-
Minimum Segment No.	Output.SegmentNumber.Minimum	Unsigned	5	0	-	-
Number of Detected Edges[n]	Output.Array.EdgeCount[n]	Unsigned	5	0	-	-
Position X[n]	Output.Array.Position.X[n]	Signed	5	3	-	X
Position X[n].Absolute Measured Value	Output.Array.Position.X[n].Abs	Signed	5	3	-	-
Position Y[n]	Output.Array.Position.Y[n]	Signed	5	3	-	Y
Position Y[n].Absolute Measured Value	Output.Array.Position.Y[n].Abs	Signed	5	3	-	-
Angle[n]	Output.Array.Position.Angle[n]	Signed	3	3	-	-
Angle[n].Absolute Measured Value	Output.Array.Position.Angle[n].Abs	Signed	3	3	-	-
Distance[n]	Output.Array.Distance[n]	Unsigned	5	3	✓	L
Distance[n].Absolute Measured Value	Output.Array.Distance[n].Abs	Unsigned	5	3	-	-
Radius[n]	Output.Array.Radius[n]	Unsigned	5	3	✓	L
Radius[n].Absolute Measured Value	Output.Array.Radius[n].Abs	Unsigned	5	3	-	-
Intensity[n]	Output.Array.EdgeIntensity[n]	Unsigned	3	3	-	-

Profile Width

#O100

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Number of Segments	Output.Segments	Unsigned	5	0	✓	–
Number of Detected Segments	Output.DetectedSegments	Unsigned	5	0	✓	–
Number of Detected Segments.Judged Value OK	Output.DetectedSegments.Pass	Unsigned	1	0	–	–
Number of Detected Segments.Judged Value Fail	Output.DetectedSegments.Fail	Unsigned	1	0	–	–
Pair Count	Output.Count	Unsigned	5	0	–	–
Pair Count (Maximum)	Output.MaxCount	Unsigned	5	0	–	–
Pair Count (Minimum)	Output.MinCount	Unsigned	5	0	–	–
Edge Width	Output.Width	Unsigned	5	3	✓	L
Edge Width.Absolute Measured Value	Output.Width.Abs	Unsigned	5	3	–	–
Edge Width.Judged Value OK	Output.Width.Pass	Unsigned	1	0	–	–
Edge Width.Judged Value Fail	Output.Width.Fail	Unsigned	1	0	–	–
Edge Width (Maximum)	Output.MaxWidth	Unsigned	5	3	✓	L
Edge Width (Maximum).Absolute Measured Value	Output.MaxWidth.Abs	Unsigned	5	3	–	–
Edge Width (Maximum).Judged Value OK	Output.MaxWidth.Pass	Unsigned	1	0	–	–
Edge Width (Maximum).Judged Value Fail	Output.MaxWidth.Fail	Unsigned	1	0	–	–
Edge Width (Minimum)	Output.MinWidth	Unsigned	5	3	✓	L
Edge Width (Minimum).Absolute Measured Value	Output.MinWidth.Abs	Unsigned	5	3	–	–
Edge Width (Minimum).Judged Value OK	Output.MinWidth.Pass	Unsigned	1	0	–	–
Edge Width(Minimum).Judged Value Fail	Output.MinWidth.Fail	Unsigned	1	0	–	–
Edge Width (Average)	Output.AverageWidth	Unsigned	5	3	–	L
Edge Width (Average).Absolute Measured Value	Output.AverageWidth.Abs	Unsigned	5	3	–	–
Peak-to-Peak Width (Maximum)	Output.MaxPeakToPeakWidth	Signed	5	3	✓	L
Peak-to-Peak Width (Maximum).Absolute Measured Value	Output.MaxPeakToPeakWidth.Abs	Signed	5	3	–	–
Peak-to-Peak Width (Maximum).Judged Value OK	Output.MaxPeakToPeakWidth.Pass	Unsigned	1	0	–	–
Peak-to-Peak Width (Maximum).Judged Value Fail	Output.MaxPeakToPeakWidth.Fail	Unsigned	1	0	–	–
Peak-to-Peak Width (Minimum)	Output.MinPeakToPeakWidth	Signed	5	3	✓	L
Peak-to-Peak Width (Minimum).Absolute Measured Value	Output.MinPeakToPeakWidth.Abs	Signed	5	3	–	–
Peak-to-Peak Width (Minimum).Judged Value OK	Output.MinPeakToPeakWidth.Pass	Unsigned	1	0	–	–
Peak-to-Peak Width (Minimum).Judged Value Fail	Output.MinPeakToPeakWidth.Fail	Unsigned	1	0	–	–
Pair Count[n]	Output.Array.EdgeCount[n]	Unsigned	5	0	–	–
Edge Width[n]	Output.Array.Width[n]	Unsigned	5	3	✓	L

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Edge Width[n].Absolute Measured Value	Output.Array.Width[n].Abs	Unsigned	5	3	–	–

Profile Defect

#O101

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Number of Segments	Output.Segments	Unsigned	5	0	✓	–
Number of Detected Segments	Output.DetectedSegments	Unsigned	5	0	✓	–
Number of Detected Segments.Judged Value OK	Output.DetectedSegments.Pass	Unsigned	1	0	–	–
Number of Detected Segments.Judged Value Fail	Output.DetectedSegments.Fail	Unsigned	1	0	–	–
Defect Count	Output.Count	Unsigned	5	0	✓	–
Defect Count.Judged Value OK	Output.Count.Pass	Unsigned	1	0	–	–
Defect Count.Judged Value Fail	Output.Count.Fail	Unsigned	1	0	–	–
Defect Count (+)	Output.Count.Positive	Unsigned	5	0	✓	–
Defect Count (+).Judged Value OK	Output.Count.Positive.Pass	Unsigned	1	0	–	–
Defect Count (+).Judged Value Fail	Output.Count.Positive.Fail	Unsigned	1	0	–	–
Defect Count (-)	Output.Count.Negative	Unsigned	5	0	✓	–
Defect Count (-).Judged Value OK	Output.Count.Negative.Pass	Unsigned	1	0	–	–
Defect Count (-).Judged Value Fail	Output.Count.Negative.Fail	Unsigned	1	0	–	–
Total Defect Size	Output.TotalDefectSize	Unsigned	7	3	✓	–
Total Defect Size.Judged Value OK	Output.TotalDefectSize.Pass	Unsigned	1	0	–	–
Total Defect Size.Judged Value Fail	Output.TotalDefectSize.Fail	Unsigned	1	0	–	–
Total Defect Level	Output.TotalDefectLevel	Unsigned	5	3	✓	–
Total Defect Width	Output.TotalDefectWidth	Unsigned	5	0	✓	–
Judged Label Defect Size	Output.DefectSize	Unsigned	7	3	✓	–
Judged Label Defect Size.Judged Value OK	Output.DefectSize.Pass	Unsigned	1	0	–	–
Judged Label Defect Size.Judged Value Fail	Output.DefectSize.Fail	Unsigned	1	0	–	–
Judged Label Defect Size (Maximum)	Output.MaxDefectSize	Unsigned	7	3	✓	–
Judged Label Defect Size (Maximum).Judged Value OK	Output.MaxDefectSize.Pass	Unsigned	1	0	–	–
Judged Label Defect Size (Maximum).Judged Value Fail	Output.MaxDefectSize.Fail	Unsigned	1	0	–	–
Judged Label Defect Size (Minimum)	Output.MinDefectSize	Unsigned	7	3	✓	–
Judged Label Defect Size (Minimum).Judged Value OK	Output.MinDefectSize.Pass	Unsigned	1	0	–	–
Judged Label Defect Size (Minimum).Judged Value Fail	Output.MinDefectSize.Fail	Unsigned	1	0	–	–
Judged Label Defect Level	Output.DefectLevel	Unsigned	5	3	✓	–
Judged Label Defect Level (Maximum)	Output.MaxDefectLevel	Unsigned	5	3	✓	–
Judged Label Defect Level (Minimum)	Output.MinDefectLevel	Unsigned	5	3	✓	–
Judged Label Defect Width	Output.DefectWidth	Unsigned	5	0	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Judged Label Defect Width (Maximum)	Output.MaxDefectWidth	Unsigned	5	0	✓	–
Judged Label Defect Width (Minimum)	Output.MinDefectWidth	Unsigned	5	0	✓	–
Judged Label Defect Position X	Output.DefectPosition.X	Signed	5	3	✓	X
Judged Label Defect Position X.Absolute Measured Value	Output.DefectPosition.X.Abs	Signed	5	3	–	–
Judged Label Defect Position X.Judged Value OK	Output.DefectPosition.X.Pass	Unsigned	1	0	–	–
Judged Label Defect Position X.Judged Value Fail	Output.DefectPosition.X.Fail	Unsigned	1	0	–	X
Judged Label Defect Position X (Maximum)	Output.DefectPosition.MaxX	Signed	5	3	✓	–
Judged Label Defect Position X (Maximum).Judged Value OK	Output.DefectPosition.MaxX.Pass	Unsigned	1	0	–	–
Judged Label Defect Position X (Maximum).Judged Value Fail	Output.DefectPosition.MaxX.Fail	Unsigned	1	0	–	X
Judged Label Defect Position X (Minimum)	Output.DefectPosition.MinX	Signed	5	3	✓	–
Judged Label Defect Position X (Minimum).Judged Value OK	Output.DefectPosition.MinX.Pass	Unsigned	1	0	–	–
Judged Label Defect Position X (Minimum).Judged Value Fail	Output.DefectPosition.MinX.Fail	Unsigned	1	0	–	–
Judged Label Defect Position Y	Output.DefectPosition.Y	Signed	5	3	✓	Y
Judged Label Defect Position Y.Absolute Measured Value	Output.DefectPosition.Y.Abs	Signed	5	3	–	–
Judged Label Defect Position Y.Judged Value OK	Output.DefectPosition.Y.Pass	Unsigned	1	0	–	–
Judged Label Defect Position Y.Judged Value Fail	Output.DefectPosition.Y.Fail	Unsigned	1	0	–	–
Judged Label Defect Position Y (Maximum)	Output.DefectPosition.MaxY	Signed	5	3	✓	Y
Judged Label Defect Position Y (Maximum).Judged Value OK	Output.DefectPosition.MaxY.Pass	Unsigned	1	0	–	–
Judged Label Defect Position Y (Maximum).Judged Value Fail	Output.DefectPosition.MaxY.Fail	Unsigned	1	0	–	–
Judged Label Defect Position Y (Minimum)	Output.DefectPosition.MinY	Signed	5	3	✓	Y
Judged Label Defect Position Y (Minimum).Judged Value OK	Output.DefectPosition.MinY.Pass	Unsigned	1	0	–	–
Judged Label Defect Position Y (Minimum).Judged Value Fail	Output.DefectPosition.MinY.Fail	Unsigned	1	0	–	–
Defect Peak Position X	Output.DefectTopPosition.X	Signed	5	3	–	X
Defect Peak Position Y	Output.DefectTopPosition.Y	Signed	5	3	–	Y
Reference Line X1	Output.ReferenceLine.X1	Signed	5	3	–	X
Reference Line X1.Absolute Measured Value	Output.ReferenceLine.X1.Abs	Signed	5	3	–	–
Reference Line Y1	Output.ReferenceLine.Y1	Signed	5	3	–	Y
Reference Line Y1.Absolute Measured Value	Output.ReferenceLine.Y1.Abs	Signed	5	3	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Reference Line X2	Output.ReferenceLine.X2	Signed	5	3	–	X
Reference Line X2.Absolute Measured Value	Output.ReferenceLine.X2.Abs	Signed	5	3	–	–
Reference Line Y2	Output.ReferenceLine.Y2	Signed	5	3	–	Y
Reference Line Y2.Absolute Measured Value	Output.ReferenceLine.Y2.Abs	Signed	5	3	–	–
ρ of Reference Line	Output.ReferenceLine.Rho	Signed	5	3	–	–
ρ of Reference Line.Absolute Measured Value	Output.ReferenceLine.Rho.Abs	Signed	5	3	–	–
θ of Reference Line	Output.ReferenceLine.Theta	Signed	5	3	–	–
θ of Reference Line.Absolute Measured Value	Output.ReferenceLine.Theta.Abs	Signed	5	3	–	–
Reference Line Center X	Output.ReferenceLine.Center.X	Signed	5	3	–	X
Reference Line Center X.Absolute Measured Value	Output.ReferenceLine.Center.X.Abs	Signed	5	3	–	-
Reference Line Center Y	Output.ReferenceLine.Center.Y	Signed	5	3	–	Y
Reference Line Center Y.Absolute Measured Value	Output.ReferenceLine.Center.Y.Abs	Signed	5	3	–	-
Detected Line Angle (+/-180°)	Output.ReferenceLine.Angle	Signed	3	3	–	-
Detected Line Angle (+/-180°).Absolute Measured Value	Output.ReferenceLine.Angle.Abs	Signed	3	3	–	-
Reference Line X	Output.ReferenceLine.Position.X	Signed	5	3	–	X
Reference Line X.Absolute Measured Value	Output.ReferenceLine.Position.X.Abs	Signed	5	3	–	-
Reference Line Y	Output.ReferenceLine.Position.Y	Signed	5	3	–	Y
Reference Line Y.Absolute Measured Value	Output.ReferenceLine.Position.Y.Abs	Signed	5	3	–	-
Reference Line Angle	Output.ReferenceLine.Position.Angle	Signed	3	3	–	-
Reference Line Angle.Absolute Measured Value	Output.ReferenceLine.Position.Angle.Abs	Signed	3	3	–	-
Reference Circle Radius	Output.ReferenceCircle.Radius	Unsigned	6	3	✓	L
Reference Circle Radius.Absolute Measured Value	Output.ReferenceCircle.Radius.Abs	Unsigned	6	3	–	–
Reference Circle Center X	Output.ReferenceCircle.Center.X	Signed	6	3	–	–
Reference Circle Center X.Absolute Measured Value	Output.ReferenceCircle.Center.X.Abs	Signed	6	3	–	–
Reference Circle Center Y	Output.ReferenceCircle.Center.Y	Signed	6	3	✓	Y
Reference Circle Center Y.Absolute Measured Value	Output.ReferenceCircle.Center.Y.Abs	Signed	6	3	–	–
Reference Oval Radius 1	Output.ReferenceOval.Radius1	Unsigned	6	3	✓	L
Reference Oval Radius 1.Absolute Measured Value	Output.ReferenceOval.Radius1.Abs	Unsigned	6	3	–	–
Reference Oval Radius 2	Output.ReferenceOval.Radius2	Unsigned	6	3	✓	L
Reference Oval Radius 2.Absolute Measured Value	Output.ReferenceOval.Radius2.Abs	Unsigned	6	3	–	–
Reference Oval Center X	Output.ReferenceOval.Center.X	Signed	6	3	✓	X

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Reference Oval Center X.Absolute Measured Value	Output.ReferenceOval.Center.X.Abs	Signed	6	3	–	–
Reference Oval Center Y	Output.ReferenceOval.Center.Y	Signed	6	3	✓	Y
Reference Oval Center Y.Absolute Measured Value	Output.ReferenceOval.Center.Y.Abs	Signed	6	3	–	–
Reference Oval Rotation Angle	Output.ReferenceOval.Angle	Signed	6	3	✓	–
Reference Oval Rotation Angle.Absolute Measured Value	Output.ReferenceOval.Angle.Abs	Signed	6	3	–	–
Edge Position X	Output.EdgePosition.X	Signed	5	3	–	X
Edge Position Y	Output.EdgePosition.Y	Signed	5	3	–	Y
Defect Size[n]	Output.Array.DefectSize[n]	Unsigned	7	3	✓	–
Defect Level[n]	Output.Array.DefectLevel[n]	Unsigned	5	3	✓	–
Defect Width[n]	Output.Array.DefectWidth[n]	Unsigned	5	0	✓	–
Defect Position X[n]	Output.Array.DefectPosition.X[n]	Signed	5	3	✓	X
Defect Position X[n].Absolute Measured Value	Output.Array.DefectPosition.X[n].Abs	Signed	5	3	–	–
Defect Position Y[n]	Output.Array.DefectPosition.Y[n]	Signed	5	3	✓	Y
Defect Position Y[n].Absolute Measured Value	Output.Array.DefectPosition.Y[n].Abs	Signed	5	3	–	–
Defect Angle[n]	Output.Array.DefectPosition.Angle[n]	Signed	3	3	–	–
Defect Angle[n].Absolute Measured Value	Output.Array.DefectPosition.Angle[n].Abs	Signed	3	3	–	–
Defect Peak Position X[n]	Output.Array.DefectTopPosition.X[n]	Signed	5	3	–	X
Defect Peak Position X[n].Absolute Measured Value	Output.Array.DefectTopPosition.X[n].Abs	Signed	5	3	–	–
Defect Peak Position Y[n]	Output.Array.DefectTopPosition.Y[n]	Signed	5	3	–	Y
Defect Peak Position Y[n].Absolute Measured Value	Output.Array.DefectTopPosition.Y[n].Abs	Signed	5	3	–	–
Edge Position X[n]	Output.Array.EdgePosition.X[n]	Signed	5	3	–	X
Edge Position X[n].Absolute Measured Value	Output.Array.EdgePosition.X[n].Abs	Signed	5	3	–	–
Edge Position Y[n]	Output.Array.EdgePosition.Y[n]	Signed	5	3	–	Y
Edge Position Y[n].Absolute Measured Value	Output.Array.EdgePosition.Y[n].Abs	Signed	5	3	–	–

Defect

#O102

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detected Defect Level	Output.DetectedDefectLevel	Unsigned	3	0	✓	–
Total Defect Area	Output.TotalDefectArea	Unsigned	8	0	✓	–
Total Defect Area.Judged Value OK	Output.TotalDefectArea.Pass	Unsigned	1	0	–	–
Total Defect Area.Judged Value Fail	Output.TotalDefectArea.Fail	Unsigned	1	0	–	–
Groups	Output.Count	Unsigned	2	0	✓	–
Groups.Judged Value OK	Output.Count.Pass	Unsigned	1	0	–	–
Groups.Judged Value Fail	Output.Count.Fail	Unsigned	1	0	–	–
Defect Area	Output.DefectArea	Unsigned	8	0	✓	–
Defect Area.Judged Value OK	Output.DefectArea.Pass	Unsigned	1	0	–	–
Defect Area.Judged Value Fail	Output.DefectArea.Fail	Unsigned	1	0	–	–
Area	Output.Area	Unsigned	8	0	–	–
Center of Gravity X	Output.Position.X	Signed	5	3	✓	X
Center of Gravity X.Absolute Measured Value	Output.Position.X.Abs	Signed	5	3	–	–
Center of Gravity X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Center of Gravity X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Center of Gravity Y	Output.Position.Y	Signed	5	3	✓	Y
Center of Gravity Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	5	3	–	–
Center of Gravity Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Center of Gravity Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Major Axis Angle	Output.Position.Angle	Signed	3	3	–	–
Major Axis Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	–	–
Feret Diameter X	Output.FeretDiameter.X	Signed	5	3	–	L
Feret Diameter X.Absolute Measured Value	Output.FeretDiameter.X.Abs	Signed	5	3	–	–
Feret Diameter Y	Output.FeretDiameter.Y	Signed	5	3	–	L
Feret Diameter Y.Absolute Measured Value	Output.FeretDiameter.Y.Abs	Signed	5	3	–	–
Perimeter	Output.Perimeter	Unsigned	8	0	–	L
Perimeter.Absolute Measured Value	Output.Perimeter.Abs	Unsigned	8	0	–	–
Roundness	Output.Roundness	Unsigned	1	3	–	–
Bounding Rectangle Upper Left X	Output.FeretDiameterBox.UpperLeft.X	Signed	5	3	–	X
Bounding Rectangle Upper Left X.Absolute Measured Value	Output.FeretDiameterBox.UpperLeft.X.Abs	Signed	5	3	–	–
Bounding Rectangle Upper Left Y	Output.FeretDiameterBox.UpperLeft.Y	Signed	5	3	–	Y
Bounding Rectangle Upper Left Y.Absolute Measured Value	Output.FeretDiameterBox.UpperLeft.Y.Abs	Signed	5	3	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Bounding Rectangle Lower Left X	Output.FeretDiameterBox.LowerLeft.X	Signed	5	3	–	X
Bounding Rectangle Lower Left X.Absolute Measured Value	Output.FeretDiameterBox.LowerLeft.X.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left Y	Output.FeretDiameterBox.LowerLeft.Y	Signed	5	3	–	Y
Bounding Rectangle Lower Left Y.Absolute Measured Value	Output.FeretDiameterBox.LowerLeft.Y.Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right X	Output.FeretDiameterBox.UpperRight.X	Signed	5	3	–	X
Bounding Rectangle Upper Right X.Absolute Measured Value	Output.FeretDiameterBox.UpperRight.X.Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right Y	Output.FeretDiameterBox.UpperRight.Y	Signed	5	3	–	Y
Bounding Rectangle Upper Right Y.Absolute Measured Value	Output.FeretDiameterBox.UpperRight.Y.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right X	Output.FeretDiameterBox.LowerRight.X	Signed	5	3	–	X
Bounding Rectangle Lower Right X.Absolute Measured Value	Output.FeretDiameterBox.LowerRight.X.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right Y	Output.FeretDiameterBox.LowerRight.Y	Signed	5	3	–	Y
Bounding Rectangle Lower Right Y.Absolute Measured Value	Output.FeretDiameterBox.LowerRight.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left X	Output.AxesBox.UpperLeft.X	Signed	5	3	–	X
Major Axis Bounding Rectangle Upper Left X.Absolute Measured Value	Output.AxesBox.UpperLeft.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left Y	Output.AxesBox.UpperLeft.Y	Signed	5	3	–	Y
Major Axis Bounding Rectangle Upper Left Y.Absolute Measured Value	Output.AxesBox.UpperLeft.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left X	Output.AxesBox.LowerLeft.X	Signed	5	3	–	X
Major Axis Bounding Rectangle Lower Left X.Absolute Measured Value	Output.AxesBox.LowerLeft.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left Y	Output.AxesBox.LowerLeft.Y	Signed	5	3	–	Y
Major Axis Bounding Rectangle Lower Left Y.Absolute Measured Value	Output.AxesBox.LowerLeft.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right X	Output.AxesBox.UpperRight.X	Signed	5	3	–	X
Major Axis Bounding Rectangle Upper Right X.Absolute Measured Value	Output.AxesBox.UpperRight.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right Y	Output.AxesBox.UpperRight.Y	Signed	5	3	–	Y
Major Axis Bounding Rectangle Upper Right Y.Absolute Measured Value	Output.AxesBox.UpperRight.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right X	Output.AxesBox.LowerRight.X	Signed	5	3	–	X
Major Axis Bounding Rectangle Lower Right X.Absolute Measured Value	Output.AxesBox.LowerRight.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right Y	Output.AxesBox.LowerRight.Y	Signed	5	3	–	Y

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Major Axis Bounding Rectangle Lower Right Y.Absolute Measured Value	Output.AxesBox.LowerRight.Y.Abs	Signed	5	3	–	–
Major Axis	Output.MajorAxis	Unsigned	5	3	–	L
Major Axis.Absolute Measured Value	Output.MajorAxis.Abs	Unsigned	5	3	–	–
Minor Axis	Output.MinorAxis	Unsigned	5	3	–	L
Minor Axis.Absolute Measured Value	Output.MinorAxis.Abs	Unsigned	5	3	–	–
Axes Ratio	Output.AxesRatio	Unsigned	5	3	–	–
Oval Major Axis	Output.DistOvalMajorAxis	Unsigned	5	3	–	L
Oval Major Axis.Absolute Measured Value	Output.DistOvalMajorAxis.Abs	Unsigned	5	3	–	–
Oval Minor Axis	Output.DistOvalMinorAxis	Unsigned	5	3	–	L
Oval Minor Axis.Absolute Measured Value	Output.DistOvalMinorAxis.Abs	Unsigned	5	3	–	–
Aspect Ratio	Output.DistOvalAspectRatio	Unsigned	5	3	–	–
Defect Area[n]	Output.Array.DefectArea[n]	Unsigned	8	0	✓	–
Area[n]	Output.Array.Area[n]	Unsigned	8	0	✓	–
Center of Gravity X[n]	Output.Array.Position.X[n]	Signed	5	3	✓	X
Center of Gravity X[n].Absolute Measured Value	Output.Array.Position.X[n].Abs	Signed	5	3	–	–
Center of Gravity Y[n]	Output.Array.Position.Y[n]	Signed	5	3	✓	Y
Center of Gravity Y[n].Absolute Measured Value	Output.Array.Position.Y[n].Abs	Signed	5	3	–	–
Major Axis Angle[n]	Output.Array.MajorAxis.Angle[n]	Signed	3	3	✓	–
Major Axis Angle[n].Absolute Measured Value	Output.Array.MajorAxis.Angle[n].Abs	Signed	3	3	–	–
Feret Diameter X[n]	Output.Array.FeretDiameter.X[n]	Signed	5	3	✓	L
Feret Diameter X[n].Absolute Measured Value	Output.Array.FeretDiameter.X[n].Abs	Signed	5	3	–	–
Feret Diameter Y[n]	Output.Array.FeretDiameter.Y[n]	Signed	5	3	✓	L
Feret Diameter Y[n].Absolute Measured Value	Output.Array.FeretDiameter.Y[n].Abs	Signed	5	3	–	–
Perimeter[n]	Output.Array.Perimeter[n]	Unsigned	8	0	✓	L
Perimeter[n].Absolute Measured Value	Output.Array.Perimeter[n].Abs	Unsigned	8	0	–	–
Roundness[n]	Output.Array.Roundness[n]	Unsigned	1	3	✓	–
Bounding Rectangle Upper Left X[n]	Output.Array.FeretDiameterBox.UpperLeft.X[n]	Signed	5	3	✓	X
Bounding Rectangle Upper Left X[n].Absolute Measured Value	Output.Array.FeretDiameterBox.UpperLeft.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Upper Left Y[n]	Output.Array.FeretDiameterBox.UpperLeft.Y[n]	Signed	5	3	✓	Y
Bounding Rectangle Upper Left Y[n].Absolute Measured Value	Output.Array.FeretDiameterBox.UpperLeft.Y[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left X[n]	Output.Array.FeretDiameterBox.LowerLeft.X[n]	Signed	5	3	✓	X
Bounding Rectangle Lower Left X[n].Absolute Measured Value	Output.Array.FeretDiameterBox.LowerLeft.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left Y[n]	Output.Array.FeretDiameterBox.LowerLeft.Y[n]	Signed	5	3	✓	Y

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Bounding Rectangle Lower Left Y[n].Absolute Measured Value	Output.Array.FeretDiameterBox.LowerLeft.Y[n].Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right X[n]	Output.Array.FeretDiameterBox.UpperRight.X[n]	Signed	5	3	✓	X
Bounding Rectangle Upper Right X[n].Absolute Measured Value	Output.Array.FeretDiameterBox.UpperRight.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right Y[n]	Output.Array.FeretDiameterBox.UpperRight.Y[n]	Signed	5	3	✓	Y
Bounding Rectangle Upper Right Y[n].Absolute Measured Value	Output.Array.FeretDiameterBox.UpperRight.Y[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right X[n]	Output.Array.FeretDiameterBox.LowerRight.X[n]	Signed	5	3	✓	X
Bounding Rectangle Lower Right X[n].Absolute Measured Value	Output.Array.FeretDiameterBox.LowerRight.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right Y[n]	Output.Array.FeretDiameterBox.LowerRight.Y[n]	Signed	5	3	✓	Y
Bounding Rectangle Lower Right Y[n].Absolute Measured Value	Output.Array.FeretDiameterBox.LowerRight.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left X[n]	Output.Array.AxesBox.UpperLeft.X[n]	Signed	5	3	✓	X
Major Axis Bounding Rectangle Upper Left X[n].Absolute Measured Value	Output.Array.AxesBox.UpperLeft.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left Y[n]	Output.Array.AxesBox.UpperLeft.Y[n]	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Upper Left Y[n].Absolute Measured Value	Output.Array.AxesBox.UpperLeft.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left X[n]	Output.Array.AxesBox.LowerLeft.X[n]	Signed	5	3	✓	X
Major Axis Bounding Rectangle Lower Left X[n].Absolute Measured Value	Output.Array.AxesBox.LowerLeft.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left Y[n]	Output.Array.AxesBox.LowerLeft.Y[n]	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Lower Left Y[n].Absolute Measured Value	Output.Array.AxesBox.LowerLeft.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right X[n]	Output.Array.AxesBox.UpperRight.X[n]	Signed	5	3	✓	X
Major Axis Bounding Rectangle Upper Right X[n].Absolute Measured Value	Output.Array.AxesBox.UpperRight.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right Y[n]	Output.Array.AxesBox.UpperRight.Y[n]	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Upper Right Y[n].Absolute Measured Value	Output.Array.AxesBox.UpperRight.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right X[n]	Output.Array.AxesBox.LowerRight.X[n]	Signed	5	3	✓	X
Major Axis Bounding Rectangle Lower Right X[n].Absolute Measured Value	Output.Array.AxesBox.LowerRight.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right Y[n]	Output.Array.AxesBox.LowerRight.Y[n]	Signed	5	3	✓	Y

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Major Axis Bounding Rectangle Lower Right Y[n].Absolute Measured Value	Output.Array.AxesBox.LowerRight.Y[n].Abs	Signed	5	3	–	–
Major Axis[n]	Output.Array.MajorAxis[n]	Unsigned	5	3	✓	L
Major Axis[n].Absolute Measured Value	Output.Array.MajorAxis[n].Abs	Unsigned	5	3	–	–
Minor Axis[n]	Output.Array.MinorAxis[n]	Unsigned	5	3	✓	L
Minor Axis[n].Absolute Measured Value	Output.Array.MinorAxis[n].Abs	Unsigned	5	3	–	–
Axes Ratio[n]	Output.Array.AxesRatio[n]	Unsigned	5	3	✓	–
Oval Major Axis[n]	Output.Array.DistOvalMajorAxis[n]	Unsigned	5	3	✓	L
Oval Major Axis[n].Absolute Measured Value	Output.Array.DistOvalMajorAxis[n].Abs	Unsigned	5	3	–	–
Oval Minor Axis[n]	Output.Array.DistOvalMinorAxis[n]	Unsigned	5	3	✓	L
Oval Minor Axis[n].Absolute Measured Value	Output.Array.DistOvalMinorAxis[n].Abs	Unsigned	5	3	–	–
Aspect Ratio.Absolute Measured Value	Output.Array.DistOvalAspectRatio[n]	Unsigned	5	3	✓	–

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Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Total Area	Output.TotalArea	Unsigned	8	0	✓	–
Total Area.Judged Value OK	Output.TotalArea.Pass	Unsigned	1	0	–	–
Total Area.Judged Value Fail	Output.TotalArea.Fail	Unsigned	1	0	–	–
Label Count	Output.Count	Unsigned	4	0	✓	–
Label Count.Judged Value OK	Output.Count.Pass	Unsigned	1	0	–	–
Label Count.Judged Value Fail	Output.Count.Fail	Unsigned	1	0	–	–
Center of Gravity X	Output.Position.X	Signed	5	3	✓	X
Center of Gravity X.Absolute Measured Value	Output.Position.X.Abs	Signed	5	3	–	–
Center of Gravity X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Center of Gravity X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Center of Gravity X Maximum	Output.Position.MaxX	Signed	5	3	✓	X
Center of Gravity X Maximum.Judged Value OK	Output.Position.MaxX.Pass	Unsigned	1	0	–	–
Center of Gravity X Maximum.Judged Value Fail	Output.Position.MaxX.Fail	Unsigned	1	0	–	–
Center of Gravity X Minimum	Output.Position.MinX	Signed	5	3	✓	X
Center of Gravity X Minimum.Judged Value OK	Output.Position.MinX.Pass	Unsigned	1	0	–	–
Center of Gravity X Minimum.Judged Value Fail	Output.Position.MinX.Fail	Unsigned	1	0	–	–
Center of Gravity Y	Output.Position.Y	Signed	5	3	✓	Y
Center of Gravity Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	5	3	–	–
Center of Gravity Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Center of Gravity Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Center of Gravity Y Maximum	Output.Position.MaxY	Signed	5	3	✓	Y
Center of Gravity Y Maximum.Judged Value OK	Output.Position.MaxY.Pass	Unsigned	1	0	–	–
Center of Gravity Y Maximum.Judged Value Fail	Output.Position.MaxY.Fail	Unsigned	1	0	–	–
Center of Gravity Y Minimum	Output.Position.MinY	Signed	5	3	✓	Y
Center of Gravity Y Minimum.Judged Value OK	Output.Position.MinY.Pass	Unsigned	1	0	–	–
Center of Gravity Y Minimum.Judged Value Fail	Output.Position.MinY.Fail	Unsigned	1	0	–	–
Major Axis Angle	Output.Position.Angle	Signed	3	3	✓	–
Major Axis Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	–	–
Major Axis Angle.Judged Value OK	Output.Position.Angle.Pass	Unsigned	1	0	–	–
Major Axis Angle.Judged Value Fail	Output.Position.Angle.Fail	Unsigned	1	0	–	–
Major Axis Angle Maximum	Output.Position.MaxAngle	Signed	3	3	✓	–
Major Axis Angle Maximum.Judged Value OK	Output.Position.MaxAngle.Pass	Unsigned	1	0	–	–
Major Axis Angle Maximum.Judged Value Fail	Output.Position.MaxAngle.Fail	Unsigned	1	0	–	–
Major Axis Angle Minimum	Output.Position.MinAngle	Signed	3	3	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Major Axis Angle Minimum.Judged Value OK	Output.Position.MinAngle.Pass	Unsigned	1	0	–	–
Major Axis Angle Minimum.Judged Value Fail	Output.Position.MinAngle.Fail	Unsigned	1	0	–	–
Area	Output.Area	Unsigned	8	0	✓	–
Area.Judged Value OK	Output.Area.Pass	Unsigned	1	0	–	–
Area.Judged Value Fail	Output.Area.Fail	Unsigned	1	0	–	–
Area Maximum	Output.MaxArea	Unsigned	8	0	✓	–
Area Maximum.Judged Value OK	Output.MaxArea.Pass	Unsigned	1	0	–	–
Area Maximum.Judged Value Fail	Output.MaxArea.Fail	Unsigned	1	0	–	–
Area Minimum	Output.MinArea	Unsigned	8	0	✓	–
Area Minimum.Judged Value OK	Output.MinArea.Pass	Unsigned	1	0	–	–
Area Minimum.Judged Value Fail	Output.MinArea.Fail	Unsigned	1	0	–	–
Feret Diameter X	Output.FeretDiameter.X	Signed	5	3	✓	L
Feret Diameter X.Absolute Measured Value	Output.FeretDiameter.X.Abs	Signed	5	3	–	–
Feret Diameter X.Judged Value OK	Output.FeretDiameter.X.Pass	Unsigned	1	0	–	–
Feret Diameter X.Judged Value Fail	Output.FeretDiameter.X.Fail	Unsigned	1	0	–	–
Feret Diameter X Maximum	Output.FeretDiameter.MaxX	Signed	5	3	✓	L
Feret Diameter X Maximum.Absolute Measured Value	Output.FeretDiameter.MaxX.Abs	Signed	5	3	–	–
Feret Diameter X Maximum.Judged Value OK	Output.FeretDiameter.MaxX.Pass	Unsigned	1	0	–	–
Feret Diameter X Maximum.Judged Value Fail	Output.FeretDiameter.MaxX.Fail	Unsigned	1	0	–	–
Feret Diameter X Minimum	Output.FeretDiameter.MinX	Signed	5	3	✓	L
Feret Diameter X Minimum.Absolute Measured Value	Output.FeretDiameter.MinX.Abs	Signed	5	3	–	–
Feret Diameter X Minimum.Judged Value OK	Output.FeretDiameter.MinX.Pass	Unsigned	1	0	–	–
Feret Diameter X Minimum.Judged Value Fail	Output.FeretDiameter.MinX.Fail	Unsigned	1	0	–	–
Feret Diameter Y	Output.FeretDiameter.Y	Signed	5	3	✓	L
Feret Diameter Y.Absolute Measured Value	Output.FeretDiameter.Y.Abs	Signed	5	3	–	–
Feret Diameter Y.Judged Value OK	Output.FeretDiameter.Y.Pass	Unsigned	1	0	–	–
Feret Diameter Y.Judged Value Fail	Output.FeretDiameter.Y.Fail	Unsigned	1	0	–	–
Feret Diameter Y Maximum	Output.FeretDiameter.MaxY	Signed	5	3	✓	L
Feret Diameter Y Maximum.Absolute Measured Value	Output.FeretDiameter.MaxY.Abs	Signed	5	3	–	–
Feret Diameter Y Maximum.Judged Value OK	Output.FeretDiameter.MaxY.Pass	Unsigned	1	0	–	–
Feret Diameter Y Maximum.Judged Value Fail	Output.FeretDiameter.MaxY.Fail	Unsigned	1	0	–	–
Feret Diameter Y Minimum	Output.FeretDiameter.MinY	Signed	5	3	✓	L
Feret Diameter Y Minimum.Absolute Measured Value	Output.FeretDiameter.MinY.Abs	Signed	5	3	–	–
Feret Diameter Y Minimum.Judged Value OK	Output.FeretDiameter.MinY.Pass	Unsigned	1	0	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Feret Diameter Y Minimum.Judged Value Fail	Output.FeretDiameter.MinY.Fail	Unsigned	1	0	–	–
Perimeter	Output.Perimeter	Unsigned	8	0	✓	L
Perimeter.Absolute Measured Value	Output.Perimeter.Abs	Unsigned	8	0	–	–
Perimeter.Judged Value OK	Output.Perimeter.Pass	Unsigned	1	0	–	–
Perimeter.Judged Value Fail	Output.Perimeter.Fail	Unsigned	1	0	–	–
Perimeter Maximum	Output.MaxPerimeter	Unsigned	8	0	✓	L
Perimeter Maximum.Absolute Measured Value	Output.MaxPerimeter.Abs	Unsigned	8	0	–	–
Perimeter Maximum.Judged Value OK	Output.MaxPerimeter.Pass	Unsigned	1	0	–	–
Perimeter Maximum.Judged Value Fail	Output.MaxPerimeter.Fail	Unsigned	1	0	–	–
Perimeter Minimum	Output.MinPerimeter	Unsigned	8	0	✓	L
Perimeter Minimum.Absolute Measured Value	Output.MinPerimeter.Abs	Unsigned	8	0	–	–
Perimeter Minimum.Judged Value OK	Output.MinPerimeter.Pass	Unsigned	1	0	–	–
Perimeter Minimum.Judged Value Fail	Output.MinPerimeter.Fail	Unsigned	1	0	–	–
Roundness	Output.Roundness	Unsigned	1	3	✓	–
Roundness.Judged Value OK	Output.Roundness.Pass	Unsigned	1	0	–	–
Roundness.Judged Value Fail	Output.Roundness.Fail	Unsigned	1	0	–	–
Roundness Maximum	Output.MaxRoundness	Unsigned	1	3	✓	–
Roundness Maximum.Judged Value OK	Output.MaxRoundness.Pass	Unsigned	1	0	–	–
Roundness Maximum.Judged Value Fail	Output.MaxRoundness.Fail	Unsigned	1	0	–	–
Roundness Minimum	Output.MinRoundness	Unsigned	1	3	✓	–
Roundness Minimum.Judged Value OK	Output.MinRoundness.Pass	Unsigned	1	0	–	–
Roundness Minimum.Judged Value Fail	Output.MinRoundness.Fail	Unsigned	1	0	–	–
Bounding Rectangle Upper Left X	Output.BoundingRectangle.UpperLeft.X	Signed	5	3	✓	X
Bounding Rectangle Upper Left X.Absolute Measured Value	Output.BoundingRectangle.UpperLeft.X.Abs	Signed	5	3	–	–
Bounding Rectangle Upper Left Y	Output.BoundingRectangle.UpperLeft.Y	Signed	5	3	✓	Y
Bounding Rectangle Upper Left Y.Absolute Measured Value	Output.BoundingRectangle.UpperLeft.Y.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left X	Output.BoundingRectangle.LowerLeft.X	Signed	5	3	✓	X
Bounding Rectangle Lower Left X.Absolute Measured Value	Output.BoundingRectangle.LowerLeft.X.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left Y	Output.BoundingRectangle.LowerLeft.Y	Signed	5	3	✓	Y
Bounding Rectangle Lower Left Y.Absolute Measured Value	Output.BoundingRectangle.LowerLeft.Y.Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right X	Output.BoundingRectangle.UpperRight.X	Signed	5	3	✓	X
Bounding Rectangle Upper Right X.Absolute Measured Value	Output.BoundingRectangle.UpperRight.X.Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right Y	Output.BoundingRectangle.UpperRight.Y	Signed	5	3	✓	Y

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Bounding Rectangle Upper Right Y.Absolute Measured Value	Output.BoundingRectangle.UpperRight.Y.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right X	Output.BoundingRectangle.LowerRight.X	Signed	5	3	✓	X
Bounding Rectangle Lower Right X.Absolute Measured Value	Output.BoundingRectangle.LowerRight.X.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right Y	Output.BoundingRectangle.LowerRight.Y	Signed	5	3	✓	Y
Bounding Rectangle Lower Right Y.Absolute Measured Value	Output.BoundingRectangle.LowerRight.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left X	Output.Array.AxesBox.UpperLeft.X	Signed	5	3	✓	X
Major Axis Bounding Rectangle Upper Left X.Absolute Measured Value	Output.Array.AxesBox.UpperLeft.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left Y	Output.Array.AxesBox.UpperLeft.Y	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Upper Left Y.Absolute Measured Value	Output.Array.AxesBox.UpperLeft.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left X	Output.Array.AxesBox.LowerLeft.X	Signed	5	3	✓	X
Major Axis Bounding Rectangle Lower Left X.Absolute Measured Value	Output.Array.AxesBox.LowerLeft.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left Y	Output.Array.AxesBox.LowerLeft.Y	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Lower Left Y.Absolute Measured Value	Output.Array.AxesBox.LowerLeft.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right X	Output.Array.AxesBox.UpperRight.X	Signed	5	3	✓	X
Major Axis Bounding Rectangle Upper Right X.Absolute Measured Value	Output.Array.AxesBox.UpperRight.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right Y	Output.Array.AxesBox.UpperRight.Y	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Upper Right Y.Absolute Measured Value	Output.Array.AxesBox.UpperRight.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right X	Output.Array.AxesBox.LowerRight.X	Signed	5	3	✓	X
Major Axis Bounding Rectangle Lower Right X.Absolute Measured Value	Output.Array.AxesBox.LowerRight.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right Y	Output.Array.AxesBox.LowerRight.Y	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Lower Right Y.Absolute Measured Value	Output.Array.AxesBox.LowerRight.Y.Abs	Signed	5	3	–	–
Major Axis	Output.MajorAxis	Unsigned	5	3	✓	L
Major Axis.Absolute Measured Value	Output.MajorAxis.Abs	Unsigned	5	3	–	–
Major Axis.Judged Value OK	Output.MajorAxis.Pass	Unsigned	1	0	–	–
Major Axis.Judged Value Fail	Output.MajorAxis.Fail	Unsigned	1	0	–	–
Major Axis Maximum	Output.MaxMajorAxis	Unsigned	5	3	✓	L
Major Axis Maximum.Absolute Measured Value	Output.MaxMajorAxis.Abs	Unsigned	5	3	–	–
Major Axis Maximum.Judged Value OK	Output.MaxMajorAxis.Pass	Unsigned	1	0	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Major Axis Maximum.Judged Value Fail	Output.MaxMajorAxis.Fail	Unsigned	1	0	–	–
Major Axis Minimum	Output.MinMajorAxis	Unsigned	5	3	✓	L
Major Axis Minimum.Absolute Measured Value	Output.MinMajorAxis.Abs	Unsigned	5	3	–	–
Major Axis Minimum.Judged Value OK	Output.MinMajorAxis.Pass	Unsigned	1	0	–	–
Major Axis Minimum.Judged Value Fail	Output.MinMajorAxis.Fail	Unsigned	1	0	–	–
Minor Axis	Output.MinorAxis	Unsigned	5	3	✓	L
Minor Axis.Absolute Measured Value	Output.MinorAxis.Abs	Unsigned	5	3	–	–
Minor Axis.Judged Value OK	Output.MinorAxis.Pass	Unsigned	1	0	–	–
Minor Axis.Judged Value Fail	Output.MinorAxis.Fail	Unsigned	1	0	–	–
Minor Axis Maximum	Output.MaxMinorAxis	Unsigned	5	3	✓	L
Minor Axis Maximum.Absolute Measured Value	Output.MaxMinorAxis.Abs	Unsigned	5	3	–	–
Minor Axis Maximum.Judged Value OK	Output.MaxMinorAxis.Pass	Unsigned	1	0	–	–
Minor Axis Maximum.Judged Value Fail	Output.MaxMinorAxis.Fail	Unsigned	1	0	–	–
Minor Axis Minimum	Output.MinMinorAxis	Unsigned	5	3	✓	L
Minor Axis Minimum.Absolute Measured Value	Output.MinMinorAxis.Abs	Unsigned	5	3	–	–
Minor Axis Minimum.Judged Value OK	Output.MinMinorAxis.Pass	Unsigned	1	0	–	–
Minor Axis Minimum.Judged Value Fail	Output.MinMinorAxis.Fail	Unsigned	1	0	–	–
Axes Ratio	Output.AxesRatio	Unsigned	5	3	✓	–
Axes Ratio.Judged Value OK	Output.AxesRatio.Pass	Unsigned	1	0	–	–
Axes Ratio.Judged Value Fail	Output.AxesRatio.Fail	Unsigned	1	0	–	–
Axes Ratio Maximum	Output.MaxAxesRatio	Unsigned	5	3	✓	–
Axes Ratio Maximum.Judged Value OK	Output.MaxAxesRatio.Pass	Unsigned	1	0	–	–
Axes Ratio Maximum.Judged Value Fail	Output.MaxAxesRatio.Fail	Unsigned	1	0	–	–
Axes Ratio Minimum	Output.MinAxesRatio	Unsigned	5	3	✓	–
Axes Ratio Minimum.Judged Value OK	Output.MinAxesRatio.Pass	Unsigned	1	0	–	–
Axes Ratio Minimum.Judged Value Fail	Output.MinAxesRatio.Fail	Unsigned	1	0	–	–
Minimum Bounding Rectangle Long Side	Output.MinimumBoundingRectangle.LongSide	Unsigned	5	3	✓	L
Minimum Bounding Rectangle Long Side.Absolute Measured Value	Output.MinimumBoundingRectangle.LongSide.Abs	Unsigned	5	3	–	–
Minimum Bounding Rectangle Long Side Maximum	Output.MinimumBoundingRectangle.MaxLongSide	Unsigned	5	3	✓	L
Minimum Bounding Rectangle Long Side Maximum.Absolute Measured Value	Output.MinimumBoundingRectangle.MaxLongSide.Abs	Unsigned	5	3	–	–
Minimum Bounding Rectangle Long Side Minimum	Output.MinimumBoundingRectangle.MinLongSide	Unsigned	5	3	✓	L
Minimum Bounding Rectangle Long Side Minimum.Absolute Measured Value	Output.MinimumBoundingRectangle.MinLongSide.Abs	Unsigned	5	3	–	–
Minimum Bounding Rectangle Short Side	Output.MinimumBoundingRectangle.ShortSide	Unsigned	5	3	✓	L

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Minimum Bounding Rectangle Short Side.Absolute Measured Value	Output.MinimumBoundingRectangle.ShortSide.Abs	Unsigned	5	3	–	–
Minimum Bounding Rectangle Short Side Maximum	Output.MinimumBoundingRectangle.MaxShortSide	Unsigned	5	3	✓	L
Minimum Bounding Rectangle Short Side Maximum.Absolute Measured Value	Output.MinimumBoundingRectangle.MaxShortSide.Abs	Unsigned	5	3	–	–
Minimum Bounding Rectangle Short Side Minimum	Output.MinimumBoundingRectangle.MinShortSide	Unsigned	5	3	✓	L
Minimum Bounding Rectangle Short Side Minimum.Absolute Measured Value	Output.MinimumBoundingRectangle.MinShortSide.Abs	Unsigned	5	3	–	–
Minimum Bounding Rectangle Center Coordinate X	Output.MinimumBoundingRectangle.Center.X	Signed	5	3	✓	X
Minimum Bounding Rectangle Center Coordinate X.Absolute Measured Value	Output.MinimumBoundingRectangle.Center.X.Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Center Coordinate X Maximum	Output.MinimumBoundingRectangle.Center.MaxX	Signed	5	3	–	–
Minimum Bounding Rectangle Center Coordinate X Minimum	Output.MinimumBoundingRectangle.Center.MinX	Signed	5	3	–	–
Minimum Bounding Rectangle Center Coordinate Y	Output.MinimumBoundingRectangle.Center.Y	Signed	5	3	✓	Y
Minimum Bounding Rectangle Center Coordinate Y.Absolute Measured Value	Output.MinimumBoundingRectangle.Center.Y.Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Center Coordinate Y Maximum	Output.MinimumBoundingRectangle.Center.MaxY	Signed	5	3	–	–
Minimum Bounding Rectangle Center Coordinate Y Minimum	Output.MinimumBoundingRectangle.Center.MinY	Signed	5	3	–	–
Minimum Bounding Rectangle Angle	Output.MinimumBoundingRectangle.Angle	Signed	3	3	✓	–
Minimum Bounding Rectangle Angle.Absolute Measured Value	Output.MinimumBoundingRectangle.Angle.Abs	Signed	3	3	–	–
Minimum Bounding Rectangle Angle Maximum	Output.MinimumBoundingRectangle.Angle.MaxY	Signed	3	3	–	–
Minimum Bounding Rectangle Angle Minimum	Output.MinimumBoundingRectangle.Angle.MinY	Signed	3	3	–	–
Minimum Bounding Rectangle Upper Left X	Output.MinimumBoundingRectangle.UpperLeft.X	Signed	5	3	✓	X
Minimum Bounding Rectangle Upper Left X.Absolute Measured Value	Output.MinimumBoundingRectangle.UpperLeft.X.Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Upper Left Y	Output.MinimumBoundingRectangle.UpperLeft.Y	Signed	5	3	✓	Y
Minimum Bounding Rectangle Upper Left Y.Absolute Measured Value	Output.MinimumBoundingRectangle.UpperLeft.Y.Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Lower Left X	Output.MinimumBoundingRectangle.LowerLeft.X	Signed	5	3	✓	X
Minimum Bounding Rectangle Lower Left X.Absolute Measured Value	Output.MinimumBoundingRectangle.LowerLeft.X.Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Lower Left Y	Output.MinimumBoundingRectangle.LowerLeft.Y	Signed	5	3	✓	Y

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Minimum Bounding Rectangle Lower Left Y.Absolute Measured Value	Output.MinimumBoundingRectangle.LowerLeft.Y.Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Upper Right X	Output.MinimumBoundingRectangle.UpperRight.X	Signed	5	3	✓	X
Minimum Bounding Rectangle Upper Right X.Absolute Measured Value	Output.MinimumBoundingRectangle.UpperRight.X.Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Upper Right Y	Output.MinimumBoundingRectangle.UpperRight.Y	Signed	5	3	✓	Y
Minimum Bounding Rectangle Upper Right Y.Absolute Measured Value	Output.MinimumBoundingRectangle.UpperRight.Y.Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Lower Right X	Output.MinimumBoundingRectangle.LowerRight.X	Signed	5	3	✓	X
Minimum Bounding Rectangle Lower Right X.Absolute Measured Value	Output.MinimumBoundingRectangle.LowerRight.X.Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Lower Right Y	Output.MinimumBoundingRectangle.LowerRight.Y	Signed	5	3	✓	Y
Minimum Bounding Rectangle Lower Right Y.Absolute Measured Value	Output.MinimumBoundingRectangle.LowerRight.Y.Abs	Signed	5	3	–	–
Equivalent Oval Major Axis	Output.DistOvalMajorAxis	Unsigned	5	3	✓	L
Equivalent Oval Major Axis.Absolute Measured Value	Output.DistOvalMajorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Major Axis.Judged Value OK	Output.DistOvalMajorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Major Axis.Judged Value Fail	Output.DistOvalMajorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Major Axis Maximum	Output.MaxDistOvalMajorAxis	Unsigned	5	3	✓	L
Equivalent Oval Major Axis Maximum.Absolute Measured Value	Output.MaxDistOvalMajorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Major Axis Maximum.Judged Value OK	Output.MaxDistOvalMajorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Major Axis Maximum.Judged Value Fail	Output.MaxDistOvalMajorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Major Axis Minimum	Output.MinDistOvalMajorAxis	Unsigned	5	3	✓	L
Equivalent Oval Major Axis Minimum.Absolute Measured Value	Output.MinDistOvalMajorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Major Axis Minimum.Judged Value OK	Output.MinDistOvalMajorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Major Axis Minimum.Judged Value Fail	Output.MinDistOvalMajorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Minor Axis	Output.DistOvalMinorAxis	Unsigned	5	3	✓	L
Equivalent Oval Minor Axis.Absolute Measured Value	Output.DistOvalMinorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Minor Axis.Judged Value OK	Output.DistOvalMinorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Minor Axis.Judged Value Fail	Output.DistOvalMinorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Minor Axis Maximum	Output.MaxDistOvalMinorAxis	Unsigned	5	3	✓	L

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Equivalent Oval Minor Axis Maximum.Absolute Measured Value	Output.MaxDistOvalMinorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Minor Axis Maximum.Judged Value OK	Output.MaxDistOvalMinorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Minor Axis Maximum.Judged Value Fail	Output.MaxDistOvalMinorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Minor Axis Minimum	Output.MinDistOvalMinorAxis	Unsigned	5	3	✓	L
Equivalent Oval Minor Axis Minimum.Absolute Measured Value	Output.MinDistOvalMinorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Minor Axis Minimum.Judged Value OK	Output.MinDistOvalMinorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Minor Axis Minimum.Judged Value Fail	Output.MinDistOvalMinorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio	Output.AspectRatio	Unsigned	5	3	✓	–
Equivalent Oval Aspect Ratio.Judged Value OK	Output.AspectRatio.Pass	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio.Judged Value Fail	Output.AspectRatio.Fail	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio Maximum	Output.MaxAspectRatio	Unsigned	5	3	✓	–
Equivalent Oval Aspect Ratio Maximum.Judged Value OK	Output.MaxAspectRatio.Pass	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio Maximum.Judged Value Fail	Output.MaxAspectRatio.Fail	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio Minimum	Output.MinAspectRatio	Unsigned	5	3	✓	–
Equivalent Oval Aspect Ratio Minimum.Judged Value OK	Output.MinAspectRatio.Pass	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio Minimum.Judged Value Fail	Output.MinAspectRatio.Fail	Unsigned	1	0	–	–
Center of Gravity X[n]	Output.Array.Position.X[n]	Signed	5	3	✓	X
Center of Gravity X[n].Absolute Measured Value	Output.Array.Position.X[n].Abs	Signed	5	3	–	–
Center of Gravity Y[n]	Output.Array.Position.Y[n]	Signed	5	3	✓	Y
Center of Gravity Y[n].Absolute Measured Value	Output.Array.Position.Y[n].Abs	Signed	5	3	–	–
Major Axis Angle[n]	Output.Array.Position.Angle[n]	Signed	3	3	✓	–
Major Axis Angle[n].Absolute Measured Value	Output.Array.Position.Angle[n].Abs	Signed	3	3	–	–
Area[n]	Output.Array.Area[n]	Unsigned	8	0	✓	–
Feret Diameter X[n]	Output.Array.FeretDiameter.X[n]	Signed	5	3	✓	L
Feret Diameter X[n].Absolute Measured Value	Output.Array.FeretDiameter.X[n].Abs	Signed	5	3	–	–
Feret Diameter Y[n]	Output.Array.FeretDiameter.Y[n]	Signed	5	3	✓	L
Feret Diameter Y[n].Absolute Measured Value	Output.Array.FeretDiameter.Y[n].Abs	Signed	5	3	–	–
Perimeter[n]	Output.Array.Perimeter[n]	Unsigned	8	0	✓	L
Perimeter[n].Absolute Measured Value	Output.Array.Perimeter[n].Abs	Unsigned	8	0	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Roundness[n]	Output.Array.Roundness[n]	Unsigned	1	3	✓	–
Bounding Rectangle Upper Left X[n]	Output.BoundingRectangle.UpperLeft.X[n]	Signed	5	3	✓	X
Bounding Rectangle Upper Left X[n].Absolute Measured Value	Output.BoundingRectangle.UpperLeft.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Upper Left Y[n]	Output.BoundingRectangle.UpperLeft.Y[n]	Signed	5	3	✓	Y
Bounding Rectangle Upper Left Y[n].Absolute Measured Value	Output.BoundingRectangle.UpperLeft.Y[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left X[n]	Output.BoundingRectangle.LowerLeft.X[n]	Signed	5	3	✓	X
Bounding Rectangle Lower Left X[n].Absolute Measured Value	Output.BoundingRectangle.LowerLeft.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left Y[n]	Output.BoundingRectangle.LowerLeft.Y[n]	Signed	5	3	✓	Y
Bounding Rectangle Lower Left Y[n].Absolute Measured Value	Output.BoundingRectangle.LowerLeft.Y[n].Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right X[n]	Output.BoundingRectangle.UpperRight.X[n]	Signed	5	3	✓	X
Bounding Rectangle Upper Right X[n].Absolute Measured Value	Output.BoundingRectangle.UpperRight.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right Y[n]	Output.BoundingRectangle.UpperRight.Y[n]	Signed	5	3	✓	Y
Bounding Rectangle Upper Right Y[n].Absolute Measured Value	Output.BoundingRectangle.UpperRight.Y[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right X[n]	Output.BoundingRectangle.LowerRight.X[n]	Signed	5	3	✓	X
Bounding Rectangle Lower Right X[n].Absolute Measured Value	Output.BoundingRectangle.LowerRight.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right Y[n]	Output.BoundingRectangle.LowerRight.Y[n]	Signed	5	3	✓	Y
Bounding Rectangle Lower Right Y[n].Absolute Measured Value	Output.BoundingRectangle.LowerRight.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left X[n]	Output.Array.AxesBox.UpperLeft.X[n]	Signed	5	3	–	X
Major Axis Bounding Rectangle Upper Left X[n].Absolute Measured Value	Output.Array.AxesBox.UpperLeft.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left Y[n]	Output.Array.AxesBox.UpperLeft.Y[n]	Signed	5	3	–	Y
Major Axis Bounding Rectangle Upper Left Y[n].Absolute Measured Value	Output.Array.AxesBox.UpperLeft.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left X[n]	Output.Array.AxesBox.LowerLeft.X[n]	Signed	5	3	–	X
Major Axis Bounding Rectangle Lower Left X[n].Absolute Measured Value	Output.Array.AxesBox.LowerLeft.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left Y[n]	Output.Array.AxesBox.LowerLeft.Y[n]	Signed	5	3	–	Y
Major Axis Bounding Rectangle Lower Left Y[n].Absolute Measured Value	Output.Array.AxesBox.LowerLeft.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right X[n]	Output.Array.AxesBox.UpperRight.X[n]	Signed	5	3	–	X

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Major Axis Bounding Rectangle Upper Right X[n].Absolute Measured Value	Output.Array.AxesBox.UpperRight.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right Y[n]	Output.Array.AxesBox.UpperRight.Y[n]	Signed	5	3	–	Y
Major Axis Bounding Rectangle Upper Right Y[n].Absolute Measured Value	Output.Array.AxesBox.UpperRight.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right X[n]	Output.Array.AxesBox.LowerRight.X[n]	Signed	5	3	–	X
Major Axis Bounding Rectangle Lower Right X[n].Absolute Measured Value	Output.Array.AxesBox.LowerRight.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right Y[n]	Output.Array.AxesBox.LowerRight.Y[n]	Signed	5	3	–	Y
Major Axis Bounding Rectangle Lower Right Y[n].Absolute Measured Value	Output.Array.AxesBox.LowerRight.Y[n].Abs	Signed	5	3	–	–
Major Axis[n]	Output.Array.MajorAxis[n]	Unsigned	5	3	✓	L
Major Axis[n].Absolute Measured Value	Output.Array.MajorAxis[n].Abs	Unsigned	5	3	–	–
Minor Axis[n]	Output.Array.MinorAxis[n]	Unsigned	5	3	✓	L
Minor Axis[n].Absolute Measured Value	Output.Array.MinorAxis[n].Abs	Unsigned	5	3	–	–
Axes Ratio[n]	Output.Array.AxesRatio[n]	Unsigned	5	3	✓	–
Minimum Bounding Rectangle Long Side[n]	Output.Array.MinimumBoundingRectangle.LongSide[n]	Unsigned	5	3	✓	L
Minimum Bounding Rectangle Long Side[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.LongSide[n].Abs	Unsigned	5	3	–	–
Minimum Bounding Rectangle Short Side[n]	Output.Array.MinimumBoundingRectangle.ShortSide[n]	Unsigned	5	3	✓	L
Minimum Bounding Rectangle Short Side[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.ShortSide[n].Abs	Unsigned	5	3	–	–
Minimum Bounding Rectangle Center Coordinate X[n]	Output.Array.MinimumBoundingRectangle.Center.X[n]	Signed	5	3	✓	X
Minimum Bounding Rectangle Center Coordinate X[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.Center.X[n].Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Center Coordinate Y[n]	Output.Array.MinimumBoundingRectangle.Center.Y[n]	Signed	5	3	✓	Y
Minimum Bounding Rectangle Center Coordinate Y[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.Center.Y[n].Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Angle[n]	Output.Array.MinimumBoundingRectangle.Angle[n]	Signed	5	3	✓	–
Minimum Bounding Rectangle Angle[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.Angle[n].Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Upper Left X[n]	Output.Array.MinimumBoundingRectangle.UpperLeft.X[n]	Signed	5	3	✓	X
Minimum Bounding Rectangle Upper Left X[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.UpperLeft.X[n].Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Upper Left Y[n]	Output.Array.MinimumBoundingRectangle.UpperLeft.Y[n]	Signed	5	3	✓	Y

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Minimum Bounding Rectangle Upper Left Y[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.UpperLeft.Y[n].Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Lower Left X[n]	Output.Array.MinimumBoundingRectangle.LowerLeft.X[n]	Signed	5	3	✓	X
Minimum Bounding Rectangle Lower Left X[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.LowerLeft.X[n].Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Lower Left Y[n]	Output.Array.MinimumBoundingRectangle.LowerLeft.Y[n]	Signed	5	3	✓	Y
Minimum Bounding Rectangle Lower Left Y[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.LowerLeft.Y[n].Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Upper Right X[n]	Output.Array.MinimumBoundingRectangle.UpperRight.X[n]	Signed	5	3	✓	X
Minimum Bounding Rectangle Upper Right X[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.UpperRight.X[n].Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Upper Right Y[n]	Output.Array.MinimumBoundingRectangle.UpperRight.Y[n]	Signed	5	3	✓	Y
Minimum Bounding Rectangle Upper Right Y[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.UpperRight.Y[n].Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Lower Right X[n]	Output.Array.MinimumBoundingRectangle.LowerRight.X[n]	Signed	5	3	✓	X
Minimum Bounding Rectangle Lower Right X[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.LowerRight.X[n].Abs	Signed	5	3	–	–
Minimum Bounding Rectangle Lower Right Y[n]	Output.Array.MinimumBoundingRectangle.LowerRight.Y[n]	Signed	5	3	✓	Y
Minimum Bounding Rectangle Lower Right Y[n].Absolute Measured Value	Output.Array.MinimumBoundingRectangle.LowerRight.Y[n].Abs	Signed	5	3	–	–
Equivalent Oval Major Axis[n]	Output.Array.DistOvalMajorAxis[n]	Unsigned	5	3	✓	L
Equivalent Oval Major Axis[n].Absolute Measured Value	Output.Array.DistOvalMajorAxis[n].Abs	Unsigned	5	3	–	–
Equivalent Oval Minor Axis[n]	Output.Array.DistOvalMinorAxis[n]	Unsigned	5	3	✓	L
Equivalent Oval Minor Axis[n].Absolute Measured Value	Output.Array.DistOvalMinorAxis[n].Abs	Unsigned	5	3	–	–
Equivalent Oval Aspect Ratio[n]	Output.Array.AspectRatio[n]	Unsigned	5	3	✓	–

Grayscale Blob

#O104

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detected Intensity Difference	Output.DetectionIntensity	Unsigned	3	0	✓	–
Reference Intensity	Output.BaseIntensity	Unsigned	3	0	✓	–
Total Area	Output.TotalArea	Unsigned	8	0	✓	–
Total Area.Judged Value OK	Output.TotalArea.Pass	Unsigned	1	0	–	–
Total Area.Judged Value Fail	Output.TotalArea.Fail	Unsigned	1	0	–	–
Total Volume	Output.TotalVolume	Unsigned	11	0	✓	–
Total Volume.Judged Value OK	Output.TotalVolume.Pass	Unsigned	1	0	–	–
Total Volume.Judged Value Fail	Output.TotalVolume.Fail	Unsigned	1	0	–	–
Label Count	Output.Count	Unsigned	4	0	✓	–
Label Count.Judged Value OK	Output.Count.Pass	Unsigned	1	0	–	–
Label Count.Judged Value Fail	Output.Count.Fail	Unsigned	1	0	–	–
Center of Gravity X	Output.Position.X	Signed	5	3	✓	X
Center of Gravity X.Absolute Measured Value	Output.Position.X.Abs	Signed	5	3	–	–
Center of Gravity X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Center of Gravity X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Center of Gravity X Maximum	Output.Position.MaxX	Signed	5	3	✓	X
Center of Gravity X Maximum.Judged Value OK	Output.Position.MaxX.Pass	Unsigned	1	0	–	–
Center of Gravity X Maximum.Judged Value Fail	Output.Position.MaxX.Fail	Unsigned	1	0	–	–
Center of Gravity X Minimum	Output.Position.MinX	Signed	5	3	✓	X
Center of Gravity X Minimum.Judged Value OK	Output.Position.MinX.Pass	Unsigned	1	0	–	–
Center of Gravity X Minimum.Judged Value Fail	Output.Position.MinX.Fail	Unsigned	1	0	–	–
Center of Gravity Y	Output.Position.Y	Signed	5	3	✓	Y
Center of Gravity Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	5	3	–	–
Center of Gravity Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Center of Gravity Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Center of Gravity Y Maximum	Output.Position.MaxY	Signed	5	3	✓	Y
Center of Gravity Y Maximum.Judged Value OK	Output.Position.MaxY.Pass	Unsigned	1	0	–	–
Center of Gravity Y Maximum.Judged Value Fail	Output.Position.MaxY.Fail	Unsigned	1	0	–	–
Center of Gravity Y Minimum	Output.Position.MinY	Signed	5	3	✓	Y
Center of Gravity Y Minimum.Judged Value OK	Output.Position.MinY.Pass	Unsigned	1	0	–	–
Center of Gravity Y Minimum.Judged Value Fail	Output.Position.MinY.Fail	Unsigned	1	0	–	–
Major Axis Angle	Output.Position.Angle	Signed	3	3	✓	–
Major Axis Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	–	–
Major Axis Angle.Judged Value OK	Output.Position.Angle.Pass	Unsigned	1	0	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Major Axis Angle.Judged Value Fail	Output.Position.Angle.Fail	Unsigned	1	0	–	–
Major Axis Angle Maximum	Output.Position.MaxAngle	Signed	3	3	✓	–
Major Axis Angle Maximum.Judged Value OK	Output.Position.MaxAngle.Pass	Unsigned	1	0	–	–
Major Axis Angle Maximum.Judged Value Fail	Output.Position.MaxAngle.Fail	Unsigned	1	0	–	–
Major Axis Angle Minimum	Output.Position.MinAngle	Signed	3	3	✓	–
Major Axis Angle Minimum.Judged Value OK	Output.Position.MinAngle.Pass	Unsigned	1	0	–	–
Major Axis Angle Minimum.Judged Value Fail	Output.Position.MinAngle.Fail	Unsigned	1	0	–	–
Area	Output.Area	Unsigned	8	0	✓	–
Area.Judged Value OK	Output.Area.Pass	Unsigned	1	0	–	–
Area.Judged Value Fail	Output.Area.Fail	Unsigned	1	0	–	–
Area Maximum	Output.MaxArea	Unsigned	8	0	✓	–
Area Maximum.Judged Value OK	Output.MaxArea.Pass	Unsigned	1	0	–	–
Area Maximum.Judged Value Fail	Output.MaxArea.Fail	Unsigned	1	0	–	–
Area Minimum	Output.MinArea	Unsigned	8	0	✓	–
Area Minimum.Judged Value OK	Output.MinArea.Pass	Unsigned	1	0	–	–
Area Minimum.Judged Value Fail	Output.MinArea.Fail	Unsigned	1	0	–	–
Average Intensity Difference	Output.AverageIntensityLevel	Unsigned	3	0	✓	–
Average Intensity Difference.Judged Value OK	Output.AverageIntensityLevel.Pass	Unsigned	1	0	–	–
Average Intensity Difference.Judged Value Fail	Output.AverageIntensityLevel.Fail	Unsigned	1	0	–	–
Average Intensity Difference Maximum	Output.MaxAverageIntensityLevel	Unsigned	3	0	✓	–
Average Intensity Difference Maximum.Judged Value OK	Output.MaxAverageIntensityLevel.Pass	Unsigned	1	0	–	–
Average Intensity Difference Maximum.Judged Value Fail	Output.MaxAverageIntensityLevel.Fail	Unsigned	1	0	–	–
Average Intensity Difference Minimum	Output.MinAverageIntensityLevel	Unsigned	3	0	✓	–
Average Intensity Difference Minimum.Judged Value OK	Output.MinAverageIntensityLevel.Pass	Unsigned	1	0	–	–
Average Intensity Difference Minimum.Judged Value Fail	Output.MinAverageIntensityLevel.Fail	Unsigned	1	0	–	–
Maximum Intensity Difference	Output.MaximumIntensityLevel	Unsigned	3	0	✓	–
Maximum Intensity Difference.Judged Value OK	Output.MaximumIntensityLevel.Pass	Unsigned	1	0	–	–
Maximum Intensity Difference.Judged Value Fail	Output.MaximumIntensityLevel.Fail	Unsigned	1	0	–	–
Maximum Intensity Difference Maximum	Output.MaxMaximumIntensityLevel	Unsigned	3	0	✓	–
Maximum Intensity Difference Maximum.Judged Value OK	Output.MaxMaximumIntensityLevel.Pass	Unsigned	1	0	–	–
Maximum Intensity Difference Maximum.Judged Value Fail	Output.MaxMaximumIntensityLevel.Fail	Unsigned	1	0	–	–
Maximum Intensity Difference Minimum	Output.MinMaximumIntensityLevel	Unsigned	3	0	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Maximum Intensity Difference Minimum.Judged Value OK	Output.MinMaximumIntensityLevel.Pass	Unsigned	1	0	–	–
Maximum Intensity Difference Minimum.Judged Value Fail	Output.MinMaximumIntensityLevel.Fail	Unsigned	1	0	–	–
Volume	Output.Volume	Unsigned	11	0	✓	–
Volume.Judged Value OK	Output.Volume.Pass	Unsigned	1	0	–	–
Volume.Judged Value Fail	Output.Volume.Fail	Unsigned	1	0	–	–
Volume Maximum	Output.MaxVolume	Unsigned	11	0	✓	–
Volume Maximum.Judged Value OK	Output.MaxVolume.Pass	Unsigned	1	0	–	–
Volume Maximum.Judged Value Fail	Output.MaxVolume.Fail	Unsigned	1	0	–	–
Volume Minimum	Output.MinVolume	Unsigned	11	0	✓	–
Volume Minimum.Judged Value OK	Output.MinVolume.Pass	Unsigned	1	0	–	–
Volume Minimum.Judged Value Fail	Output.MinVolume.Fail	Unsigned	1	0	–	–
Bright/Dark	Output.BrightOrDark	Signed	1	0	✓	–
Feret Diameter X	Output.FeretDiameter.X	Signed	5	3	✓	L
Feret Diameter X.Absolute Measured Value	Output.FeretDiameter.X.Abs	Signed	5	3	–	–
Feret Diameter X.Judged Value OK	Output.FeretDiameter.X.Pass	Unsigned	1	0	–	–
Feret Diameter X.Judged Value Fail	Output.FeretDiameter.X.Fail	Unsigned	1	0	–	–
Feret Diameter X Maximum	Output.FeretDiameter.MaxX	Signed	5	3	✓	L
Feret Diameter X Maximum.Absolute Measured Value	Output.FeretDiameter.MaxX.Abs	Signed	5	3	–	–
Feret Diameter X Maximum.Judged Value OK	Output.FeretDiameter.MaxX.Pass	Unsigned	1	0	–	–
Feret Diameter X Maximum.Judged Value Fail	Output.FeretDiameter.MaxX.Fail	Unsigned	1	0	–	–
Feret Diameter X Minimum	Output.FeretDiameter.MinX	Signed	5	3	✓	L
Feret Diameter X Minimum.Absolute Measured Value	Output.FeretDiameter.MinX.Abs	Signed	5	3	–	–
Feret Diameter X Minimum.Judged Value OK	Output.FeretDiameter.MinX.Pass	Unsigned	1	0	–	–
Feret Diameter X Minimum.Judged Value Fail	Output.FeretDiameter.MinX.Fail	Unsigned	1	0	–	–
Feret Diameter Y	Output.FeretDiameter.Y	Signed	5	3	✓	L
Feret Diameter Y.Absolute Measured Value	Output.FeretDiameter.Y.Abs	Signed	5	3	–	–
Feret Diameter Y.Judged Value OK	Output.FeretDiameter.Y.Pass	Unsigned	1	0	–	–
Feret Diameter Y.Judged Value Fail	Output.FeretDiameter.Y.Fail	Unsigned	1	0	–	–
Feret Diameter Y Maximum	Output.FeretDiameter.MaxY	Signed	5	3	✓	L
Feret Diameter Y Maximum.Absolute Measured Value	Output.FeretDiameter.MaxY.Abs	Signed	5	3	–	–
Feret Diameter Y Maximum.Judged Value OK	Output.FeretDiameter.MaxY.Pass	Unsigned	1	0	–	–
Feret Diameter Y Maximum.Judged Value Fail	Output.FeretDiameter.MaxY.Fail	Unsigned	1	0	–	–
Feret Diameter Y Minimum	Output.FeretDiameter.MinY	Signed	5	3	✓	L

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Feret Diameter Y Minimum.Absolute Measured Value	Output.FeretDiameter.MinY.Abs	Signed	5	3	–	–
Feret Diameter Y Minimum.Judged Value OK	Output.FeretDiameter.MinY.Pass	Unsigned	1	0	–	–
Feret Diameter Y Minimum.Judged Value Fail	Output.FeretDiameter.MinY.Fail	Unsigned	1	0	–	–
Perimeter	Output.Perimeter	Unsigned	8	0	✓	L
Perimeter.Absolute Measured Value	Output.Perimeter.Abs	Unsigned	8	0	–	–
Perimeter.Judged Value OK	Output.Perimeter.Pass	Unsigned	1	0	–	–
Perimeter.Judged Value Fail	Output.Perimeter.Fail	Unsigned	1	0	–	–
Perimeter Maximum	Output.MaxPerimeter	Unsigned	8	0	✓	L
Perimeter Maximum.Absolute Measured Value	Output.MaxPerimeter.Abs	Unsigned	8	0	–	–
Perimeter Maximum.Judged Value OK	Output.MaxPerimeter.Pass	Unsigned	1	0	–	–
Perimeter Maximum.Judged Value Fail	Output.MaxPerimeter.Fail	Unsigned	1	0	–	–
Perimeter Minimum	Output.MinPerimeter	Unsigned	8	0	✓	L
Perimeter Minimum.Absolute Measured Value	Output.MinPerimeter.Abs	Unsigned	8	0	–	–
Perimeter Minimum.Judged Value OK	Output.MinPerimeter.Pass	Unsigned	1	0	–	–
Perimeter Minimum.Judged Value Fail	Output.MinPerimeter.Fail	Unsigned	1	0	–	–
Roundness	Output.Roundness	Unsigned	1	3	✓	–
Roundness.Judged Value OK	Output.Roundness.Pass	Unsigned	1	0	–	–
Roundness.Judged Value Fail	Output.Roundness.Fail	Unsigned	1	0	–	–
Roundness Maximum	Output.MaxRoundness	Unsigned	1	3	✓	–
Roundness Maximum.Judged Value OK	Output.MaxRoundness.Pass	Unsigned	1	0	–	–
Roundness Maximum.Judged Value Fail	Output.MaxRoundness.Fail	Unsigned	1	0	–	–
Roundness Minimum	Output.MinRoundness	Unsigned	1	3	✓	–
Roundness Minimum.Judged Value OK	Output.MinRoundness.Pass	Unsigned	1	0	–	–
Roundness Minimum.Judged Value Fail	Output.MinRoundness.Fail	Unsigned	1	0	–	–
Bounding Rectangle Upper Left X	Output.BoundingRectangle.UpperLeft.X	Signed	5	3	✓	X
Bounding Rectangle Upper Left X.Absolute Measured Value	Output.BoundingRectangle.UpperLeft.X.Abs	Signed	5	3	–	–
Bounding Rectangle Upper Left Y	Output.BoundingRectangle.UpperLeft.Y	Signed	5	3	✓	Y
Bounding Rectangle Upper Left Y.Absolute Measured Value	Output.BoundingRectangle.UpperLeft.Y.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left X	Output.BoundingRectangle.LowerLeft.X	Signed	5	3	✓	X
Bounding Rectangle Lower Left X.Absolute Measured Value	Output.BoundingRectangle.LowerLeft.X.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left Y	Output.BoundingRectangle.LowerLeft.Y	Signed	5	3	✓	Y
Bounding Rectangle Lower Left Y.Absolute Measured Value	Output.BoundingRectangle.LowerLeft.Y.Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right X	Output.BoundingRectangle.UpperRight.X	Signed	5	3	✓	X

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Bounding Rectangle Upper Right X.Absolute Measured Value	Output.BoundingRectangle.UpperRight.X.Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right Y	Output.BoundingRectangle.UpperRight.Y	Signed	5	3	✓	Y
Bounding Rectangle Upper Right Y.Absolute Measured Value	Output.BoundingRectangle.UpperRight.Y.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right X	Output.BoundingRectangle.LowerRight.X	Signed	5	3	✓	X
Bounding Rectangle Lower Right X.Absolute Measured Value	Output.BoundingRectangle.LowerRight.X.Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right Y	Output.BoundingRectangle.LowerRight.Y	Signed	5	3	✓	Y
Bounding Rectangle Lower Right Y.Absolute Measured Value	Output.BoundingRectangle.LowerRight.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left X	Output.AxesBox.UpperLeft.X	Signed	5	3	✓	X
Major Axis Bounding Rectangle Upper Left X.Absolute Measured Value	Output.AxesBox.UpperLeft.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left Y	Output.AxesBox.UpperLeft.Y	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Upper Left Y.Absolute Measured Value	Output.AxesBox.UpperLeft.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left X	Output.AxesBox.LowerLeft.X	Signed	5	3	✓	X
Major Axis Bounding Rectangle Lower Left X.Absolute Measured Value	Output.AxesBox.LowerLeft.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left Y	Output.AxesBox.LowerLeft.Y	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Lower Left Y.Absolute Measured Value	Output.AxesBox.LowerLeft.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right X	Output.AxesBox.UpperRight.X	Signed	5	3	✓	X
Major Axis Bounding Rectangle Upper Right X.Absolute Measured Value	Output.AxesBox.UpperRight.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right Y	Output.AxesBox.UpperRight.Y	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Upper Right Y.Absolute Measured Value	Output.AxesBox.UpperRight.Y.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right X	Output.AxesBox.LowerRight.X	Signed	5	3	✓	X
Major Axis Bounding Rectangle Lower Right X.Absolute Measured Value	Output.AxesBox.LowerRight.X.Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right Y	Output.AxesBox.LowerRight.Y	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Lower Right Y.Absolute Measured Value	Output.AxesBox.LowerRight.Y.Abs	Signed	5	3	–	–
Major Axis	Output.MajorAxis	Unsigned	5	3	✓	L
Major Axis.Absolute Measured Value	Output.MajorAxis.Abs	Unsigned	5	3	–	–
Major Axis.Judged Value OK	Output.MajorAxis.Pass	Unsigned	1	0	–	–
Major Axis.Judged Value Fail	Output.MajorAxis.Fail	Unsigned	1	0	–	–
Major Axis Maximum	Output.MaxMajorAxis	Unsigned	5	3	✓	L

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Major Axis Maximum.Absolute Measured Value	Output.MaxMajorAxis.Abs	Unsigned	5	3	–	–
Major Axis Maximum.Judged Value OK	Output.MaxMajorAxis.Pass	Unsigned	1	0	–	–
Major Axis Maximum.Judged Value Fail	Output.MaxMajorAxis.Fail	Unsigned	1	0	–	–
Major Axis Minimum	Output.MinMajorAxis	Unsigned	5	3	✓	L
Major Axis Minimum.Absolute Measured Value	Output.MinMajorAxis.Abs	Unsigned	5	3	–	–
Major Axis Minimum.Judged Value OK	Output.MinMajorAxis.Pass	Unsigned	1	0	–	–
Major Axis Minimum.Judged Value Fail	Output.MinMajorAxis.Fail	Unsigned	1	0	–	–
Minor Axis	Output.MinorAxis	Unsigned	5	3	✓	L
Minor Axis.Absolute Measured Value	Output.MinorAxis.Abs	Unsigned	5	3	–	–
Minor Axis.Judged Value OK	Output.MinorAxis.Pass	Unsigned	1	0	–	–
Minor Axis.Judged Value Fail	Output.MinorAxis.Fail	Unsigned	1	0	–	–
Minor Axis Maximum	Output.MaxMinorAxis	Unsigned	5	3	✓	L
Minor Axis Maximum.Absolute Measured Value	Output.MaxMinorAxis.Abs	Unsigned	5	3	–	–
Minor Axis Maximum.Judged Value OK	Output.MaxMinorAxis.Pass	Unsigned	1	0	–	–
Minor Axis Maximum.Judged Value Fail	Output.MaxMinorAxis.Fail	Unsigned	1	0	–	–
Minor Axis Minimum	Output.MinMinorAxis	Unsigned	5	3	✓	L
Minor Axis Minimum.Absolute Measured Value	Output.MinMinorAxis.Abs	Unsigned	5	3	–	–
Minor Axis Minimum.Judged Value OK	Output.MinMinorAxis.Pass	Unsigned	1	0	–	–
Minor Axis Minimum.Judged Value Fail	Output.MinMinorAxis.Fail	Unsigned	1	0	–	–
Axes Ratio	Output.AxesRatio	Unsigned	5	3	✓	–
Axes Ratio.Judged Value OK	Output.AxesRatio.Pass	Unsigned	1	0	–	–
Axes Ratio.Judged Value Fail	Output.AxesRatio.Fail	Unsigned	1	0	–	–
Axes Ratio Maximum	Output.MaxAxesRatio	Unsigned	5	3	✓	–
Axes Ratio Maximum.Judged Value OK	Output.MaxAxesRatio.Pass	Unsigned	1	0	–	–
Axes Ratio Maximum.Judged Value Fail	Output.MaxAxesRatio.Fail	Unsigned	1	0	–	–
Axes Ratio Minimum	Output.MinAxesRatio	Unsigned	5	3	✓	–
Axes Ratio Minimum.Judged Value OK	Output.MinAxesRatio.Pass	Unsigned	1	0	–	–
Axes Ratio Minimum.Judged Value Fail	Output.MinAxesRatio.Fail	Unsigned	1	0	–	–
Equivalent Oval Major Axis	Output.DistOvalMajorAxis	Unsigned	5	3	✓	L
Equivalent Oval Major Axis.Absolute Measured Value	Output.DistOvalMajorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Major Axis.Judged Value OK	Output.DistOvalMajorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Major Axis.Judged Value Fail	Output.DistOvalMajorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Major Axis Maximum	Output.MaxDistOvalMajorAxis	Unsigned	5	3	✓	L
Equivalent Oval Major Axis Maximum.Absolute Measured Value	Output.MaxDistOvalMajorAxis.Abs	Unsigned	5	3	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Equivalent Oval Major Axis Maximum.Judged Value OK	Output.MaxDistOvalMajorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Major Axis Maximum.Judged Value Fail	Output.MaxDistOvalMajorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Major Axis Minimum	Output.MinDistOvalMajorAxis	Unsigned	5	3	✓	L
Equivalent Oval Major Axis Minimum.Absolute Measured Value	Output.MinDistOvalMajorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Major Axis Minimum.Judged Value OK	Output.MinDistOvalMajorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Major Axis Minimum.Judged Value Fail	Output.MinDistOvalMajorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Minor Axis	Output.DistOvalMinorAxis	Unsigned	5	3	✓	L
Equivalent Oval Minor Axis.Absolute Measured Value	Output.DistOvalMinorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Minor Axis.Judged Value OK	Output.DistOvalMinorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Minor Axis.Judged Value Fail	Output.DistOvalMinorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Minor Axis Maximum	Output.MaxDistOvalMinorAxis	Unsigned	5	3	✓	L
Equivalent Oval Minor Axis Maximum.Absolute Measured Value	Output.MaxDistOvalMinorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Minor Axis Maximum.Judged Value OK	Output.MaxDistOvalMinorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Minor Axis Maximum.Judged Value Fail	Output.MaxDistOvalMinorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Minor Axis Minimum	Output.MinDistOvalMinorAxis	Unsigned	5	3	✓	L
Equivalent Oval Minor Axis Minimum.Absolute Measured Value	Output.MinDistOvalMinorAxis.Abs	Unsigned	5	3	–	–
Equivalent Oval Minor Axis Minimum.Judged Value OK	Output.MinDistOvalMinorAxis.Pass	Unsigned	1	0	–	–
Equivalent Oval Minor Axis Minimum.Judged Value Fail	Output.MinDistOvalMinorAxis.Fail	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio	Output.AspectRatio	Unsigned	5	3	✓	–
Equivalent Oval Aspect Ratio.Judged Value OK	Output.AspectRatio.Pass	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio.Judged Value Fail	Output.AspectRatio.Fail	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio Maximum	Output.MaxAspectRatio	Unsigned	5	3	✓	–
Equivalent Oval Aspect Ratio Maximum.Judged Value OK	Output.MaxAspectRatio.Pass	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio Maximum.Judged Value Fail	Output.MaxAspectRatio.Fail	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio Minimum	Output.MinAspectRatio	Unsigned	5	3	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Equivalent Oval Aspect Ratio Minimum.Judged Value OK	Output.MinAspectRatio.Pass	Unsigned	1	0	–	–
Equivalent Oval Aspect Ratio Minimum.Judged Value Fail	Output.MinAspectRatio.Fail	Unsigned	1	0	–	–
Center of Gravity X[n]	Output.Array.Position.X[n]	Signed	5	3	✓	X
Center of Gravity X[n].Absolute Measured Value	Output.Array.Position.X[n].Abs	Signed	5	3	–	–
Center of Gravity Y[n]	Output.Array.Position.Y[n]	Signed	5	3	✓	Y
Center of Gravity Y[n].Absolute Measured Value	Output.Array.Position.Y[n].Abs	Signed	5	3	–	–
Major Axis Angle[n]	Output.Array.Position.Angle[n]	Signed	3	3	✓	–
Major Axis Angle[n].Absolute Measured Value	Output.Array.Position.Angle[n].Abs	Signed	3	3	–	–
Area[n]	Output.Array.Area[n]	Unsigned	8	0	✓	–
Average Intensity Difference[n]	Output.Array.AverageIntensityLevel[n]	Unsigned	3	0	✓	–
Maximum Intensity Difference[n]	Output.Array.MaximumIntensityLevel[n]	Unsigned	3	0	✓	–
Volume[n]	Output.Array.Volume[n]	Unsigned	11	0	✓	–
Bright/Dark[n]	Output.Array.BrightOrDark[n]	Signed	1	0	✓	–
Feret Diameter X[n]	Output.Array.FeretDiameter.X[n]	Signed	5	3	✓	L
Feret Diameter X[n].Absolute Measured Value	Output.Array.FeretDiameter.X[n].Abs	Signed	5	3	–	–
Feret Diameter Y[n]	Output.Array.FeretDiameter.Y[n]	Signed	5	3	✓	L
Feret Diameter Y[n].Absolute Measured Value	Output.Array.FeretDiameter.Y[n].Abs	Signed	5	3	–	–
Perimeter[n]	Output.Array.Perimeter[n]	Unsigned	8	0	✓	L
Perimeter[n].Absolute Measured Value	Output.Array.Perimeter[n].Abs	Unsigned	8	0	–	–
Roundness[n]	Output.Array.Roundness[n]	Unsigned	1	3	✓	–
Bounding Rectangle Upper Left X[n]	Output.BoundingRectangle.UpperLeft.X[n]	Signed	5	3	✓	X
Bounding Rectangle Upper Left X[n].Absolute Measured Value	Output.BoundingRectangle.UpperLeft.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Upper Left Y[n]	Output.BoundingRectangle.UpperLeft.Y[n]	Signed	5	3	✓	Y
Bounding Rectangle Upper Left Y[n].Absolute Measured Value	Output.BoundingRectangle.UpperLeft.Y[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left X[n]	Output.BoundingRectangle.LowerLeft.X[n]	Signed	5	3	✓	X
Bounding Rectangle Lower Left X[n].Absolute Measured Value	Output.BoundingRectangle.LowerLeft.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Left Y[n]	Output.BoundingRectangle.LowerLeft.Y[n]	Signed	5	3	✓	Y
Bounding Rectangle Lower Left Y[n].Absolute Measured Value	Output.BoundingRectangle.LowerLeft.Y[n].Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right X[n]	Output.BoundingRectangle.UpperRight.X[n]	Signed	5	3	✓	X
Bounding Rectangle Upper Right X[n].Absolute Measured Value	Output.BoundingRectangle.UpperRight.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Upper Right Y[n]	Output.BoundingRectangle.UpperRight.Y[n]	Signed	5	3	✓	Y

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Bounding Rectangle Upper Right Y[n].Absolute Measured Value	Output.BoundingRectangle.UpperRight.Y[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right X[n]	Output.BoundingRectangle.LowerRight.X[n]	Signed	5	3	✓	X
Bounding Rectangle Lower Right X[n].Absolute Measured Value	Output.BoundingRectangle.LowerRight.X[n].Abs	Signed	5	3	–	–
Bounding Rectangle Lower Right Y[n]	Output.BoundingRectangle.LowerRight.Y[n]	Signed	5	3	✓	Y
Bounding Rectangle Lower Right Y[n].Absolute Measured Value	Output.BoundingRectangle.LowerRight.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left X[n]	Output.Array.AxesBox.UpperLeft.X[n]	Signed	5	3	✓	X
Major Axis Bounding Rectangle Upper Left X[n].Absolute Measured Value	Output.Array.AxesBox.UpperLeft.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Left Y[n]	Output.Array.AxesBox.UpperLeft.Y[n]	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Upper Left Y[n].Absolute Measured Value	Output.Array.AxesBox.UpperLeft.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left X[n]	Output.Array.AxesBox.LowerLeft.X[n]	Signed	5	3	✓	X
Major Axis Bounding Rectangle Lower Left X[n].Absolute Measured Value	Output.Array.AxesBox.LowerLeft.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Left Y[n]	Output.Array.AxesBox.LowerLeft.Y[n]	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Lower Left Y[n].Absolute Measured Value	Output.Array.AxesBox.LowerLeft.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right X[n]	Output.Array.AxesBox.UpperRight.X[n]	Signed	5	3	✓	X
Major Axis Bounding Rectangle Upper Right X[n].Absolute Measured Value	Output.Array.AxesBox.UpperRight.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Upper Right Y[n]	Output.Array.AxesBox.UpperRight.Y[n]	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Upper Right Y[n].Absolute Measured Value	Output.Array.AxesBox.UpperRight.Y[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right X[n]	Output.Array.AxesBox.LowerRight.X[n]	Signed	5	3	✓	X
Major Axis Bounding Rectangle Lower Right X[n].Absolute Measured Value	Output.Array.AxesBox.LowerRight.X[n].Abs	Signed	5	3	–	–
Major Axis Bounding Rectangle Lower Right Y[n]	Output.Array.AxesBox.LowerRight.Y[n]	Signed	5	3	✓	Y
Major Axis Bounding Rectangle Lower Right Y[n].Absolute Measured Value	Output.Array.AxesBox.LowerRight.Y[n].Abs	Signed	5	3	–	–
Major Axis[n]	Output.Array.MajorAxis[n]	Unsigned	5	3	✓	L
Major Axis[n].Absolute Measured Value	Output.Array.MajorAxis[n].Abs	Unsigned	5	3	–	–
Minor Axis[n]	Output.Array.MinorAxis[n]	Unsigned	5	3	✓	L
Minor Axis[n].Absolute Measured Value	Output.Array.MinorAxis[n].Abs	Unsigned	5	3	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Axes Ratio[n]	Output.Array.AxesRatio[n]	Unsigned	5	3	✓	–
Equivalent Oval Major Axis[n]	Output.Array.DistOvalMajorAxis[n]	Unsigned	5	3	✓	L
Equivalent Oval Major Axis[n].Absolute Measured Value	Output.Array.DistOvalMajorAxis[n].Abs	Unsigned	5	3	–	–
Equivalent Oval Minor Axis[n]	Output.Array.DistOvalMinorAxis[n]	Unsigned	5	3	✓	L
Equivalent Oval Minor Axis[n].Absolute Measured Value	Output.Array.DistOvalMinorAxis[n].Abs	Unsigned	5	3	–	–
Equivalent Oval Aspect Ratio[n]	Output.Array.AspectRatio[n]	Unsigned	5	3	✓	–

OCR2

#O105

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Line 1: Detected String	Output.Line[0].String	Unsigned	-	-	✓	–
Line 1: Detected String.Judged Value OK	Output.Line[0].String.Pass	Unsigned	1	0	–	–
Line 1: Detected String.Judged Value Fail	Output.Line[0].String.Fail	Unsigned	1	0	–	–
Line 1: Registered String	Output.Line[0].ReferenceString	Unsigned	-	-	✓	–
Line 1: Number of Characters	Output.Line[0].Count	Unsigned	2	0	✓	–
Line 1: Number of Characters.Judged Value OK	Output.Line[0].Count.Pass	Unsigned	1	0	–	–
Line 1: Number of Characters.Judged Value Fail	Output.Line[0].Count.Fail	Unsigned	1	0	–	–
Line 1: Correlation (Maximum)	Output.Line[0].MaxCorrelation	Unsigned	2	0	–	–
Line 1: Correlation (Maximum).Judged Value OK	Output.Line[0].MaxCorrelation.Pass	Unsigned	1	0	–	–
Line 1: Correlation (Maximum).Judged Value Fail	Output.Line[0].MaxCorrelation.Fail	Unsigned	1	0	–	–
Line 1: Correlation (Minimum)	Output.Line[0].MinCorrelation	Unsigned	2	0	–	–
Line 1: Correlation (Minimum).Judged Value OK	Output.Line[0].MinCorrelation.Pass	Unsigned	1	0	–	–
Line 1: Correlation (Minimum).Judged Value Fail	Output.Line[0].MinCorrelation.Fail	Unsigned	1	0	–	–
Line 1: Stability (Maximum)	Output.Line[0].MaxStrability	Unsigned	2	0	–	–
Line 1: Stability (Maximum).Judged Value OK	Output.Line[0].MaxStrability.Pass	Unsigned	1	0	–	–
Line 1: Stability (Maximum).Judged Value Fail	Output.Line[0].MaxStrability.Fail	Unsigned	1	0	–	–
Line 1: Stability (Minimum)	Output.Line[0].MinStrability	Unsigned	2	0	–	–
Line 1: Stability (Minimum).Judged Value OK	Output.Line[0].MinStrability.Pass	Unsigned	1	0	–	–
Line 1: Stability (Minimum).Judged Value Fail	Output.Line[0].MinStrability.Fail	Unsigned	1	0	–	–
Line 2: Detected String	Output.Line[1].String	Unsigned	-	-	✓	–
Line 2: Detected String.Judged Value OK	Output.Line[1].String.Pass	Unsigned	1	0	–	–
Line 2: Detected String.Judged Value Fail	Output.Line[1].String.Fail	Unsigned	1	0	–	–
Line 2: Registered String	Output.Line[1].ReferenceString	Unsigned	-	-	✓	–
Line 2: Number of Characters	Output.Line[1].Count	Unsigned	2	0	✓	–
Line 2: Number of Characters.Judged Value OK	Output.Line[1].Count.Pass	Unsigned	1	0	–	–
Line 2: Number of Characters.Judged Value Fail	Output.Line[1].Count.Fail	Unsigned	1	0	–	–
Line 2: Correlation (Maximum)	Output.Line[1].MaxCorrelation	Unsigned	2	0	–	–
Line 2: Correlation (Maximum).Judged Value OK	Output.Line[1].MaxCorrelation.Pass	Unsigned	1	0	–	–
Line 2: Correlation (Maximum).Judged Value Fail	Output.Line[1].MaxCorrelation.Fail	Unsigned	1	0	–	–
Line 2: Correlation (Minimum)	Output.Line[1].MinCorrelation	Unsigned	2	0	–	–
Line 2: Correlation (Minimum).Judged Value OK	Output.Line[1].MinCorrelation.Pass	Unsigned	1	0	–	–
Line 2: Correlation (Minimum).Judged Value Fail	Output.Line[1].MinCorrelation.Fail	Unsigned	1	0	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Line 2: Stability (Maximum)	Output.Line[1].MaxStrability	Unsigned	2	0	–	–
Line 2: Stability (Maximum).Judged Value OK	Output.Line[1].MaxStrability.Pass	Unsigned	1	0	–	–
Line 2: Stability (Maximum).Judged Value Fail	Output.Line[1].MaxStrability.Fail	Unsigned	1	0	–	–
Line 2: Stability (Minimum)	Output.Line[1].MinStrability	Unsigned	2	0	–	–
Line 2: Stability (Minimum).Judged Value OK	Output.Line[1].MinStrability.Pass	Unsigned	1	0	–	–
Line 2: Stability (Minimum).Judged Value Fail	Output.Line[1].MinStrability.Fail	Unsigned	1	0	–	–
Line 1 [Character *]: Detected Character	Output.Line[0].Character[*].RecognizedCharacter	Unsigned	-	-	✓	–
Line 1 [Character *]: Registered Character	Output.Line[0].Character[*].ReferenceCharacter	Unsigned	-	-	✓	–
Line 1 [Character *]: Candidate 1 Character	Output.Line[0].Character[*].Candidate[0].Character	Unsigned	-	-	✓	–
Line 1 [Character *]: Candidate 1 Correlation	Output.Line[0].Character[*].Candidate[0].Correlation	Unsigned	2	0	✓	–
Line 1 [Character *]: Library registration number for Candidate 1	Output.Line[n].Character[*].Candidate[0].LibraryRegisterNumber	Unsigned	2	0	✓	-
Line 1 [Character *]: Candidate 2 Character	Output.Line[0].Character[*].Candidate[1].Character	Unsigned	-	-	✓	–
Line 1 [Character *]: Candidate 2 Correlation	Output.Line[0].Character[*].Candidate[1].Correlation	Unsigned	2	0	✓	–
Line 1 [Character *]: Library registration number for Candidate 2	Output.Line[n].Character[*].Candidate[1].LibraryRegisterNumber	Unsigned	2	0	✓	-
Line 1 [Character *]: Stability	Output.Line[0].Character[*].Stability	Unsigned	2	0	✓	–
Line 1 [Character *]: Intensity Deviation	Output.Line[0].Character[*].IntensityDeviation	Unsigned	3	0	✓	–
Line 2 [Character *]: Detected Character	Output.Line[1].Character[*].RecognizedCharacter	Unsigned	-	-	✓	–
Line 2 [Character *]: Registered Character	Output.Line[1].Character[*].ReferenceCharacter	Unsigned	-	-	✓	–
Line 2 [Character *]: Candidate 1 Character	Output.Line[1].Character[*].Candidate[0].Character	Unsigned	-	-	✓	–
Line 2 [Character *]: Candidate 1 Correlation	Output.Line[1].Character[*].Candidate[0].Correlation	Unsigned	2	0	✓	–
Line 2 [Character *]: Library registration number for Candidate 1	Output.Line[n].Character[*].Candidate[0].LibraryRegisterNumber	Unsigned	2	0	✓	-
Line 2 [Character *]: Candidate 2 Character	Output.Line[1].Character[*].Candidate[1].Character	Unsigned	-	-	✓	–
Line 2 [Character *]: Candidate 2 Correlation	Output.Line[1].Character[*].Candidate[1].Correlation	Unsigned	2	0	✓	–
Line 2 [Character *]: Library registration number for Candidate 2	Output.Line[n].Character[*].Candidate[1].LibraryRegisterNumber	Unsigned	2	0	✓	-
Line 2 [Character *]: Stability	Output.Line[1].Character[*].Stability	Unsigned	2	0	✓	–
Line 2 [Character *]: Intensity Deviation	Output.Line[1].Character[*].IntensityDeviation	Unsigned	3	0	✓	–
Cutout Block: Point 1X	Output.Line[n].Character[*].CharacterRegion[0].Posion.X	Signed	5	0	–	X
Cutout Block: Point 1X.Absolute Measured Value	Output.Line[n].Character[*].CharacterRegion[0].Posion.X.Abs	Signed	5	0	–	-
Cutout Block: Point 1Y	Output.Line[n].Character[*].CharacterRegion[0].Posion.Y	Signed	5	0	–	Y
Cutout Block: Point 1Y.Absolute Measured Value	Output.Line[n].Character[*].CharacterRegion[0].Posion.Y.Abs	Signed	5	0	–	-
Cutout Block: Point 2X	Output.Line[n].Character[*].CharacterRegion[1].Posion.X	Signed	5	0	–	X
Cutout Block: Point 2X.Absolute Measured Value	Output.Line[n].Character[*].CharacterRegion[1].Posion.X.Abs	Signed	5	0	–	-

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Cutout Block: Point 2Y	Output.Line[n].Character[*].CharacterRegion[1].Posion.Y	Signed	5	0	–	Y
Cutout Block: Point 2Y.Absolute Measured Value	Output.Line[n].Character[*].CharacterRegion[1].Posion.Y.Abs	Signed	5	0	–	-
Cutout Block: Point 3X	Output.Line[n].Character[*].CharacterRegion[1].Posion.X	Signed	5	0	–	X
Cutout Block: Point 3X.Absolute Measured Value	Output.Line[n].Character[*].CharacterRegion[2].Posion.X.Abs	Signed	5	0	–	-
Cutout Block: Point 3Y	Output.Line[n].Character[*].CharacterRegion[2].Posion.Y	Signed	5	0	–	Y
Cutout Block: Point 3Y.Absolute Measured Value	Output.Line[n].Character[*].CharacterRegion[2].Posion.Y.Abs	Signed	5	0	–	-
Cutout Block: Point 4X	Output.Line[n].Character[*].CharacterRegion[3].Posion.X	Signed	5	0	–	X
Cutout Block: Point 4X.Absolute Measured Value	Output.Line[n].Character[*].CharacterRegion[3].Posion.X.Abs	Signed	5	0	–	-
Cutout Block: Point 4Y	Output.Line[n].Character[*].CharacterRegion[3].Posion.Y	Signed	5	0	–	Y
Cutout Block: Point 4Y.Absolute Measured Value	Output.Line[n].Character[*].CharacterRegion[3].Posion.Y.Abs	Signed	5	0	–	-

1D Code Reader

#O106

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Read Data	Output.Reference.DataString	Unsigned	-	-	✓	–
Collation Pattern	Output.Reference.ReferenceString	Unsigned	-	-	✓	–
Read Data.Judged Value OK	Output.Reference.DataString.Pass	Unsigned	-	-	–	-
Read Data.Judged Value Fail	Output.Reference.DataString.Fail	Unsigned	-	-	–	-
Read Data Length	Output.CodeLength	Unsigned	3	0	✓	–
Read Data Length.Judged Value OK	Output.CodeLength.Pass	Unsigned	1	0	–	–
Read Data Length.Judged Value Fail	Output.CodeLength.Fail	Unsigned	1	0	–	–
Position X	Output.Position.X	Unsigned	5	3	✓	X
Position X.Absolute Measured Value	Output.Position.X.Abs	Unsigned	5	3	–	–
Position X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Position X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Position Y	Output.Position.Y	Unsigned	5	3	✓	Y
Position Y.Absolute Measured Value	Output.Position.Y.Abs	Unsigned	5	3	–	–
Position Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Position Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Detected Angle	Output.Position.Angle	Signed	3	3	✓	–
Detected Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	–	–
Detected Angle.Judged Value OK	Output.Position.Angle.Pass	Unsigned	1	0	–	–
Detected Angle.Judged Value Fail	Output.Position.Angle.Fail	Unsigned	1	0	–	–
Code Data Length	Output.TotalCodeLength	Unsigned	3	0	–	–
Code Angle	Output.Position.CodeAngle	Signed	3	3	–	–
Code Angle.Absolute Measured Value	Output.Position.CodeAngle.Abs	Signed	3	3	–	–
Detected Code Resolution	Output.Array.ModuleSize[0]	Unsigned	1	3	✓	–
Code Color	Output.CodeColor	Unsigned	1	0	–	–
Reading Stability	Output.Array.Stability[0]	Unsigned	1	0	✓	–
Reading Error	Output.ReadError	Unsigned	1	0	–	–
Reading Error Cause	Output.ReadErrorCause	Unsigned	1	0	–	–
Detection Region: Point 1 X	Output.CodeArea.X1	Signed	5	0	–	X
Detection Region: Point 1 X.Absolute Measured Value	Output.CodeArea.X1.Abs	Signed	5	0	–	–
Detection Region: Point 1 Y	Output.CodeArea.Y1	Signed	5	0	–	Y
Detection Region: Point 1 Y.Absolute Measured Value	Output.CodeArea.Y1.Abs	Signed	5	0	–	–
Detection Region: Point 2 X	Output.CodeArea.X2	Signed	5	0	–	X

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detection Region: Point 2 X.Absolute Measured Value	Output.CodeArea.X2.Abs	Signed	5	0	–	–
Detection Region: Point 2 Y	Output.CodeArea.Y2	Signed	5	0	–	Y
Detection Region: Point 2 Y.Absolute Measured Value	Output.CodeArea.Y2.Abs	Signed	5	0	–	–
Detection Region: Point 3 X	Output.CodeArea.X3	Signed	5	0	–	X
Detection Region: Point 3 X.Absolute Measured Value	Output.CodeArea.X3.Abs	Signed	5	0	–	–
Detection Region: Point 3 Y	Output.CodeArea.Y3	Signed	5	0	–	Y
Detection Region: Point 3 Y.Absolute Measured Value	Output.CodeArea.Y3.Abs	Signed	5	0	–	–
Detection Region: Point 4 X	Output.CodeArea.X4	Signed	5	0	–	X
Detection Region: Point 4 X.Absolute Measured Value	Output.CodeArea.X4.Abs	Signed	5	0	–	–
Detection Region: Point 4 Y	Output.CodeArea.Y4	Signed	5	0	–	Y
Detection Region: Point 4 Y.Absolute Measured Value	Output.CodeArea.Y4.Abs	Signed	5	0	–	–
Verification: Overall Symbol Grade	Output.OverallSymbolGrade	Unsigned	1	1	✓	–
Verification: Decode (DEC)	Output.Array.Verification.Decode[0]	Unsigned	1	0	✓	–
Verification: Edge Determination (EDGE)	Output.Array.Verification.EdgeDetermination[0]	Unsigned	1	0	✓	–
Verification: Symbol Contrast (SC)	Output.Array.Verification.SymbolContrast[0]	Unsigned	1	0	✓	–
Verification: Minimum Reflectance (MINR)	Output.Array.Verification.MinimumReflectance[0]	Unsigned	1	0	✓	–
Verification: Minimum Edge Contrast (MINE)	Output.Array.Verification.MinimumEdgeContrast[0]	Unsigned	1	0	✓	–
Verification: Modulation (MOD)	Output.Array.Verification.Modulation[0]	Unsigned	1	0	✓	–
Verification: Minimum Quiet Zone (QZ)	Output.Array.Verification.MinimumQuietZone[0]	Unsigned	1	0	✓	–
Verification: Decodability (DCD)	Output.Array.Verification.Decodability[0]	Unsigned	1	0	✓	–
Verification: Defects (DEF)	Output.Array.Verification.Defects[0]	Unsigned	1	0	✓	–
Verification: Wide-Narrow Ratio (WNR)	Output.Array.Verification.WideToNarrowRatio[0]	Unsigned	1	0	✓	–
Verification: Inter Character Gap (CGAP)	Output.Array.Verification.IntercharacterGap[0]	Unsigned	1	0	✓	–

2D Code Reader

#O107

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Read Data	Output.Reference.DataString	Unsigned	-	-	✓	–
Collation Pattern	Output.Reference.ReferenceString	Unsigned	-	-	✓	–
Read Data Length	Output.CodeLength	Unsigned	3	0	✓	–
Read Data Length.Judged Value OK	Output.CodeLength.Pass	Unsigned	1	0	–	–
Read Data Length.Judged Value Fail	Output.CodeLength.Fail	Unsigned	1	0	–	–
Position X	Output.Position.X	Unsigned	5	3	✓	X
Position X.Absolute Measured Value	Output.Position.X.Abs	Unsigned	5	3	–	–
Position X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Position X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Position Y	Output.Position.Y	Unsigned	5	3	✓	Y
Position Y.Absolute Measured Value	Output.Position.Y.Abs	Unsigned	5	3	–	–
Position Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Position Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Detected Angle	Output.Position.Angle	Signed	3	3	✓	–
Detected Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	–	–
Detected Angle.Judged Value OK	Output.Position.Angle.Pass	Unsigned	1	0	–	–
Detected Angle.Judged Value Fail	Output.Position.Angle.Fail	Unsigned	1	0	–	–
Read Data (Composite Code 1D Part)	Output.CompositeCode.1dPart.Reference.DataString	Unsigned	-	-	✓	–
Read Data (1 Character) (Composite Code 1D Part)	Output.CompositeCode.1dPart.Reference.DataString.Data[n]	Unsigned	-	-	✓	–
Read Data Length (Composite Code 1D Part)	Output.CompositeCode.1dPart.CodeLength	Unsigned	-	-	✓	–
Read Data (Composite Code 2D Part)	Output.CompositeCode.2dPart.Reference.DataString	Unsigned	-	-	✓	–
Read Data (1 Character) (Composite Code 2D Part)	Output.CompositeCode.2dPart.Reference.DataString.Data[n]	Unsigned	-	-	✓	–
Read Data Length (Composite Code 2D Part)	Output.CompositeCode.2dPart.CodeLength	Unsigned	3	0	✓	–
Position X (Composite Code 1D Part)	Output.CompositeCode.1dPart.Position.X	Unsigned	5	3	✓	X
Position X (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.Position.X.Abs	Unsigned	5	3	✓	–
Position Y (Composite Code 1D Part)	Output.CompositeCode.1dPart.Position.Y	Unsigned	5	3	✓	Y
Position Y (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.Position.Y.Abs	Unsigned	5	3	✓	–
Detected Angle (Composite Code 1D Part)	Output.CompositeCode.1dPart.Position.Angle	Signed	3	3	✓	–
Detected Angle (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.Position.Angle.Abs	Signed	3	3	✓	–
Position X (Composite Code 2D Part)	Output.CompositeCode.2dPart.Position.X	Unsigned	5	3	✓	X

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Position X (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.Position.X.Abs	Unsigned	5	3	✓	–
Position Y (Composite Code 2D Part)	Output.CompositeCode.2dPart.Position.Y	Unsigned	5	3	✓	Y
Position Y (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.Position.Y.Abs	Unsigned	5	3	✓	–
Detected Angle (Composite Code 2D Part)	Output.CompositeCode.2dPart.Position.Angle	Signed	3	3	✓	–
Detected Angle (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.Position.Angle.Abs	Signed	3	3	✓	–
Code Data Length	Output.TotalCodeLength	Unsigned	3	0	–	–
Code Angle	Output.Position.CodeAngle	Signed	3	3	–	–
Code Angle.Absolute Measured Value	Output.Position.CodeAngle.Abs	Signed	3	3	–	–
Number of Rows	Output.Array.Rows.Count[0]	Unsigned	3	0	–	–
Number of Columns	Output.Array.Columns.Count[0]	Unsigned	3	0	–	–
Detected Code Resolution	Output.Array.ModuleSize[0]	Unsigned	1	3	✓	–
Unused Error Correction Rate	Output.Array.UnusedErrorCorrection[0]	Unsigned	1	0	✓	–
Code Color	Output.CodeColor	Unsigned	1	0	–	–
Mirrored Reading	Output.MirrordReading	Unsigned	1	0	–	–
Reading Error	Output.ReadError	Unsigned	1	0	–	–
Reading Error Cause	Output.ReadErrorCause	Unsigned	1	0	–	–
Composite Code Side Slip Width	Output.CompositeCodeSideSlipWidth	Signed	3	3	–	–
Detection Region: Point 1 X	Output.CodeArea.X1	Signed	5	0	–	X
Detection Region: Point 1 X.Absolute Measured Value	Output.CodeArea.X1.Abs	Signed	5	0	–	–
Detection Region: Point 1 Y	Output.CodeArea.Y1	Signed	5	0	–	Y
Detection Region: Point 1 Y.Absolute Measured Value	Output.CodeArea.Y1.Abs	Signed	5	0	–	–
Detection Region: Point 2 X	Output.CodeArea.X2	Signed	5	0	–	X
Detection Region: Point 2 X.Absolute Measured Value	Output.CodeArea.X2.Abs	Signed	5	0	–	–
Detection Region: Point 2 Y	Output.CodeArea.Y2	Signed	5	0	–	Y
Detection Region: Point 2 Y.Absolute Measured Value	Output.CodeArea.Y2.Abs	Signed	5	0	–	–
Detection Region: Point 3 X	Output.CodeArea.X3	Signed	5	0	–	X
Detection Region: Point 3 X.Absolute Measured Value	Output.CodeArea.X3.Abs	Signed	5	0	–	–
Detection Region: Point 3 Y	Output.CodeArea.Y3	Signed	5	0	–	Y
Detection Region: Point 3 Y.Absolute Measured Value	Output.CodeArea.Y3.Abs	Signed	5	0	–	–
Detection Region: Point 4 X	Output.CodeArea.X4	Signed	5	0	–	X

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detection Region: Point 4 X.Absolute Measured Value	Output.CodeArea.X4.Abs	Signed	5	0	–	–
Detection Region: Point 4 Y	Output.CodeArea.Y4	Signed	5	0	–	Y
Detection Region: Point 4 Y.Absolute Measured Value	Output.CodeArea.Y4.Abs	Signed	5	0	–	–
Detection Region: Point 1 X (Composite Code 1D Part)	Output.CompositeCode.1dPart.CodeArea.X1	Signed	5	3	–	X
Detection Region: Point 1 X (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.CodeArea.X1.Abs	Signed	5	3	–	–
Detection Region: Point 1 Y (Composite Code 1D Part)	Output.CompositeCode.1dPart.CodeArea.Y1	Signed	5	3	–	Y
Detection Region: Point 1 Y (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.CodeArea.Y1.Abs	Signed	5	3	–	–
Detection Region: Point 2 X (Composite Code 1D Part)	Output.CompositeCode.1dPart.CodeArea.X2	Signed	5	3	–	X
Detection Region: Point 2 X (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.CodeArea.X2.Abs	Signed	5	3	–	–
Detection Region: Point 2 Y (Composite Code 1D Part)	Output.CompositeCode.1dPart.CodeArea.Y2	Signed	5	3	–	Y
Detection Region: Point 2 Y (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.CodeArea.Y2.Abs	Signed	5	3	–	–
Detection Region: Point 3 X (Composite Code 1D Part)	Output.CompositeCode.1dPart.CodeArea.X3	Signed	5	3	–	X
Detection Region: Point 3 X (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.CodeArea.X3.Abs	Signed	5	3	–	–
Detection Region: Point 3 Y (Composite Code 1D Part)	Output.CompositeCode.1dPart.CodeArea.Y3	Signed	5	3	–	Y
Detection Region: Point 3 Y (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.CodeArea.Y3.Abs	Signed	5	3	–	–
Detection Region: Point 4 X (Composite Code 1D Part)	Output.CompositeCode.1dPart.CodeArea.X4	Signed	5	3	–	X
Detection Region: Point 4 X (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.CodeArea.X4.Abs	Signed	5	3	–	–
Detection Region: Point 4 Y (Composite Code 1D Part)	Output.CompositeCode.1dPart.CodeArea.Y4	Signed	5	3	–	Y
Detection Region: Point 4 Y (Composite Code 1D Part).Absolute Measured Value	Output.CompositeCode.1dPart.CodeArea.Y4.Abs	Signed	5	3	–	–
Detection Region: Point 1 X (Composite Code 2D Part)	Output.CompositeCode.2dPart.CodeArea.X1	Signed	5	3	–	X
Detection Region: Point 1 X (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.CodeArea.X1.Abs	Signed	5	3	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detection Region: Point 1 Y (Composite Code 2D Part)	Output.CompositeCode.2dPart.CodeArea.Y1	Signed	5	3	–	Y
Detection Region: Point 1 Y (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.CodeArea.Y1.Abs	Signed	5	3	–	–
Detection Region: Point 2 X (Composite Code 2D Part)	Output.CompositeCode.2dPart.CodeArea.X2	Signed	5	3	–	X
Detection Region: Point 2 X (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.CodeArea.X2.Abs	Signed	5	3	–	–
Detection Region: Point 2 Y (Composite Code 2D Part)	Output.CompositeCode.2dPart.CodeArea.Y2	Signed	5	3	–	Y
Detection Region: Point 2 Y (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.CodeArea.Y2.Abs	Signed	5	3	–	–
Detection Region: Point 3 X (Composite Code 2D Part)	Output.CompositeCode.2dPart.CodeArea.X3	Signed	5	3	–	X
Detection Region: Point 3 X (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.CodeArea.X3.Abs	Signed	5	3	–	–
Detection Region: Point 3 Y (Composite Code 2D Part)	Output.CompositeCode.2dPart.CodeArea.Y3	Signed	5	3	–	Y
Detection Region: Point 3 Y (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.CodeArea.Y3.Abs	Signed	5	3	–	–
Detection Region: Point 4 X (Composite Code 2D Part)	Output.CompositeCode.2dPart.CodeArea.X4	Signed	5	3	–	X
Detection Region: Point 4 X (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.CodeArea.X4.Abs	Signed	5	3	–	–
Detection Region: Point 4 Y (Composite Code 2D Part)	Output.CompositeCode.2dPart.CodeArea.Y4	Signed	5	3	–	Y
Detection Region: Point 4 Y (Composite Code 2D Part).Absolute Measured Value	Output.CompositeCode.2dPart.CodeArea.Y4.Abs	Signed	5	3	–	–
Verification: Overall Symbol Grade	Output.OverallSymbolGrade	Unsigned	1	1	✓	–
Verification: Overall Symbol Grade (Int)	Output.OverallSymbolGradeInt	Unsigned	1	0	✓	–
Verification: ISO_Decode (DEC)	Output.Array.Verification.ISO.Decode[0]	Unsigned	1	0	✓	–
Verification: ISO_Symbol Contrast (SC)	Output.Array.Verification.ISO.SymbolContrast[0]	Unsigned	1	0	✓	–
Verification: ISO_Modulation (MOD)	Output.Array.Verification.ISO.Modulation[0]	Unsigned	1	0	✓	–
Verification: ISO_Reflectance Margin (RM)	Output.Array.Verification.ISO.ReflectanceMargin[0]	Unsigned	1	0	✓	–
Verification: ISO_Fixed Pattern Damage (FPD)	Output.Array.Verification.ISO.FixedPatternDamage[0]	Unsigned	1	0	✓	–
Verification: ISO_Axial Nonuniformity (AN)	Output.Array.Verification.ISO.AxialNonuniformity[0]	Unsigned	1	0	✓	–
Verification: ISO_Grid Nonuniformity (GN)	Output.Array.Verification.ISO.GridNonuniformity[0]	Unsigned	1	0	✓	–
Verification: ISO_Unused Error Correction (UEC)	Output.Array.Verification.ISO.UnusedErrorCorrection[0]	Unsigned	1	0	✓	–
Verification: ISO_Format Information Damage (FID)	Output.Array.Verification.ISO.FormatInformationDamage[0]	Unsigned	1	0	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Verification: ISO_Version Information Damage (VID)	Output.Array.Verification.ISO.VersionInformationDamage[0]	Unsigned	1	0	✓	–
Verification: ISO_Print Growth Horizontal (PGH)	Output.Array.Verification.ISO.PrintGrowthHorizontal[0]	Unsigned	1	0	✓	–
Verification: ISO_Print Growth Vertical (PGV)	Output.Array.Verification.ISO.PrintGrowthVertical[0]	Unsigned	1	0	✓	–
Verification: AIM_Decode (DEC)	Output.Array.Verification.AIM.Decode[0]	Unsigned	1	0	✓	–
Verification: AIM_Cell Contrast (CC)	Output.Array.Verification.AIM.CellContrast[0]	Unsigned	1	0	✓	–
Verification: AIM_Cell Modulation (CM)	Output.Array.Verification.AIM.CellModulation[0]	Unsigned	1	0	✓	–
Verification: AIM_Reflectance Margin (RM)	Output.Array.Verification.AIM.ReflectanceMargin[0]	Unsigned	1	0	✓	–
Verification: AIM_Fixed Pattern Damage (FPD)	Output.Array.Verification.AIM.FixedPatternDamage[0]	Unsigned	1	0	✓	–
Verification: AIM_Axial Nonuniformity (AN)	Output.Array.Verification.AIM.AxialNonuniformity[0]	Unsigned	1	0	✓	–
Verification: AIM_Grid Nonuniformity (GN)	Output.Array.Verification.AIM.GridNonuniformity[0]	Unsigned	1	0	✓	–
Verification: AIM_Unused Error Correction (UEC)	Output.Array.Verification.AIM.UnusedErrorCorrection[0]	Unsigned	1	0	✓	–
Verification: AIM_Format Information Damage (FID)	Output.Array.Verification.AIM.FormatInformationDamage[0]	Unsigned	1	0	✓	–
Verification: AIM_Version Information Damage (VID)	Output.Array.Verification.AIM.VersionInformationDamage[0]	Unsigned	1	0	✓	–
Verification: AIM_Print Growth Horizontal (PGH)	Output.Array.Verification.AIM.PrintGrowthHorizontal[0]	Unsigned	1	0	✓	–
Verification: AIM_Print Growth Vertical (PGV)	Output.Array.Verification.AIM.PrintGrowthVertical[0]	Unsigned	1	0	✓	–
Verification: SAE_Quiet Zone (QZ)	Output.Array.Verification.SAE.QuietZone[0]	Unsigned	1	0	✓	–
Verification: SAE_Symbol Contrast (SC)	Output.Array.Verification.SAE.SymbolContrast[0]	Unsigned	1	0	✓	–
Verification: SAE_Angular Distortion (AD)	Output.Array.Verification.SAE.AngularDistortion[0]	Unsigned	1	0	✓	–
Verification: SAE_Module Fill (MF)	Output.Array.Verification.SAE.ModuleFill[0]	Unsigned	1	0	✓	–
Verification: ST_Decode (DEC)	Output.Array.Verification.ST.Decode[0]	Unsigned	1	0	✓	–
Verification: ST_Edge Determination (EDGE)	Output.Array.Verification.ST.EdgeDetermination[0]	Unsigned	1	0	✓	–
Verification: ST_Symbol Contrast (SC)	Output.Array.Verification.ST.SymbolContrast[0]	Unsigned	1	0	✓	–
Verification: ST_Minimum Reflectance (MINR)	Output.Array.Verification.ST.MinimumReflectance[0]	Unsigned	1	0	✓	–
Verification: ST_Minimum Edge Contrast (MINE)	Output.Array.Verification.ST.MinimumEdgeContrast[0]	Unsigned	1	0	✓	–
Verification: ST_Modulation (MOD)	Output.Array.Verification.ST.Modulation[0]	Unsigned	1	0	✓	–
Verification: ST_Minimum Quiet Zone (QZ)	Output.Array.Verification.ST.MinimumQuietZone[0]	Unsigned	1	0	✓	–
Verification: ST_Decodability (DCD)	Output.Array.Verification.ST.Decodability[0]	Unsigned	1	0	✓	–
Verification: ST_Defects (DEF)	Output.Array.Verification.ST.Defects[0]	Unsigned	1	0	✓	–
Verification: ST_Codeword Yield (CY)	Output.Array.Verification.ST.CodewordYield[0]	Unsigned	1	0	✓	–
Verification: ST_Codeword Print Quality (CPQ)	Output.Array.Verification.ST.CodewordPrintQuality[0]	Unsigned	1	0	✓	–
Verification: ST_Unused Error Correction (UEC)	Output.Array.Verification.ST.UnusedErrorCorrection[0]	Unsigned	1	0	✓	–
Verification: BC_Decode (DEC)	Output.Array.Verification.BC.Decode[0]	Unsigned	1	0	✓	–
Verification: BC_Edge Determination (EDGE)	Output.Array.Verification.BC.EdgeDetermination[0]	Unsigned	1	0	✓	–
Verification: BC_Symbol Contrast (SC)	Output.Array.Verification.BC.SymbolContrast[0]	Unsigned	1	0	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Verification: BC_Minimum Reflectance (MINR)	Output.Array.Verification.BC.MinimumReflectance[0]	Unsigned	1	0	✓	–
Verification: BC_Minimum Edge Contrast (MINE)	Output.Array.Verification.BC.MinimumEdgeContrast[0]	Unsigned	1	0	✓	–
Verification: BC_Modulation (MOD)	Output.Array.Verification.BC.Modulation[0]	Unsigned	1	0	✓	–
Verification: BC_Minimum Quiet Zone (QZ)	Output.Array.Verification.BC.MinimumQuietZone[0]	Unsigned	1	0	✓	–
Verification: BC_Decodability (DCD)	Output.Array.Verification.BC.Decodability[0]	Unsigned	1	0	✓	–
Verification: BC_Defects (DEF)	Output.Array.Verification.BC.Defects[0]	Unsigned	1	0	✓	–

AI Classification

#O108

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Result Classification Label Index	Output.Index	Unsigned	2	0	–	–
Result Classification Label	Output.Class	Unsigned	-	-	✓	–
Result Classification Label.Judged Value OK	Output.Class.Pass	Unsigned	1	0	–	–
Result Classification Label.Judged Value Fail	Output.Class.Fail	Unsigned	1	0	–	–
Match Degree	Output.Score	Unsigned	3	0	✓	–
Match Degree.Judged Value OK	Output.Score.Pass	Unsigned	1	0	–	–
Match Degree.Judged Value Fail	Output.Score.Fail	Unsigned	1	0	–	–
Result Classification Label Index	Output.Array.Index[n]	Unsigned	2	0	–	–
Result Classification Label	Output.Array.Class[n]	Unsigned	-	-	✓	–
Match Degree	Output.Array.Score[n]	Unsigned	3	0	✓	–

AI Detection

#O109

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Anomaly Level	Output.Level	Unsigned	4	3	✓	–
Anomaly Level.Judged Value OK	Output.Level.Pass	Unsigned	1	0	–	–
Anomaly Level.Judged Value Fail	Output.Level.Fail	Unsigned	1	0	–	–

AI Segmentation

#O152

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Anomaly Level	Output.Level	Unsigned	3	3	✓	–
Anomaly Level.Judged Value OK	Output.Level.Pass	Unsigned	1	0	–	–
Anomaly Level.Judged Value Fail	Output.Level.Fail	Unsigned	1	0	–	–

AI OCR

#O155

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detected String	Output.Line[0].String	Unsigned	-	-	✓	-
Detected String.Judged Value OK	Output.Line[0].String.Pass	Unsigned	1	0	-	-
Detected String.Judged Value Fail	Output.Line[0].String.Fail	Unsigned	1	0	-	-
Registered String	Output.Line[0].ReferenceString	Unsigned	-	-	✓	-
Number of Characters	Output.Line[0].Count	Unsigned	2	0	✓	-
Number of Characters.Judged Value OK	Output.Line[0].Count.Pass	Unsigned	1	0	-	-
Number of Characters.Judged Value Fail	Output.Line[0].Count.Fail	Unsigned	1	0	-	-
Match Degree (Maximum)	Output.Line[0].MaxQualityScore	Unsigned	2	0	-	-
Match Degree (Maximum) Judged Value OK	Output.Line[0].MaxQualityScore.Pass	Unsigned	1	0	-	-
Match Degree (Maximum) Judged Value Fail	Output.Line[0].MaxQualityScore.Fail	Unsigned	1	0	-	-
Match Degree (Minimum)	Output.Line[0].MinQualityScore	Unsigned	2	0	-	-
Match Degree (Minimum) Judged Value OK	Output.Line[0].MinQualityScore.Pass	Unsigned	1	0	-	-
Match Degree (Minimum) Judged Value Fail	Output.Line[0].MinQualityScore.Fail	Unsigned	1	0	-	-
Character *	Output.Line[0].Character[*]					-
Recognized Character	Output.Line[0].Character[*].RecognizedCharacter	Unsigned	-	-	✓	-
Judgment Character	Output.Line[0].Character[*].ReferenceCharacter	Unsigned	-	-	✓	-
Library Registration No.	Output.Line[0].Character[*].LibraryRegisterNumber	Unsigned	2	0	✓	-
Match Degree	Output.Line[0].Character[*].QualityScore	Unsigned	2	0	✓	-
(Rectangle) Width	Output.Line[0].Character[*].Width	Unsigned	5	0	-	-
(Rectangle) Height	Output.Line[0].Character[*].Height	Unsigned	5	0	-	-
(Rectangle) Center X	Output.Line[0].Character[*].Center.X	Signed	5	3	-	X
(Rectangle) Center X.Absolute Measured Value	Output.Line[0].Character[*].Center.X.Abs	Signed	5	3	-	-
(Rectangle) Center Y	Output.Line[0].Character[*].Center.Y	Signed	5	3	-	Y
(Rectangle) Center Y.Absolute Measured Value	Output.Line[0].Character[*].Center.Y.Abs	Signed	5	3	-	-
(Rectangle) Rotation Angle	Output.Line[0].Character[*].Angle	Unsigned	3	3	-	-
(Rectangle) Rotation Angle.Absolute Measured Value	Output.Line[0].Character[*].Angle.Abs	Unsigned	3	3	-	-
(Arc) Center X	Output.Line[0].Character[*].Center.X	Signed	5	3	-	X
(Arc) Center X.Absolute Measured Value	Output.Line[0].Character[*].Center.X.Abs	Signed	5	3	-	-
(Arc) Center Y	Output.Line[0].Character[*].Center.Y	Signed	5	3	-	Y
(Arc) Center Y.Absolute Measured Value	Output.Line[0].Character[*].Center.Y.Abs	Signed	5	3	-	-
(Arc) Radius 1	Output.Line[0].Character[*].Radius1	Unsigned	4	0	-	-
(Arc) Radius 2	Output.Line[0].Character[*].Radius2	Unsigned	4	0	-	-
(Arc) Starting Angle	Output.Line[0].Character[*].StartingAngle	Unsigned	3	3	-	-

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
(Arc) Starting Angle.Absolute Measured Value	Output.Line[0].Character[*].StartingAngle.Abs	Unsigned	3	3	-	-
(Arc) Ending Angle	Output.Line[0].Character[*].EndAngle	Unsigned	3	3	-	-
(Arc) Ending Angle.Absolute Measured Value	Output.Line[0].Character[*].EndAngle.Abs	Unsigned	3	3	-	-

Points Distance

#O110

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Distance	Output.Distance	Unsigned	5	3	✓	L
Distance.Absolute Measured Value	Output.Distance.Abs	Unsigned	5	3	–	–
Distance.Judged Value Pass	Output.Distance.Pass	Unsigned	1	0	–	–
Distance.Judged Value Fail	Output.Distance.Fail	Unsigned	1	0	–	–
Distance X	Output.Distance.X	Unsigned	5	3	✓	X
Distance X.Absolute Measured Value	Output.Distance.X.Abs	Unsigned	5	3	–	–
Distance X.Judged Value Pass	Output.Distance.X.Pass	Unsigned	1	0	–	–
Distance X.Judged Value Fail	Output.Distance.X.Fail	Unsigned	1	0	–	–
Distance Y	Output.Distance.Y	Unsigned	5	3	✓	Y
Distance Y.Absolute Measured Value	Output.Distance.Y.Abs	Unsigned	5	3	–	–
Distance Y.Judged Value Pass	Output.Distance.Y.Pass	Unsigned	1	0	–	–
Distance Y.Judged Value Fail	Output.Distance.Y.Fail	Unsigned	1	0	–	–
Detected Point 1X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Point 1X.Absolute Measured Value	Output.Target1.Position.X.Abs	Signed	5	3	–	–
Detected Point 1Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Point 1Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Signed	5	3	–	–
Detected Point 2X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Point 2X.Absolute Measured Value	Output.Target2.Position.X.Abs	Signed	5	3	–	–
Detected Point 2Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Point 2Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Signed	5	3	–	–

Point/Line Distance

#O111

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Distance	Output.Distance	Unsigned	5	3	✓	L
Distance.Absolute Measured Value	Output.Distance.Abs	Unsigned	5	3	–	–
Distance.Judged Value OK	Output.Distance.Pass	Unsigned	1	0	–	–
Distance.Judged Value Fail	Output.Distance.Fail	Unsigned	1	0	–	–
Distance X	Output.Distance.X	Unsigned	5	3	✓	X
Distance X.Absolute Measured Value	Output.Distance.X.Abs	Unsigned	5	3	–	–
Distance X.Judged Value OK	Output.Distance.X.Pass	Unsigned	1	0	–	–
Distance X.Judged Value Fail	Output.Distance.X.Fail	Unsigned	1	0	–	–
Distance Y	Output.Distance.Y	Unsigned	5	3	✓	Y
Distance Y.Absolute Measured Value	Output.Distance.Y.Abs	Unsigned	5	3	–	–
Distance Y.Judged Value OK	Output.Distance.Y.Pass	Unsigned	1	0	–	–
Distance Y.Judged Value Fail	Output.Distance.Y.Fail	Unsigned	1	0	–	–
Detected Point X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Point X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	–	–
Detected Point Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Point Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	–	–
Detected Line.Angle	Output.Target2.Position.X	Signed	3	3	✓	–
Detected Line.Angle.Absolute Measured Value	Output.Target2.Position.X.Abs	Signed	3	3	–	–
Detected Line X	Output.Target2.Position.Y	Unsigned	5	3	✓	X
Detected Line X.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	–	–
Detected Line Y	Output.Target2.Angle	Unsigned	5	3	✓	Y
Detected Line Y.Absolute Measured Value	Output.Target2.Angle.Abs	Unsigned	5	3	–	–

Lines Distance

#O112

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Distance	Output.Distance	Unsigned	5	3	✓	L
Distance.Absolute Measured Value	Output.Distance.Abs	Unsigned	5	3	–	–
Distance.Judged Value OK	Output.Distance.Pass	Unsigned	1	0	–	–
Distance.Judged Value Fail	Output.Distance.Fail	Unsigned	1	0	–	–
Distance X	Output.Distance.X	Unsigned	5	3	✓	X
Distance X.Absolute Measured Value	Output.Distance.X.Abs	Unsigned	5	3	–	–
Distance X.Judged Value OK	Output.Distance.X.Pass	Unsigned	1	0	–	–
Distance X.Judged Value Fail	Output.Distance.X.Fail	Unsigned	1	0	–	–
Distance Y	Output.Distance.Y	Unsigned	5	3	✓	Y
Distance Y.Absolute Measured Value	Output.Distance.Y.Abs	Unsigned	5	3	–	–
Distance Y.Judged Value OK	Output.Distance.Y.Pass	Unsigned	1	0	–	–
Distance Y.Judged Value Fail	Output.Distance.Y.Fail	Unsigned	1	0	–	–
Detected Line 1.Angle	Output.Target1.Angle	Signed	3	3	✓	–
Detected Line 1.Angle.Absolute Measured Value	Output.Target1.Angle.Abs	Signed	3	3	–	–
Detected Line 1.X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Line 1.X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 1.Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Line 1.Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	–	–
Detected Line 2.Angle	Output.Target2.Angle	Signed	3	3	✓	–
Detected Line 2.Angle.Absolute Measured Value	Output.Target2.Angle.Abs	Signed	3	3	–	–
Detected Line 2.X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Line 2.X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 2.Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Line 2.Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	–	–

Point/Circle Distance

#O113

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Distance	Output.Distance	Signed	5	3	✓	L
Distance.Absolute Measured Value	Output.Distance.Abs	Signed	5	3	–	–
Distance.Judged Value OK	Output.Distance.Pass	Unsigned	1	0	–	–
Distance.Judged Value Fail	Output.Distance.Fail	Unsigned	1	0	–	–
Distance X	Output.Distance.X	Signed	5	3	✓	X
Distance X.Absolute Measured Value	Output.Distance.X.Abs	Signed	5	3	–	–
Distance X.Judged Value OK	Output.Distance.X.Pass	Unsigned	1	0	–	–
Distance X.Judged Value Fail	Output.Distance.X.Fail	Unsigned	1	0	–	–
Distance Y	Output.Distance.Y	Signed	5	3	✓	Y
Distance Y.Absolute Measured Value	Output.Distance.Y.Abs	Signed	5	3	–	–
Distance Y.Judged Value OK	Output.Distance.Y.Pass	Unsigned	1	0	–	–
Distance Y.Judged Value Fail	Output.Distance.Y.Fail	Unsigned	1	0	–	–
Detected Point.X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Point.X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	–	–
Detected Point.Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Point.Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	–	–
Detected Circle Center X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Circle Center X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	–	–
Detected Circle Center Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Circle Center Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	–	–
Detected Circle Radius	Output.Target2.Radius	Unsigned	5	3	✓	L
Detected Circle Radius.Absolute Measured Value	Output.Target2.Radius.Abs	Unsigned	5	3	–	–
Detected Circle Diameter	Output.Target2.Diameter	Unsigned	5	3	✓	L
Detected Circle Diameter.Absolute Measured Value	Output.Target2.Diameter.Abs	Unsigned	5	3	–	–

Line/Circle Distance

#O114

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Distance	Output.Distance	Unsigned	5	3	✓	L
Distance.Absolute Measured Value	Output.Distance.Abs	Unsigned	5	3	–	–
Distance.Judged Value OK	Output.Distance.Pass	Unsigned	1	0	–	–
Distance.Judged Value Fail	Output.Distance.Fail	Unsigned	1	0	–	–
Distance X	Output.Distance.X	Unsigned	5	3	✓	X
Distance X.Absolute Measured Value	Output.Distance.X.Abs	Unsigned	5	3	–	–
Distance X.Judged Value OK	Output.Distance.X.Pass	Unsigned	1	0	–	–
Distance X.Judged Value Fail	Output.Distance.X.Fail	Unsigned	1	0	–	–
Distance Y	Output.Distance.Y	Unsigned	5	3	✓	Y
Distance X.Absolute Measured Value	Output.Distance.Y.Abs	Unsigned	5	3	–	–
Distance Y.Judged Value OK	Output.Distance.Y.Pass	Unsigned	1	0	–	–
Distance Y.Judged Value Fail	Output.Distance.Y.Fail	Unsigned	1	0	–	–
Detected Line 1.Angle	Output.Target1.Angle	Signed	3	3	✓	–
Detected Line 1.Angle.Absolute Measured Value	Output.Target1.Angle.Abs	Signed	3	3	–	–
Detected Line 1.X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Line 1.X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 1.Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Line 1.Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	–	–
Detected Circle 2 Center X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Circle 2 Center X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	–	–
Detected Circle 2 Center Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Circle 2 Center Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	–	–
Detected Circle 2 Radius	Output.Target2.Radius	Unsigned	5	3	✓	L
Detected Circle 2 Radius.Absolute Measured Value	Output.Target2.Radius.Abs	Unsigned	5	3	–	–
Detected Circle 2 Diameter	Output.Target2.Diameter	Unsigned	5	3	✓	L
Detected Circle 2 Diameter.Absolute Measured Value	Output.Target2.Diameter.Abs	Unsigned	5	3	–	–

Circles Distance

#O115

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Distance	Output.Distance	Unsigned	5	3	✓	L
Distance.Absolute Measured Value	Output.Distance.Abs	Unsigned	5	3	–	–
Distance.Judged Value OK	Output.Distance.Pass	Unsigned	1	0	–	–
Distance.Judged Value Fail	Output.Distance.Fail	Unsigned	1	0	–	–
Distance X	Output.Distance.X	Unsigned	5	3	✓	X
Distance X.Absolute Measured Value	Output.Distance.X.Abs	Unsigned	5	3	–	–
Distance X.Judged Value OK	Output.Distance.X.Pass	Unsigned	1	0	–	–
Distance X.Judged Value Fail	Output.Distance.X.Fail	Unsigned	1	0	–	–
Distance Y	Output.Distance.Y	Unsigned	5	3	✓	Y
Distance Y.Absolute Measured Value	Output.Distance.Y.Abs	Unsigned	5	3	–	–
Distance Y.Judged Value OK	Output.Distance.Y.Pass	Unsigned	1	0	–	–
Distance Y.Judged Value Fail	Output.Distance.Y.Fail	Unsigned	1	0	–	–
Detected Circle 1 Center X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Circle 1 Center X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	–	–
Detected Circle 1 Center Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Circle 1 Center Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	–	–
Detected Circle 1 Radius	Output.Target1.Radius	Unsigned	5	3	✓	L
Detected Circle 1 Radius.Absolute Measured Value	Output.Target1.Radius.Abs	Unsigned	5	3	–	–
Detected Circle 1 Diameter	Output.Target1.Diameter	Unsigned	5	3	✓	L
Detected Circle 1 Diameter.Absolute Measured Value	Output.Target1.Diameter.Abs	Unsigned	5	3	–	–
Detected Circle 2 Center X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Circle 2 Center X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	–	–
Detected Circle 2 Center Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Circle 2 Center Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	–	–
Detected Circle 2 Radius	Output.Target2.Radius	Unsigned	5	3	✓	L
Detected Circle 2 Radius.Absolute Measured Value	Output.Target2.Radius.Abs	Unsigned	5	3	–	–
Detected Circle 2 Diameter	Output.Target2.Diameter	Unsigned	5	3	✓	L
Detected Circle 2 Diameter.Absolute Measured Value	Output.Target2.Diameter.Abs	Unsigned	5	3	–	–

Line Detection

#O116

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Number of Segments	Output.Segments	Unsigned	5	0	✓	–
Number of Segments	Output.Segments	Unsigned	5	0	✓	-
Number of Detected Segments	Output.DetectedSegments	Unsigned	5	0	✓	-
Number of Detected Segments.Judged Value OK	Output.DetectedSegments.Pass	Unsigned	1	0	–	-
Number of Detected Segments.Judged Value Fail	Output.DetectedSegments.Fail	Unsigned	1	0	–	-
Number of Detected Edges	Output.EdgeCount	Unsigned	4	0	–	-
Number of Detected Edges Maximum	Output.EdgeCount.Maximum	Unsigned	4	0	–	-
Number of Detected Edges Minimum	Output.EdgeCount.Minimum	Unsigned	4	0	–	-
Position X	Output.Position.X	Signed	5	3	–	X
Position X.Absolute Measured Value	Output.Position.X.Abs	Signed	5	3	–	-
Position X Maximum	Output.Position.MaxX	Signed	5	3	–	X
Position X Maximum.Absolute Measured Value	Output.Position.MaxX.Abs	Signed	5	3	–	-
Position X Minimum	Output.Position.MinX	Signed	5	3	–	X
Position X Minimum.Absolute Measured Value	Output.Position.MinX.Abs	Signed	5	3	–	-
Position X Average	Output.Position.AverageX	Signed	5	3	–	X
Position X Average.Absolute Measured Value	Output.Position.AverageX.Abs	Signed	5	3	–	-
Position Y	Output.Position.Y	Signed	5	3	–	Y
Position Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	5	3	–	-
Position Y Maximum	Output.Position.MaxY	Signed	5	3	–	Y
Position Y Maximum.Absolute Measured Value	Output.Position.MaxY.Abs	Signed	5	3	–	-
Position Y Minimum	Output.Position.MinY	Signed	5	3	–	Y
Position Y Minimum.Absolute Measured Value	Output.Position.MinY.Abs	Signed	5	3	–	-
Position Y Average	Output.Position.AverageY	Signed	5	3	–	Y
Position Y Average.Absolute Measured Value	Output.Position.AverageY.Abs	Signed	5	3	–	-
Angle	Output.Position.Angle	Signed	3	3	–	-
Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	–	-
Angle Maximum	Output.Angle.Maximum	Signed	3	3	–	-
Angle Maximum.Absolute Measured Value	Output.Angle.Maximum.Abs	Signed	3	3	–	-
Angle Minimum	Output.Angle.Minimum	Signed	3	3	–	-
Angle Minimum.Absolute Measured Value	Output.Angle.Minimum.Abs	Signed	3	3	–	-
Detected Line Center X	Output.DetectedLine.Center.X	Signed	5	3	–	X

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detected Line Center X.Absolute Measured Value	Output.DetectedLine.Center.X.Abs	Signed	5	3	–	-
Detected Line Center Y	Output.DetectedLine.Center.Y	Signed	5	3	–	Y
Detected Line Center Y.Absolute Measured Value	Output.DetectedLine.Center.Y.Abs	Signed	5	3	–	-
Detected Line Angle (+/-180°)	Output.DetectedLine.Angle	Signed	3	3	–	-
Detected Line Angle (+/-180°).Absolute Measured Value	Output.DetectedLine.Angle.Abs	Signed	3	3	–	-
Detected Line Angle (+/-180°).Judged Value OK	Output.DetectedLine.Angle.Pass	Unsigned	1	0	–	-
Detected Line Angle (+/-180°).Judged Value Fail	Output.DetectedLine.Angle.Fail	Unsigned	1	0	–	-
Detected Line X	Output.DetectionLine.Position.X	Signed	5	3	✓	X
Detected Line X.Absolute Measured Value	Output.DetectionLine.Position.X.Abs	Signed	5	3	–	-
Detected Line Y	Output.DetectionLine.Position.Y	Signed	5	3	✓	Y
Detected Line Y.Absolute Measured Value	Output.DetectionLine.Position.Y.Abs	Signed	5	3	–	-
Detected Line Angle	Output.DetectionLine.Position.Angle	Signed	3	3	✓	-
Detected Line Angle.Absolute Measured Value	Output.DetectionLine.Position.Angle.Abs	Signed	3	3	–	-
Detected Line Angle.Judged Value OK	Output.DetectionLine.Position.Angle.Pass	Unsigned	1	0	–	-
Detected Line Angle.Judged Value Fail	Output.DetectionLine.Position.Angle.Fail	Unsigned	1	0	–	-
Detected Line Count	Output.DetectedLine.Count	Unsigned	1	3	✓	-
Detected Line Count.Judged Value OK	Output.DetectedLine.Count.Pass	Unsigned	1	3	–	-
Detected Line Count.Judged Value Fail	Output.DetectedLine.Count.Fail	Unsigned	1	3	–	-
Distance (Maximum)	Output.MaxDistance	Unsigned	5	3	✓	L
Distance (Maximum).Absolute Measured Value	Output.MaxDistance.Abs	Unsigned	5	3	–	-
Distance (Maximum).Judged Value OK	Output.MaxDistance.Pass	Unsigned	1	0	–	-
Distance (Maximum).Judged Value Fail	Output.MaxDistance.Fail	Unsigned	1	0	–	-
Distance (Minimum)	Output.MinDistance	Unsigned	5	3	✓	L
Distance (Minimum).Absolute Measured Value	Output.MinDistance.Abs	Unsigned	5	3	–	-
Distance (Minimum).Judged Value OK	Output.MinDistance.Pass	Unsigned	1	0	–	-
Distance (Minimum).Judged Value Fail	Output.MinDistance.Fail	Unsigned	1	0	–	-
Distance Average	Output.Distance.Average	Unsigned	5	3	–	L
Distance Average.Absolute Measured Value	Output.Distance.Average.Abs	Unsigned	5	3	–	-
Intensity	Output.EdgeIntensity	Unsigned	5	3	–	-
Intensity Maximum	Output.EdgeIntensity.Maximum	Unsigned	3	3	–	-
Intensity Minimum	Output.EdgeIntensity.Minimum	Unsigned	3	3	–	-
Detected Line X1	Output.DetectionLine.Point1.Position.X	Signed	5	3	–	X
Detected Line X1.Absolute Measured Value	Output.DetectionLine.Point1.Position.X.Abs	Signed	5	3	–	-

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detected Line Y1	Output.DetectionLine.Point1.Position.Y	Signed	5	3	–	Y
Detected Line Y1.Absolute Measured Value	Output.DetectionLine.Point1.Position.Y.Abs	Signed	5	3	–	-
Detected Line X2	Output.DetectionLine.Point2.Position.X	Signed	5	3	–	X
Detected Line X2.Absolute Measured Value	Output.DetectionLine.Point2.Position.X.Abs	Signed	5	3	–	-
Detected Line Y2	Output.DetectionLine.Point2.Position.Y	Signed	5	3	–	Y
Detected Line Y2.Absolute Measured Value	Output.DetectionLine.Point2.Position.Y.Abs	Signed	5	3	–	-
Detected Line ρ	Output.DetectedLine.Rho	Signed	5	3	–	L
ρ of Detected Line.Absolute Measured Value	Output.DetectedLine.Rho.Abs	Signed	5	3	–	-
Detected Line θ	Output.DetectedLine.Theta	Signed	5	3	–	-
θ of Detected Line.Absolute Measured Value	Output.DetectedLine.Theta.Abs	Signed	5	3	–	-
Maximum Segment No.	Output.SegmentNumber.Maximum	Unsigned	5	0	–	-
Minimum Segment No.	Output.SegmentNumber.Minimum	Unsigned	5	0	–	-
Judged Label Distance	Output.Distance	Unsigned	5	3	✓	L
Distance.Absolute Measured Value	Output.Distance.Abs					-
Distance.Judged Value OK	Output.Distance.Pass	Unsigned	1	0	–	-
Distance.Judged Value Fail	Output.Distance.Fail	Unsigned	1	0	–	-
Number of Detected Edges[n]	Output.Array.EdgeCount[n]	Unsigned	5	0	–	-
Position X[n]	Output.Array.Position.X[n]	Signed	5	3	–	X
Position X[n].Absolute Measured Value	Output.Array.Position.X[n].Abs	Signed	5	3	–	-
Position Y[n]	Output.Array.Position.Y[n]	Signed	5	3	–	Y
Position Y[n].Absolute Measured Value	Output.Array.Position.Y[n].Abs	Signed	5	3	–	-
Angle[n]	Output.Array.Position.Angle[n]	Signed	3	3	–	-
Angle[n].Absolute Measured Value	Output.Array.Position.Angle[n].Abs	Signed	3	3	–	-
Distance[n]	Output.Array.Distance[n]	Unsigned	5	3	✓	L
Distance[n].Absolute Measured Value	Output.Array.Distance[n].Abs	Unsigned	5	3	–	-
Intensity[n]	Output.Array.EdgeIntensity[n]	Unsigned	3	3	–	-

Line Passing Two Points

#O117

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detected Line Angle	Output.DetectionLine.Position.Angle	Signed	3	3	✓	-
Detected Line Angle.Absolute Measured Value	Output.DetectionLine.Position.Angle.Abs	Signed	3	3	-	-
Detected Line Angle.Judged Value OK	Output.DetectionLine.Position.Angle.Pass	Unsigned	1	0	-	-
Detected Line Angle.Judged Value Fail	Output.DetectionLine.Position.Angle.Fail	Unsigned	1	0	-	-
Detected Line Angle (+/-180°)	Output.Angle	Signed	3	3	-	-
Detected Line Angle (+/-180°).Absolute Measured Value	Output.Angle.Abs	Signed	3	3	-	-
Detected Line Angle (+/-180°).Judged Value OK	Output.Angle.Pass	Unsigned	1	0	-	-
Detected Line Angle (+/-180°).Judged Value Fail	Output.Angle.Fail	Unsigned	1	0	-	-
Detected Point 1.X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Point 1.X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	-	-
Detected Point 1.Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Point 1.Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	-	-
Detected Point 2.X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Point 2.X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	-	-
Detected Point 2.Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Point 2.Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	-	-

Bisection of Two Lines

#O118

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Median X (+/-180°)	Output.Position.X	Signed	5	3	-	X
Median X (+/-180°).Absolute Measured Value	Output.Position.X.Abs	Signed	5	3	-	-
Median Y (+/-180°)	Output.Position.Y	Signed	5	3	-	Y
Median Y (+/-180°) Absolute Measured Value	Output.Position.Y.Abs	Signed	5	3	-	-
Bisector Angle (+/-180°)	Output.Angle	Signed	3	3	-	-
Bisector Angle (+/-180°).Absolute Measured Value	Output.Angle.Abs	Signed	3	3	-	-
Bisector Angle (+/-180°).Judged Value OK	Output.Angle.Pass	Unsigned	1	0	-	-
Bisector Angle (+/-180°).Judged Value Fail	Output.Angle.Fail	Unsigned	1	0	-	-
Detected Median X	Output.DetectionLine.Position.X	Signed	5	3	✓	X
Detected Median X.Absolute Measured Value	Output.DetectionLine.Position.X.Abs	Signed	5	3	-	-
Detected Median Y	Output.DetectionLine.Position.Y	Signed	5	3	✓	Y
Detected Median Y.Absolute Measured Value	Output.DetectionLine.Position.Y.Abs	Signed	5	3	-	-
Detected Bisector Angle	Output.DetectionLine.Position.Angle	Signed	3	3	✓	-
Detected Bisector Angle.Absolute Measured Value	Output.DetectionLine.Position.Angle.Abs	Signed	3	3	-	-
Detected Bisector Angle.Judged Value OK	Output.DetectionLine.Position.Angle.Pass	Unsigned	1	0	-	-
Detected Bisector Angle.Judged Value Fail	Output.DetectionLine.Position.Angle.Fail	Unsigned	1	0	-	-
Detected Line 1X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Line 1 X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	-	-
Detected Line 1Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Line 1 Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	-	-
Detected Line 1 Angle	Output.Target1.Angle	Signed	3	3	✓	-
Detected Line 1 Angle.Absolute Measured Value	Output.Target1.Angle.Abs	Signed	3	3	-	-
Detected Line 2 X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Line 2 X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	-	-
Detected Line 2 Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Line 2 Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	-	-
Detected Line 2 Angle	Output.Target2.Angle	Signed	3	3	✓	-
Detected Line 2 Angle.Absolute Measured Value	Output.Target2.Angle.Abs	Signed	3	3	-	-

Angle Formed by Two Lines

#O119

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Angle	Output.Angle	Signed	3	3	✓	–
Angle.Absolute Measured Value	Output.Angle.Abs	Signed	3	3	–	–
Angle.Judged Value OK	Output.Angle.Pass	Unsigned	1	0	–	–
Angle.Judged Value Fail	Output.Angle.Fail	Unsigned	1	0	–	–
Detected Line 1.Angle	Output.Target1.Angle	Signed	3	3	✓	–
Detected Line 1.Angle.Absolute Measured Value	Output.Target1.Angle.Abs	Signed	3	3	–	–
Detected Line 1.X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Line 1.X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 1.Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Line 1.Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	–	–
Detected Line 2.Angle	Output.Target2.Angle	Signed	3	3	✓	–
Detected Line 2.Angle.Absolute Measured Value	Output.Target2.Angle.Abs	Signed	3	3	–	–
Detected Line 2.X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Line 2.X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 2.Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Line 2.Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	–	–

Circle Detection

#O120

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Number of Segments	Output.Segments	Unsigned	5	0	✓	–
Number of Detected Segments	Output.DetectedSegments	Unsigned	5	0	✓	–
Number of Detected Segments.Judged Value OK	Output.DetectedSegments.Pass	Unsigned	1	0	–	–
Number of Detected Segments.Judged Value Fail	Output.DetectedSegments.Fail	Unsigned	1	0	–	–
Number of Detected Edges Maximum	Output.EdgeCount.Maximum	Unsigned	5	0	–	–
Number of Detected Edges Minimum	Output.EdgeCount.Minimum	Unsigned	5	0	–	–
Position X	Output.Position.X	Signed	5	3	–	X
Position X.Absolute Measured Value	Output.Position.X.Abs	Signed	5	3	–	–
Position X Average	Output.Position.AverageX	Signed	5	3	–	X
Position X Average.Absolute Measured Value	Output.Position.AverageX.Abs	Signed	5	3	–	–
Position Y	Output.Position.Y	Signed	5	3	–	Y
Position Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	5	3	–	–
Position Y Average	Output.Position.AverageY	Signed	5	3	–	Y
Position Y Average.Absolute Measured Value	Output.Position.AverageY.Abs	Signed	5	3	–	–
Angle	Output.Position.Angle	Signed	3	3	–	–
Angle.Absolute Measured Value	Output.Position.Angle.Abs	Signed	3	3	–	–
Angle Maximum	Output.Angle.Maximum	Signed	3	3	–	–
Angle Maximum.Absolute Measured Value	Output.Angle.Maximum.Abs	Signed	3	3	–	–
Angle Minimum	Output.Angle.Minimum	Signed	3	3	–	–
Angle Minimum.Absolute Measured Value	Output.Angle.Minimum.Abs	Signed	3	3	–	–
Detected Circle Center X	Output.DetectedCircle.Center.X	Signed	5	3	✓	X
Detected Circle Center X.Absolute Measured Value	Output.DetectedCircle.Center.X.Abs	Signed	5	3	–	–
Detected Circle Center X.Judged Value OK	Output.DetectedCircle.Center.X.Pass	Unsigned	1	0	–	–
Detected Circle Center X.Judged Value Fail	Output.DetectedCircle.Center.X.Fail	Unsigned	1	0	–	–
Detected Circle Center Y	Output.DetectedCircle.Center.Y	Signed	5	3	✓	Y
Detected Circle Center Y.Absolute Measured Value	Output.DetectedCircle.Center.Y.Abs	Signed	5	3	–	–
Detected Circle Center Y.Judged Value OK	Output.DetectedCircle.Center.Y.Pass	Unsigned	1	0	–	–
Detected Circle Center Y.Judged Value Fail	Output.DetectedCircle.Center.Y.Fail	Unsigned	1	0	–	–
Detected Circle Radius	Output.DetectedCircle.Radius	Unsigned	5	3	✓	L
Detected Circle Radius.Absolute Measured Value	Output.DetectedCircle.Radius.Abs	Unsigned	5	3	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detected Circle Radius.Judged Value OK	Output.DetectedCircle.Radius.Pass	Unsigned	1	0	–	–
Detected Circle Radius.Judged Value Fail	Output.DetectedCircle.Radius.Fail	Unsigned	1	0	–	–
Detected Circle Diameter	Output.DetectedCircle.Diameter	Unsigned	5	3	✓	L
Detected Circle Diameter.Absolute Measured Value	Output.DetectedCircle.Diameter.Abs	Unsigned	5	3	–	–
Detected Circle Diameter.Judged Value OK	Output.DetectedCircle.Diameter.Pass	Unsigned	1	0	–	–
Detected Circle Diameter.Judged Value Fail	Output.DetectedCircle.Diameter.Fail	Unsigned	1	0	–	–
Detected Circle Count	Output.DetectedCircle.Count	Unsigned	1	0	✓	–
Detected Circle Count.Judged Value OK	Output.DetectedCircle.Count.Pass	Unsigned	1	0	–	–
Detected Circle Count.Judged Value Fail	Output.DetectedCircle.Count.Fail	Unsigned	1	0	–	–
Distance Maximum	Output.MaxDistance	Unsigned	5	3	–	L
Distance Maximum.Absolute Measured Value	Output.MaxDistance.Abs	Unsigned	5	3	–	–
Distance Maximum.Judged Value OK	Output.MaxDistance.Pass	Unsigned	1	0	–	–
Distance Maximum.Judged Value Fail	Output.MaxDistance.Fail	Unsigned	1	0	–	–
Distance Minimum	Output.MinDistance	Unsigned	5	3	–	L
Distance Minimum.Absolute Measured Value	Output.MinDistance.Abs	Unsigned	5	3	–	–
Distance Minimum.Judged Value OK	Output.MinDistance.Pass	Unsigned	1	0	–	–
Distance Minimum.Judged Value Fail	Output.MinDistance.Fail	Unsigned	1	0	–	–
Distance Average	Output.AverageDistance	Unsigned	5	3	–	L
Distance Average.Absolute Measured Value	Output.AverageDistance.Abs	Unsigned	5	3	–	–
Radius (Maximum)	Output.MaxRadius	Unsigned	5	3	✓	L
Radius (Maximum).Absolute Measured Value	Output.MaxRadius.Abs	Unsigned	5	3	–	–
Radius (Maximum).Judged Value OK	Output.MaxRadius.Pass	Unsigned	1	0	–	–
Radius (Maximum).Judged Value Fail	Output.MaxRadius.Fail	Unsigned	1	0	–	–
Radius (Minimum)	Output.MinRadius	Unsigned	5	3	✓	L
Radius (Minimum).Absolute Measured Value	Output.MinRadius.Abs	Unsigned	5	3	–	–
Radius (Minimum).Judged Value OK	Output.MinRadius.Pass	Unsigned	1	0	–	–
Radius (Minimum).Judged Value Fail	Output.MinRadius.Fail	Unsigned	1	0	–	–
Radius Average	Output.Radius.Average	Unsigned	5	3	–	L
Radius Average.Absolute Measured Value	Output.Radius.Average.Abs	Unsigned	5	3	–	–
Intensity	Output.EdgeIntensity	Unsigned	3	3	–	–
Intensity Maximum	Output.EdgeIntensity.Maximum	Unsigned	3	3	–	–
Intensity Minimum	Output.EdgeIntensity.Minimum	Unsigned	3	3	–	–
Maximum Segment No.	Output.SegmentNumber.Maximum	Unsigned	5	0	–	–
Minimum Segment No.	Output.SegmentNumber.Minimum	Unsigned	5	0	–	–
Judged Label Radius	Output.Radius	Unsigned	5	3	✓	L
Judged Label Radius.Absolute Measured Value	Output.Radius.Abs	Unsigned	5	3	–	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Judged Label Radius.Judged Value OK	Output.Radius.Pass	Unsigned	1	0	–	–
Judged Label Radius.Judged Value Fail	Output.Radius.Fail	Unsigned	1	0	–	–
Number of Detected Edges[n]	Output.Array.EdgeCount[n]	Unsigned	5	0	–	–
Position X[n]	Output.Array.Position.X[n]	Signed	5	3	–	X
Position X[n].Absolute Measured Value	Output.Array.Position.X[n].Abs	Signed	5	3	–	–
Position Y[n]	Output.Array.Position.Y[n]	Signed	5	3	–	Y
Position Y[n].Absolute Measured Value	Output.Array.Position.Y[n].Abs	Signed	5	3	–	–
Angle[n]	Output.Array.Position.Angle[n]	Signed	3	3	–	–
Angle[n].Absolute Measured Value	Output.Array.Position.Angle[n].Abs	Signed	3	3	–	–
Distance[n]	Output.Array.Distance[n]	Unsigned	5	3	–	L
Distance[n].Absolute Measured Value	Output.Array.Distance[n].Abs	Unsigned	5	3	–	–
Radius[n]	Output.Array.Radius[n]	Unsigned	5	3	✓	L
Radius[n].Absolute Measured Value	Output.Array.Radius[n].Abs	Unsigned	5	3	–	–
Intensity[n]	Output.Array.EdgeIntensity[0]	Unsigned	3	3	–	–

Line/V-Line Intersection

#O121

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Intersection X	Output.Position.X	Signed	3	3	✓	X
Intersection X.Absolute Measured Value	Output.Position.X.Abs	Signed	3	3	–	–
Intersection X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Intersection X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Intersection Y	Output.Position.Y	Signed	3	3	✓	Y
Intersection Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	3	3	–	–
Intersection Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Intersection Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Detected Line 1.Angle	Output.Target1.Angle	Signed	3	3	✓	–
Detected Line 1.Angle.Absolute Measured Value	Output.Target1.Angle.Abs	Signed	3	3	–	–
Detected Line 1.X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Line 1.X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 1.Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Line 1.Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	–	–
Detected Point.X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Point.X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	–	–
Detected Point.Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Point.Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	–	–

Two Lines Intersection

#O122

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Intersection X	Output.Position.X	Signed	3	3	✓	X
Intersection X.Absolute Measured Value	Output.Position.X.Abs	Signed	3	3	–	–
Intersection X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Intersection X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Intersection Y	Output.Position.Y	Signed	3	3	✓	Y
Intersection Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	3	3	–	–
Intersection Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Intersection Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Detected Line 1.Angle	Output.Target1.Angle	Signed	3	3	✓	–
Detected Line 1.Angle.Absolute Measured Value	Output.Target1.Angle.Abs	Signed	3	3	–	–
Detected Line 1.X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Line 1.X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 1.Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Line 1.Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	–	–
Detected Line 2.Angle	Output.Target2.Angle	Signed	3	3	✓	–
Detected Line 2.Angle.Absolute Measured Value	Output.Target2.Angle.Abs	Signed	3	3	–	–
Detected Line 2.X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Line 2.X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 2.Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Line 2.Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	–	–

Center of Quadrangle

#O123

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Center X	Output.Position.X	Signed	3	3	✓	X
Center X.Absolute Measured Value	Output.Position.X.Abs	Signed	3	3	–	–
Center X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Center X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Center Y	Output.Position.Y	Signed	3	3	✓	Y
Center Y.Absolute Measured Value	Output.Position.Y.Abs	Signed	3	3	–	–
Center Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Center Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Detected Line 1.Angle	Output.Target1.Angle	Signed	3	3	✓	–
Detected Line 1.Angle.Absolute Measured Value	Output.Target1.Angle.Abs	Signed	3	3	–	–
Detected Line 1.X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Line 1.X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 1.Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Line 1.Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	–	–
Detected Line 2.Angle	Output.Target2.Angle	Signed	3	3	✓	–
Detected Line 2.Angle.Absolute Measured Value	Output.Target2.Angle.Abs	Signed	3	3	–	–
Detected Line 2.X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Line 2.X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 2.Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Line 2.Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	–	–
Detected Line 3.Angle	Output.Target3.Angle	Signed	3	3	✓	–
Detected Line 3.Angle.Absolute Measured Value	Output.Target3.Angle.Abs	Signed	3	3	–	–
Detected Line 3.X	Output.Target3.Position.X	Unsigned	5	3	✓	X
Detected Line 3.X.Absolute Measured Value	Output.Target3.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 3.Y	Output.Target3.Position.Y	Unsigned	5	3	✓	Y
Detected Line 3.Y.Absolute Measured Value	Output.Target3.Position.Y.Abs	Unsigned	5	3	–	–
Detected Line 4.Angle	Output.Target4.Angle	Signed	3	3	✓	–
Detected Line 4.Angle.Absolute Measured Value	Output.Target4.Angle.Abs	Signed	3	3	–	–
Detected Line 4.X	Output.Target4.Position.X	Unsigned	5	3	✓	X
Detected Line 4.X.Absolute Measured Value	Output.Target4.Position.X.Abs	Unsigned	5	3	–	–
Detected Line 4.Y	Output.Target4.Position.Y	Unsigned	5	3	✓	Y

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detected Line 4.Y.Absolute Measured Value	Output.Target4.Position.Y.Abs	Unsigned	5	3	–	–

Midpoint of Points

#O124

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Midpoint X	Output.Position.X	Unsigned	5	3	✓	X
Midpoint X.Absolute Measured Value	Output.Position.X.Abs	Unsigned	5	3	–	–
Midpoint X.Judged Value OK	Output.Position.X.Pass	Unsigned	1	0	–	–
Midpoint X.Judged Value Fail	Output.Position.X.Fail	Unsigned	1	0	–	–
Midpoint Y	Output.Position.Y	Unsigned	5	3	✓	Y
Midpoint Y.Absolute Measured Value	Output.Position.Y.Abs	Unsigned	5	3	–	–
Midpoint Y.Judged Value OK	Output.Position.Y.Pass	Unsigned	1	0	–	–
Midpoint Y.Judged Value Fail	Output.Position.Y.Fail	Unsigned	1	0	–	–
Detected Point 1.X	Output.Target1.Position.X	Unsigned	5	3	✓	X
Detected Point 1.X.Absolute Measured Value	Output.Target1.Position.X.Abs	Unsigned	5	3	–	–
Detected Point 1.Y	Output.Target1.Position.Y	Unsigned	5	3	✓	Y
Detected Point 1.Y.Absolute Measured Value	Output.Target1.Position.Y.Abs	Unsigned	5	3	–	–
Detected Point 2.X	Output.Target2.Position.X	Unsigned	5	3	✓	X
Detected Point 2.X.Absolute Measured Value	Output.Target2.Position.X.Abs	Unsigned	5	3	–	–
Detected Point 2.Y	Output.Target2.Position.Y	Unsigned	5	3	✓	Y
Detected Point 2.Y.Absolute Measured Value	Output.Target2.Position.Y.Abs	Unsigned	5	3	–	–

Image Position Adjustment

#O125

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Shift Amount X	Output.CorrectionAmount.X	Signed	5	3	✓	X
Shift Amount Y	Output.CorrectionAmount.Y	Signed	5	3	✓	Y
Rotation Angle	Output.CorrectionAmount.Angle	Signed	5	3	✓	–
Rotation Center X	Output.RotationCenter.X	Signed	5	3	✓	X
Rotation Center Y	Output.RotationCenter.Y	Signed	5	3	✓	Y

Calibration (Robot)

#O126

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Execution Time	Output.General.ExecutionTime	Unsigned	7	3	✓	–
Error Code	Output.General.ErrorCode	Unsigned	7	0	✓	–
Tool Center X	Output.ToolCenter.X	Signed	5	3	✓	–
Tool Center Y	Output.ToolCenter.Y	Signed	5	3	✓	–
Tool Center X (pixel)	Output.ToolCenter.Pixel.X	Signed	5	3	✓	–
Tool Center Y (pixel)	Output.ToolCenter.Pixel.Y	Signed	5	3	✓	–
Parallel Movement X	Output.Shift.X	Signed	5	3	✓	–
Parallel Movement Y	Output.Shift.Y	Signed	5	3	✓	–
X-Axis Rotation	Output.RotateX	Signed	3	3	✓	–
Y-Axis Inversion	Output.ReverseY	Signed	3	3	✓	–
Y-Axis Skew Angle	Output.SkewY	Signed	3	3	✓	–
Resolution X	Output.Resolution.X	Signed	4	3	✓	–
Resolution Y	Output.Resolution.Y	Signed	4	3	✓	–
Calibration Error (Maximum)	Output.Calibration.DetectedPoints.Error.Max	Signed	5	3	✓	–
Calibration Error (Average)	Output.Calibration.DetectedPoints.Error.Ave	Signed	5	3	✓	–
Field of View X	Output.FieldOfView.X	Signed	4	3	✓	–
Field of View Y	Output.FieldOfView.Y	Signed	4	3	✓	–
Start Position X	Output.StartPosition.X	Signed	4	3	✓	–
Start Position Y	Output.StartPosition.Y	Signed	4	3	✓	–
Start Position Z	Output.StartPosition.Z	Signed	4	3	✓	–
Start Position Rx	Output.StartPosition.Rx	Signed	3	3	✓	–
Start Position Ry	Output.StartPosition.Ry	Signed	3	3	✓	–
Start Position Rz	Output.StartPosition.Rz	Signed	3	3	✓	–
Transformation Matrix (Camera to Robot)	Output.ToWorldMatrix	-	-	-	✓	–
Transformation Matrix (Camera to Robot)[n]	Output.ToWorldMatrix[n]	Signed	5	3	✓	–
Transformation Matrix (Robot to Camera)	Output.ToPixelMatrix	-	-	-	✓	–
Transformation Matrix (Robot to Camera)[n]	Output.ToPixelMatrix[n]	Signed	5	3	✓	–

Pick/Place

#O127

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detection Count	Output.Num	Unsigned	4	0	✓	-
Post-Transformation X Shift from Reference	Output.Position.GapX	Signed	5	3	✓	-
Post-Transformation X Shift from Reference.Judged Value OK	Output.Position.GapX.Pass	Unsigned	1	0	✓	-
Post-Transformation X Shift from Reference.Judged Value Fail	Output.Position.GapX.Fail	Unsigned	1	0	✓	-
Post-Transformation X Shift from Reference Maximum	Output.Position.GapX.Max	Signed	5	3	✓	-
Post-Transformation X Shift from Reference Maximum.Judged Value OK	Output.Position.GapX.Max.Pass	Unsigned	1	0	✓	-
Post-Transformation X Shift from Reference Maximum.Judged Value Fail	Output.Position.GapX.Max.Fail	Unsigned	1	0	✓	-
Post-Transformation X Shift from Reference Minimum	Output.Position.GapX.Min	Signed	5	3	✓	-
Post-Transformation X Shift from Reference Minimum.Judged Value OK	Output.Position.GapX.Min.Pass	Unsigned	1	0	✓	-
Post-Transformation X Shift from Reference Minimum.Judged Value Fail	Output.Position.GapX.Min.Fail	Unsigned	1	0	✓	-
Post-Transformation Y Shift from Reference	Output.Position.GapY	Signed	5	3	✓	-
Post-Transformation Y Shift from Reference.Judged Value OK	Output.Position.GapY.Pass	Unsigned	1	0	✓	-
Post-Transformation Y Shift from Reference.Judged Value Fail	Output.Position.GapY.Fail	Unsigned	1	0	✓	-
Post-Transformation Y Shift from Reference Maximum	Output.Position.GapY.Max	Signed	5	3	✓	-
Post-Transformation Y Shift from Reference Maximum.Judged Value OK	Output.Position.GapY.Max.Pass	Unsigned	1	0	✓	-
Post-Transformation Y Shift from Reference Maximum.Judged Value Fail	Output.Position.GapY.Max.Fail	Unsigned	1	0	✓	-
Post-Transformation Y Shift from Reference Minimum	Output.Position.GapY.Min	Signed	5	3	✓	-
Post-Transformation Y Shift from Reference Minimum.Judged Value OK	Output.Position.GapY.Min.Pass	Unsigned	1	0	✓	-
Post-Transformation Y Shift from Reference Minimum.Judged Value Fail	Output.Position.GapY.Min.Fail	Unsigned	1	0	✓	-
Post-Transformation Angle Shift from Reference (Rz)	Output.Position.GapRz	Signed	3	3	✓	-

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Post-Transformation Angle Shift from Reference (Rz).Judged Value OK	Output.Position.GapRz.Pass	Unsigned	1	0	✓	-
Post-Transformation Angle Shift from Reference (Rz).Judged Value Fail	Output.Position.GapRz.Fail	Unsigned	1	0	✓	-
Post-Transformation Angle Shift from Reference (Rz) Maximum	Output.Position.GapRz.Max	Signed	3	3	✓	-
Post-Transformation Angle Shift from Reference (Rz) Maximum.Judged Value OK	Output.Position.GapRz.Max.Pass	Unsigned	1	0	✓	-
Post-Transformation Angle Shift from Reference (Rz) Maximum.Judged Value Fail	Output.Position.GapRz.max.Fail	Unsigned	1	0	✓	-
Post-Transformation Angle Shift from Reference (Rz) Minimum	Output.Position.GapRz.Min	Signed	3	3	✓	-
Post-Transformation Angle Shift from Reference (Rz) Minimum.Judged Value OK	Output.Position.GapRz.Min.Pass	Unsigned	1	0	✓	-
Post-Transformation Angle Shift from Reference (Rz) Minimum.Judged Value Fail	Output.Position.GapRz.Min.Fail	Unsigned	1	0	✓	-
Robot Coordinate X	Output.RobotPose.Position.X	Signed	4	3	✓	-
Robot Coordinate X.Judged Value OK	Output.RobotPose.Position.X.Pass	Unsigned	1	0	✓	-
Robot Coordinate X.Judged Value Fail	Output.RobotPose.Position.X.Fail	Unsigned	1	0	✓	-
Robot Coordinate X Maximum	Output.RobotPose.Position.X.Max	Signed	4	3	✓	-
Robot Coordinate X Maximum.Judged Value OK	Output.RobotPose.Position.X.Max.Pass	Unsigned	1	0	✓	-
Robot Coordinate X Maximum.Judged Value Fail	Output.RobotPose.Position.X.Max.Fail	Unsigned	1	0	✓	-
Robot Coordinate X Minimum	Output.RobotPose.Position.X.Min	Signed	4	3	✓	-
Robot Coordinate X Minimum.Judged Value OK	Output.RobotPose.Position.X.Min.Pass	Unsigned	1	0	✓	-
Robot Coordinate X Minimum.Judged Value Fail	Output.RobotPose.Position.X.Min.Fail	Unsigned	1	0	✓	-
Robot Coordinate Y	Output.RobotPose.Position.Y	Signed	4	3	✓	-
Robot Coordinate Y.Judged Value OK	Output.RobotPose.Position.Y.Pass	Unsigned	1	0	✓	-
Robot Coordinate Y.Judged Value Fail	Output.RobotPose.Position.Y.Fail	Unsigned	1	0	✓	-
Robot Coordinate Y Maximum	Output.RobotPose.Position.Y.Max	Signed	4	3	✓	-
Robot Coordinate Y Maximum.Judged Value OK	Output.RobotPose.Position.Y.Max.Pass	Unsigned	1	0	✓	-
Robot Coordinate Y Maximum.Judged Value Fail	Output.RobotPose.Position.Y.Max.Fail	Unsigned	1	0	✓	-
Robot Coordinate Y Minimum	Output.RobotPose.Position.Y.Min	Signed	4	3	✓	-
Robot Coordinate Y Minimum.Judged Value OK	Output.RobotPose.Position.Y.Min.Pass	Unsigned	1	0	✓	-

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Robot Coordinate Y Minimum.Judged Value Fail	Output.RobotPose.Position.Y.Min.Fail	Unsigned	1	0	✓	-
Robot Coordinate Z	Output.RobotPose.Position.Z	Signed	4	3	✓	-
Robot Coordinate Z.Judged Value OK	Output.RobotPose.Position.Z.Pass	Unsigned	1	0	✓	-
Robot Coordinate Z.Judged Value Fail	Output.RobotPose.Position.Z.Fail	Unsigned	1	0	✓	-
Robot Coordinate Z Maximum	Output.RobotPose.Position.Z.Max	Signed	4	3	✓	-
Robot Coordinate Z Maximum.Judged Value OK	Output.RobotPose.Position.Z.Max.Pass	Unsigned	1	0	✓	-
Robot Coordinate Z Maximum.Judged Value Fail	Output.RobotPose.Position.Z.Max.Fail	Unsigned	1	0	✓	-
Robot Coordinate Z Minimum	Output.RobotPose.Position.Z.Min	Signed	4	3	✓	-
Robot Coordinate Z Minimum.Judged Value OK	Output.RobotPose.Position.Z.Min.Pass	Unsigned	1	0	✓	-
Robot Coordinate Z Minimum.Judged Value Fail	Output.RobotPose.Position.Z.Min.Fail	Unsigned	1	0	✓	-
Robot Coordinate Rx	Output.RobotPose.Orientation.X	Signed	3	3	✓	-
Robot Coordinate Rx.Judged Value OK	Output.RobotPose.Orientation.X.Pass	Unsigned	1	0	✓	-
Robot Coordinate Rx.Judged Value Fail	Output.RobotPose.Orientation.X.Fail	Unsigned	1	0	✓	-
Robot Coordinate Rx Maximum	Output.RobotPose.Orientation.X.Max	Signed	3	3	✓	-
Robot Coordinate Rx Maximum.Judged Value OK	Output.RobotPose.Orientation.X.Max.Pass	Unsigned	1	0	✓	-
Robot Coordinate Rx Maximum.Judged Value Fail	Output.RobotPose.Orientation.X.Max.Fail	Unsigned	1	0	✓	-
Robot Coordinate Rx Minimum	Output.RobotPose.Orientation.X.Min	Signed	3	3	✓	-
Robot Coordinate Rx Minimum.Judged Value OK	Output.RobotPose.Orientation.X.Min.Pass	Unsigned	1	0	✓	-
Robot Coordinate Rx Minimum.Judged Value Fail	Output.RobotPose.Orientation.X.Min.Fail	Unsigned	1	0	✓	-
Robot Coordinate Ry	Output.RobotPose.Orientation.Y	Signed	3	3	✓	-
Robot Coordinate Ry.Judged Value OK	Output.RobotPose.Orientation.Y.Pass	Unsigned	1	0	✓	-
Robot Coordinate Ry.Judged Value Fail	Output.RobotPose.Orientation.Y.Fail	Unsigned	1	0	✓	-
Robot Coordinate Ry Maximum	Output.RobotPose.Orientation.Y.Max	Signed	3	3	✓	-
Robot Coordinate Ry Maximum.Judged Value OK	Output.RobotPose.Orientation.Y.Max.Pass	Unsigned	1	0	✓	-
Robot Coordinate Ry Maximum.Judged Value Fail	Output.RobotPose.Orientation.Y.Max.Fail	Unsigned	1	0	✓	-
Robot Coordinate Ry Minimum	Output.RobotPose.Orientation.Y.Min	Signed	3	3	✓	-
Robot Coordinate Ry Minimum.Judged Value OK	Output.RobotPose.Orientation.Y.Min.Pass	Unsigned	1	0	✓	-

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Robot Coordinate Ry Minimum.Judged Value Fail	Output.RobotPose.Orientation.Y.Min.Fail	Unsigned	1	0	✓	-
Robot Coordinate Rz	Output.RobotPose.Orientation.Z	Signed	3	3	✓	-
Robot Coordinate Rz.Judged Value OK	Output.RobotPose.Orientation.Z.Pass	Unsigned	1	0	✓	-
Robot Coordinate Rz.Judged Value Fail	Output.RobotPose.Orientation.Z.Fail	Unsigned	1	0	✓	-
Robot Coordinate Rz Maximum	Output.RobotPose.Orientation.Z.Max	Signed	3	3	✓	-
Robot Coordinate Rz Maximum.Judged Value OK	Output.RobotPose.Orientation.Z.Max.Pass	Unsigned	1	0	✓	-
Robot Coordinate Rz Maximum.Judged Value Fail	Output.RobotPose.Orientation.Z.Max.Fail	Unsigned	1	0	✓	-
Robot Coordinate Rz Minimum	Output.RobotPose.Orientation.Z.Min	Signed	3	3	✓	-
Robot Coordinate Rz Minimum.Judged Value OK	Output.RobotPose.Orientation.Z.Min.Pass	Unsigned	1	0	✓	-
Robot Coordinate Rz Minimum.Judged Value Fail	Output.RobotPose.Orientation.Z.Min.Fail	Unsigned	1	0	✓	-
Correction Amount X (For Capture Position)	Output.CorrectionAmountForCapturePosition.X	Signed	4	3	✓	-
Correction Amount Y (For Capture Position)	Output.CorrectionAmountForCapturePosition.Y	Signed	4	3	✓	-
Correction Angle (Rz) (For Capture Position)	Output.CorrectionAmountForCapturePosition.Rz	Signed	3	3	✓	-
Correction Amount Y (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.X	Signed	4	3	✓	-
Correction Amount Y (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.Y	Signed	4	3	✓	-
Correction Amount Z (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.Z	Signed	4	3	✓	-
Correction Angle (Rx) (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.Rx	Signed	3	3	✓	-
Correction Angle (Ry) (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.Ry	Signed	3	3	✓	-
Correction Angle (Rz) (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.Rz	Signed	3	3	✓	-
Post-Transformation X Shift from Reference[n]	Output.Array.Position.GapX[n]	Signed	5	3	✓	-
Post-Transformation Y Shift from Reference[n]	Output.Array.Position.GapY[n]	Signed	5	3	✓	-
Post-Transformation Angle Shift from Reference (Rz)[n]	Output.Array.Position.GapZ[n]	Signed	3	3	✓	-
Robot Coordinate X[n]	Output.Array.RobotPose.Position.X[n]	Signed	4	3	✓	-
Robot Coordinate Y[n]	Output.Array.RobotPose.Position.Y[n]	Signed	4	3	✓	-
Robot Coordinate Z[n]	Output.Array.RobotPose.Position.Z[n]	Signed	4	3	✓	-
Robot Coordinate Rx[n]	Output.Array.RobotPose.Orientation.X[n]	Signed	4	3	✓	-
Robot Coordinate Ry[n]	Output.Array.RobotPose.Orientation.Y[n]	Signed	4	3	✓	-
Robot Coordinate Rz[n]	Output.Array.RobotPose.Orientation.Z[n]	Signed	4	3	✓	-
Correction Amount X (For Capture Position) [n]	Output.Array.CorrectionAmountForCapturePosition.X	Signed	4	3	✓	-
Correction Amount Y (For Capture Position) [n]	Output.Array.CorrectionAmountForCapturePosition.Y	Signed	4	3	✓	-
Correction Angle (Rz) (For Capture Position) [n]	Output.Array.CorrectionAmountForCapturePosition.Rz	Signed	3	3	✓	-

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Correction Amount X (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.X	Signed	4	3	✓	-
Correction Amount Y (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.Y	Signed	4	3	✓	-
Correction Amount Z (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.Z	Signed	4	3	✓	-
Correction Angle (Rx) (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.Rx	Signed	3	3	✓	-
Correction Angle (Ry) (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.Ry	Signed	3	3	✓	-
Correction Angle (Rz) (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.Rz	Signed	3	3	✓	-

Grip Shift Correction

#O128

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Detection Count	Output.Num	Unsigned	4	0	✓	–
Post-Transformation X Shift from Reference	Output.Position.GapX	Signed	5	3	✓	–
Post-Transformation X Shift from Reference.Judged Value OK	Output.Position.GapX.Pass	Unsigned	1	0	✓	–
Post-Transformation X Shift from Reference.Judged Value Fail	Output.Position.GapX.Fail	Unsigned	1	0	✓	–
Post-Transformation X Shift from Reference Maximum	Output.Position.GapX.Max	Signed	5	3	✓	–
Post-Transformation X Shift from Reference Maximum.Judged Value OK	Output.Position.GapX.Max.Pass	Unsigned	1	0	✓	–
Post-Transformation X Shift from Reference Maximum.Judged Value Fail	Output.Position.GapX.Max.Fail	Unsigned	1	0	✓	–
Post-Transformation X Shift from Reference Minimum	Output.Position.GapX.Min	Signed	5	3	✓	–
Post-Transformation X Shift from Reference Minimum.Judged Value OK	Output.Position.GapX.Min.Pass	Unsigned	1	0	✓	–
Post-Transformation X Shift from Reference Minimum.Judged Value Fail	Output.Position.GapX.Min.Fail	Unsigned	1	0	✓	–
Post-Transformation Y Shift from Reference	Output.Position.GapY	Signed	5	3	✓	–
Post-Transformation Y Shift from Reference.Judged Value OK	Output.Position.GapY.Pass	Unsigned	1	0	✓	–
Post-Transformation Y Shift from Reference.Judged Value Fail	Output.Position.GapY.Fail	Unsigned	1	0	✓	–
Post-Transformation Y Shift from Reference Maximum	Output.Position.GapY.Max	Signed	5	3	✓	–
Post-Transformation Y Shift from Reference Maximum.Judged Value OK	Output.Position.GapY.Max.Pass	Unsigned	1	0	✓	–
Post-Transformation Y Shift from Reference Maximum.Judged Value Fail	Output.Position.GapY.Max.Fail	Unsigned	1	0	✓	–
Post-Transformation Y Shift from Reference Minimum	Output.Position.GapY.Min	Signed	5	3	✓	–
Post-Transformation Y Shift from Reference Minimum.Judged Value OK	Output.Position.GapY.Min.Pass	Unsigned	1	0	✓	–
Post-Transformation Y Shift from Reference Minimum.Judged Value Fail	Output.Position.GapY.Min.Fail	Unsigned	1	0	✓	–
Post-Transformation Angle Shift from Reference (Rz)	Output.Position.GapRz	Signed	3	3	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Post-Transformation Angle Shift from Reference (Rz).Judged Value OK	Output.Position.GapRz.Pass	Unsigned	1	0	✓	–
Post-Transformation Angle Shift from Reference (Rz).Judged Value Fail	Output.Position.GapRz.Fail	Unsigned	1	0	✓	–
Post-Transformation Angle Shift from Reference (Rz) Maximum	Output.Position.GapRz.Max	Signed	3	3	✓	–
Post-Transformation Angle Shift from Reference (Rz) Maximum.Judged Value OK	Output.Position.GapRz.Max.Pass	Unsigned	1	0	✓	–
Post-Transformation Angle Shift from Reference (Rz) Maximum.Judged Value Fail	Output.Position.GapRz.max.Fail	Unsigned	1	0	✓	–
Post-Transformation Angle Shift from Reference (Rz) Minimum	Output.Position.GapRz.Min	Signed	3	3	✓	–
Post-Transformation Angle Shift from Reference (Rz) Minimum.Judged Value OK	Output.Position.GapRz.Min.Pass	Unsigned	1	0	✓	–
Post-Transformation Angle Shift from Reference (Rz) Minimum.Judged Value Fail	Output.Position.GapRz.Min.Fail	Unsigned	1	0	✓	–
Robot Coordinate X	Output.RobotPose.Position.X	Signed	4	3	✓	–
Robot Coordinate X.Judged Value OK	Output.RobotPose.Position.X.Pass	Unsigned	1	0	✓	–
Robot Coordinate X.Judged Value Fail	Output.RobotPose.Position.X.Fail	Unsigned	1	0	✓	–
Robot Coordinate X Maximum	Output.RobotPose.Position.X.Max	Signed	4	3	✓	–
Robot Coordinate X Maximum.Judged Value OK	Output.RobotPose.Position.X.Max.Pass	Unsigned	1	0	✓	–
Robot Coordinate X Maximum.Judged Value Fail	Output.RobotPose.Position.X.Max.Fail	Unsigned	1	0	✓	–
Robot Coordinate X Minimum	Output.RobotPose.Position.X.Min	Signed	4	3	✓	–
Robot Coordinate X Minimum.Judged Value OK	Output.RobotPose.Position.X.Min.Pass	Unsigned	1	0	✓	–
Robot Coordinate X Minimum.Judged Value Fail	Output.RobotPose.Position.X.Min.Fail	Unsigned	1	0	✓	–
Robot Coordinate Y	Output.RobotPose.Position.Y	Signed	4	3	✓	–
Robot Coordinate Y.Judged Value OK	Output.RobotPose.Position.Y.Pass	Unsigned	1	0	✓	–
Robot Coordinate Y.Judged Value Fail	Output.RobotPose.Position.Y.Fail	Unsigned	1	0	✓	–
Robot Coordinate Y Maximum	Output.RobotPose.Position.Y.Max	Signed	4	3	✓	–
Robot Coordinate Y Maximum.Judged Value OK	Output.RobotPose.Position.Y.Max.Pass	Unsigned	1	0	✓	–
Robot Coordinate Y Maximum.Judged Value Fail	Output.RobotPose.Position.Y.Max.Fail	Unsigned	1	0	✓	–
Robot Coordinate Y Minimum	Output.RobotPose.Position.Y.Min	Signed	4	3	✓	–
Robot Coordinate Y Minimum.Judged Value OK	Output.RobotPose.Position.Y.Min.Pass	Unsigned	1	0	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Robot Coordinate Y Minimum.Judged Value Fail	Output.RobotPose.Position.Y.Min.Fail	Unsigned	1	0	✓	–
Robot Coordinate Z	Output.RobotPose.Position.Z	Signed	4	3	✓	–
Robot Coordinate Z.Judged Value OK	Output.RobotPose.Position.Z.Pass	Unsigned	1	0	✓	–
Robot Coordinate Z.Judged Value Fail	Output.RobotPose.Position.Z.Fail	Unsigned	1	0	✓	–
Robot Coordinate Z Maximum	Output.RobotPose.Position.Z.Max	Signed	4	3	✓	–
Robot Coordinate Z Maximum.Judged Value OK	Output.RobotPose.Position.Z.Max.Pass	Unsigned	1	0	✓	–
Robot Coordinate Z Maximum.Judged Value Fail	Output.RobotPose.Position.Z.Max.Fail	Unsigned	1	0	✓	–
Robot Coordinate Z Minimum	Output.RobotPose.Position.Z.Min	Signed	4	3	✓	–
Robot Coordinate Z Minimum.Judged Value OK	Output.RobotPose.Position.Z.Min.Pass	Unsigned	1	0	✓	–
Robot Coordinate Z Minimum.Judged Value Fail	Output.RobotPose.Position.Z.Min.Fail	Unsigned	1	0	✓	–
Robot Coordinate Rx	Output.RobotPose.Orientation.X	Signed	3	3	✓	–
Robot Coordinate Rx.Judged Value OK	Output.RobotPose.Orientation.X.Pass	Unsigned	1	0	✓	–
Robot Coordinate Rx.Judged Value Fail	Output.RobotPose.Orientation.X.Fail	Unsigned	1	0	✓	–
Robot Coordinate Rx Maximum	Output.RobotPose.Orientation.X.Max	Signed	3	3	✓	–
Robot Coordinate Rx Maximum.Judged Value OK	Output.RobotPose.Orientation.X.Max.Pass	Unsigned	1	0	✓	–
Robot Coordinate Rx Maximum.Judged Value Fail	Output.RobotPose.Orientation.X.Max.Fail	Unsigned	1	0	✓	–
Robot Coordinate Rx Minimum	Output.RobotPose.Orientation.X.Min	Signed	3	3	✓	–
Robot Coordinate Rx Minimum.Judged Value OK	Output.RobotPose.Orientation.X.Min.Pass	Unsigned	1	0	✓	–
Robot Coordinate Rx Minimum.Judged Value Fail	Output.RobotPose.Orientation.X.Min.Fail	Unsigned	1	0	✓	–
Robot Coordinate Ry	Output.RobotPose.Orientation.Y	Signed	3	3	✓	–
Robot Coordinate Ry.Judged Value OK	Output.RobotPose.Orientation.Y.Pass	Unsigned	1	0	✓	–
Robot Coordinate Ry.Judged Value Fail	Output.RobotPose.Orientation.Y.Fail	Unsigned	1	0	✓	–
Robot Coordinate Ry Maximum	Output.RobotPose.Orientation.Y.Max	Signed	3	3	✓	–
Robot Coordinate Ry Maximum.Judged Value OK	Output.RobotPose.Orientation.Y.Max.Pass	Unsigned	1	0	✓	–
Robot Coordinate Ry Maximum.Judged Value Fail	Output.RobotPose.Orientation.Y.Max.Fail	Unsigned	1	0	✓	–
Robot Coordinate Ry Minimum	Output.RobotPose.Orientation.Y.Min	Signed	3	3	✓	–
Robot Coordinate Ry Minimum.Judged Value OK	Output.RobotPose.Orientation.Y.Min.Pass	Unsigned	1	0	✓	–

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Robot Coordinate Ry Minimum.Judged Value Fail	Output.RobotPose.Orientation.Y.Min.Fail	Unsigned	1	0	✓	–
Robot Coordinate Rz	Output.RobotPose.Orientation.Z	Signed	3	3	✓	–
Robot Coordinate Rz.Judged Value OK	Output.RobotPose.Orientation.Z.Pass	Unsigned	1	0	✓	–
Robot Coordinate Rz.Judged Value Fail	Output.RobotPose.Orientation.Z.Fail	Unsigned	1	0	✓	–
Robot Coordinate Rz Maximum	Output.RobotPose.Orientation.Z.Max	Signed	3	3	✓	–
Robot Coordinate Rz Maximum.Judged Value OK	Output.RobotPose.Orientation.Z.Max.Pass	Unsigned	1	0	✓	–
Robot Coordinate Rz Maximum.Judged Value Fail	Output.RobotPose.Orientation.Z.Max.Fail	Unsigned	1	0	✓	–
Robot Coordinate Rz Minimum	Output.RobotPose.Orientation.Z.Min	Signed	3	3	✓	–
Robot Coordinate Rz Minimum.Judged Value OK	Output.RobotPose.Orientation.Z.Min.Pass	Unsigned	1	0	✓	–
Robot Coordinate Rz Minimum.Judged Value Fail	Output.RobotPose.Orientation.Z.Min.Fail	Unsigned	1	0	✓	–
Correction Amount X (For Capture Position)	Output.CorrectionAmountForCapturePosition.X	Signed	4	3	✓	-
Correction Amount Y (For Capture Position)	Output.CorrectionAmountForCapturePosition.Y	Signed	4	3	✓	-
Correction Angle (Rz) (For Capture Position)	Output.CorrectionAmountForCapturePosition.Rz	Signed	3	3	✓	-
Correction Amount Y (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.X	Signed	4	3	✓	-
Correction Amount Y (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.Y	Signed	4	3	✓	-
Correction Amount Z (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.Z	Signed	4	3	✓	-
Correction Angle (Rx) (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.Rx	Signed	3	3	✓	-
Correction Angle (Ry) (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.Ry	Signed	3	3	✓	-
Correction Angle (Rz) (For Pick/Place Position)	Output.CorrectionAmountForPickPlacePosition.Rz	Signed	3	3	✓	-
Post-Transformation X Shift from Reference[n]	Output.Array.Position.GapX[n]	Signed	5	3	✓	–
Post-Transformation Y Shift from Reference[n]	Output.Array.Position.GapY[n]	Signed	5	3	✓	–
Post-Transformation Angle Shift from Reference (Rz)[n]	Output.Array.Position.GapZ[n]	Signed	3	3	✓	–
Robot Coordinate X[n]	Output.Array.RobotPose.Position.X[n]	Signed	4	3	✓	–
Robot Coordinate Y[n]	Output.Array.RobotPose.Position.Y[n]	Signed	4	3	✓	–
Robot Coordinate Z[n]	Output.Array.RobotPose.Position.Z[n]	Signed	4	3	✓	–
Robot Coordinate Rx[n]	Output.Array.RobotPose.Orientation.X[n]	Signed	4	3	✓	–
Robot Coordinate Ry[n]	Output.Array.RobotPose.Orientation.Y[n]	Signed	4	3	✓	–
Robot Coordinate Rz[n]	Output.Array.RobotPose.Orientation.Z[n]	Signed	4	3	✓	–
Correction Amount X (For Capture Position) [n]	Output.Array.CorrectionAmountForCapturePosition.X[n]	Signed	4	3	✓	-
Correction Amount Y (For Capture Position) [n]	Output.Array.CorrectionAmountForCapturePosition.Y[n]	Signed	4	3	✓	-
Correction Angle (Rz) (For Capture Position) [n]	Output.Array.CorrectionAmountForCapturePosition.Rz[n]	Signed	3	3	✓	-

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Correction Amount X (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.X[n]	Signed	4	3	✓	-
Correction Amount Y (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.Y[n]	Signed	4	3	✓	-
Correction Amount Z (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.Z[n]	Signed	4	3	✓	-
Correction Angle (Rx) (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.Rx[n]	Signed	3	3	✓	-
Correction Angle (Ry) (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.Ry[n]	Signed	3	3	✓	-
Correction Angle (Rz) (For Pick/Place Position) [n]	Output.Array.CorrectionAmountForPickPlacePosition.Rz[n]	Signed	3	3	✓	-

Robot Coordinate Transformation

#O129

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Count	Output.Num	Unsigned	4	0	✓	–
Post-Transformation Coordinate X	Output.Position.X	Signed	7	3	✓	–
Post-Transformation Coordinate Y	Output.Position.Y	Signed	7	3	✓	–
Post-Transformation Coordinate Angle	Output.Position.Angle	Signed	3	3	✓	–
Camera Movement X Correction Value	Output.CameraOffset.Position.X	Signed	7	3	✓	–
Camera Movement Y Correction Value	Output.CameraOffset.Position.Y	Signed	7	3	✓	–
Camera Movement Angle Correction Value	Output.CameraOffset.Position.Angle	Signed	3	3	✓	–
Object Movement X Correction Value	Output.WorkOffset.Position.X	Signed	7	3	✓	–
Object Movement Y Correction Value	Output.WorkOffset.Position.Y	Signed	7	3	✓	–
Object Movement Angle Correction Value	Output.WorkOffset.Position.Angle	Signed	3	3	✓	–
Post-Transformation Coordinate X[n]	Output.Array.Position.X[n]	Signed	7	3	✓	–
Post-Transformation Coordinate Y[n]	Output.Array.Position.Y[n]	Signed	7	3	✓	–
Post-Transformation Coordinate Angle[n]	Output.Array.Position.Angle[n]	Signed	3	3	✓	–

Data Input (Industrial Ethernet)

#O130

Result Items	Name	Options		Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Label	Number	Sign	Integer Digits	Decimal Digits		
Input Data[n]: Data Type	Output.Field[n].Type	Bit	1	Unsigned	–	–	–	–
		8-bit Integer	2					
		8-bit Unsigned Integer	3					
		16-bit Integer	4					
		16-bit Unsigned Integer	5					
		32-bit Integer	6					
		64-bit Integer	7					
		32-bit Floating-point Number	8					
		String	9					
Input Data[n]: Size	Output.Field[n].Size			Unsigned	3	0	–	–
Input Data[n]: Input Value	Output.Field[n].Value						✓	–

Data Input (Non-Procedural)

#O131

Result Items	Name	Options		Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Label	Number	Sign	Integer Digits	Decimal Digits		
Input Data[n]: Data Type	Output.Field[n].Type	Integer	1	Unsigned	–	–	–	–
		Floating-point	2					
		Logical	3					
		String	4					
Input Data[n]: Input Value	Output.Field[n].Value						✓	–

Image Output (FTP/Storage)

#O132

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Occurrence of Skipped Output	Output.OutputImage.BufferFull	Unsigned	1	0	✓	–
Remaining Output Buffer	Output.OutputImage.RemainBufferSize	Unsigned	3	0	✓	–

Statistics

#O133

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Archive Count	Output.Count	Unsigned	19	0	✓	–
Statistics Target[n]: Item Name	Output.Data[n].Name	–	–	–	✓	–
Statistics Target[n]: Latest Value	Output.Data[n].Recent	Signed	19	0	✓	–
Statistics Target[n]: Maximum Value	Output.Data[n].Max	Signed	19	0	✓	–
Statistics Target[n]: Minimum Value	Output.Data[n].Min	Signed	19	0	✓	–
Statistics Target[n]: Deviation (σ)	Output.Data[n].Deviation	Signed	19	0	✓	–
Statistics Target[n]: Average + 3σ	Output.Data[n].ThreeSigmaLimit1	Signed	19	0	✓	–
Statistics Target[n]: Average	Output.Data[n].Average	Signed	19	0	✓	–
Statistics Target[n]: Average - 3σ	Output.Data[n].ThreeSigmaLimit2	Signed	19	0	✓	–
Statistics Target[n]: Cpu	Output.Data[n].Cpu	Signed	19	0	✓	–
Statistics Target[n]: Cpl	Output.Data[n].Cpl	Signed	19	0	✓	–
Statistics Target[n]: Cpk	Output.Data[n].Cpk	Signed	19	0	✓	–
Statistics Target[n]: Sum Total	Output.Data[n].Total	Signed	19	0	✓	–

Yield Rate

#O134

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Archive Count	Output.Count	Unsigned	19	0	✓	–
Item[n]: Item Name	Output.Data[n].Name	–	–	–	✓	–
Item[n]: Latest Judgment	Output.Data[n].LatestJudgment	Unsigned	1	0	✓	–
Item[n]: Pass Count	Output.Data[n].PassCount	Unsigned	10	0	✓	–
Item[n]: Fail Count	Output.Data[n].FailCount	Unsigned	10	0	✓	–
Item[n]: Total	Output.Data[n].ProcessingCount	Unsigned	10	0	✓	–

Data History

#O135

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
Data Count	Output.Field[n].Prior.Count	Unsigned	2	0	✓	-
Archive Objects[n]	Output.Field[n]				✓	-
Item Name	Output.Field[n].Name				✓	-
Data Type	Output.Field[n].Type				✓	-
Value[n]	Output.Field[n].Prior[n].Value				✓	-
Value[n] (Reverse Order)	Output.Field[n].Reversed[n].Value				✓	-

Command Tool Common

#O136

Result Items	Name	Number Format			[Results] View Target (When [Display Full Results] is off)	Scaling Target
		Sign	Integer Digits	Decimal Digits		
General	Output.General	Refer to "Common to Tools".				
Command Error Code	Output.ErrorCode	Unsigned	5	0	✓	–

Error Code List

This section describes error codes, causes, and solutions for System Error, Setting Error, Setting Failures, and Execution Error.

System Error

#O137

A system error is issued when the system is no longer working properly, for example, if the camera or light can no longer be recognized or if the configuration file is corrupt.

Reference System errors can be assigned to Error0/Error1 for each error cause. When assigned to Error0/Error1, they can be assigned to the terminal output or to the industrial Ethernet communication and be output.
For details about assignment to Error0/Error1 for each error cause, see [System Error Settings].

Camera

Category	Error Code	Message	Cause/Countermeasure
Common	10000	The camera set in Camera Settings is not connected.	The following possibilities may be applicable. Check the type of camera connected and its settings. • The camera model registered in the Global Settings is different from the camera model actually connected. • The camera model retained in the program setting is different from the camera model actually connected.
	10001	Failed to load the ZoomTrax file.	The specified ZoomTrax setting file could not be loaded due to file corruption or other causes in a capture tool set with a zoom camera. Set ZoomTrax again.
	10009	The number of times the ZoomTrax setting was switched exceeds the number of times possible.	Attempted to switch more than the number of times the ZoomTrax setting can be switched. Check the ZoomTrax setting for each capture tool.

Category	Error Code	Message	Cause/Countermeasure
High-performance Camera	10020	An abnormality in the laser output part of the camera was detected. It is possible that the camera has broken down.	The laser circuit is damaged and there was an abnormality in the laser output. Contact your local KEYENCE office as a malfunction is suspected.
	10021	An abnormality in the lens part of the camera was detected. It is possible that the camera has broken down.	The zoom lens cannot return to the home position when the power is turned on or measuring the distance. Contact your local KEYENCE office as a malfunction is suspected.
	10022	The internal temperature of the camera is high. As this may cause a breakdown, please check the installation condition and ambient temperature.	There are problems with the camera's installation condition.
	10023	The system was stopped because the internal temperature of the camera has exceeded the prescribed value. Please turn off the power temporarily and check the installation condition and ambient temperature.	There are problems with the camera's installation condition.

Light

Category	Error Code	Message	Cause/Countermeasure
Common	10050	The connected light is different from the light setting. Update the light setting by pressing the “Import from Global Settings” button.	• The light model registered in the Global Settings is different from the light model actually connected. Press the [Import from Global Settings] button to update the lighting settings. • The light model retained in the program setting is different from the light model actually connected. Press the [Import from Global Settings] button to update the lighting settings.
	10051	The light [Light ID] is not connected. Check the connection of the light. *Light ID: LIGHT 01 to LIGHT 10, Camera-Connected Light	• Could not connect to the light controller. Check the lighting connections. • Connection with the light controller was disconnected. Check the lighting connections. • Connection with the camera-connected light was disconnected. Check the lighting connections.
	10052	The light head has been reset because its initialization was detected.	When the light head that could no longer be recognized was re-recognized, the setting data written in the light head was initialized so the setting data was written again. Check the connection status of the lighting head and whether power supply to the lighting head is continuously and properly provided.
	10055	The internal temperature of the camera-connected light is high. As this may cause a breakdown, please check the installation condition and ambient temperature.	The lighting load is too high and the temperature rating has been exceeded due to the generated heat. Alternatively, the ambient temperature exceeds the rating.
	10058	The system was stopped because the internal temperature of the camera-connected light has exceeded the prescribed value. Please turn off the power temporarily and check the installation condition and ambient temperature.	The lighting load is too high and the temperature rating has been exceeded due to the generated heat. Alternatively, the ambient temperature exceeds the rating.
	10060	A light which cannot be used with PoE power supply is connected.	A PoE-powered VS camera is connected to a multi-spectrum light (CA-DRM*X).
Camera-Connected Light Conversion Unit	10081	The internal temperature of the camera-connected light conversion unit is high. As this may cause a breakdown, please check the installation condition and ambient temperature.	The lighting load is too high and the temperature rating has been exceeded due to the generated heat. Alternatively, the ambient temperature exceeds the rating.
	10083	The internal temperature of the camera-connected light conversion unit is high. As this may cause a breakdown, please check the installation condition and ambient temperature.	The lighting load is too high and the temperature rating has been exceeded due to the generated heat. Alternatively, the ambient temperature exceeds the rating.

Category	Error Code	Message	Cause/Countermeasure
Lighting Controller	10090	The internal temperature of the lighting controller is high. As this may cause a breakdown, please check the installation condition and ambient temperature.	The load on the lighting controller is too high and the temperature rating is exceeded due to the generated heat. Alternatively, the ambient temperature exceeds the rating.
	10091	The system was stopped because the internal temperature of the lighting controller has exceeded the prescribed value. Please turn off the power temporarily and check the installation condition and ambient temperature.	The load on the lighting controller is too high and the temperature rating is exceeded due to the generated heat. Alternatively, the ambient temperature exceeds the rating.

System File

Category	Error Code	Message	Cause/Countermeasure
	10110	Unable to load the specified program setting file because it does not exist.	Since it is assumed that the program file that was attempted to be loaded at startup does not exist or that the program setting file does not exist when switching (or reloading) the program, check that the file exists correctly.
	10111	The resource memory of the program setting is exceeded.	The program setting file exceeds the resource memory when switching (or reloading) the program setting. Use VS Creator to modify the program setting so that the resource memory or image memory is not exceeded.
	10112	The image memory of the program setting is exceeded.	The program setting file exceeds the resource memory when switching (or reloading) the program setting. Use VS Creator to modify the program setting so that the resource memory or image memory is not exceeded.
	10113	Unable to load the program setting file due to unsupported version.	• The program setting file that was loaded at startup is of a version that is not supported. Change the program setting file to a different file. • The program setting file that was loaded when the program setting was switched (or reloaded) is of a version that is not supported. Use VS Creator to create a program setting file for a supported version.
	10115	Unable to load the program setting file due to damage.	The program setting file that was loaded when the program setting was switched (or reloaded) is corrupt. Use VS Creator to recreate a program setting file.
	10116	Unable to load the Global Settings file because it does not exist.	The global settings file that was attempted to be loaded at startup does not exist.
	10117	Unable to load the Global Settings file due to unsupported version.	The global settings file that was loaded at startup is of a version that is not supported. Use VS Creator to create a global settings file for a supported version.
	10118	Unable to load the Global Settings file due to damage.	The global settings file that was loaded at startup is corrupt.
	10119	Unable to load the startup program setting file.	The startup program setting file that was attempted to be loaded at startup may not exist. Check whether the file exists correctly.
	10120	Unable to load the startup program setting file due to damage.	The startup program setting file that was loaded at startup is corrupt. Change to a different startup program setting file or recreate it.
	10121	HTTPS server certificate not found.	No certificate is installed on the device while the HTTP setting mode is set to "HTTPS".

Category	Error Code	Message	Cause/Countermeasure
	10122	Failed to save temporary file(s) because the available space of the internal storage is insufficient. Increase the free space of the internal storage and then reload the program setting.	Failed to save temporary file due to insufficient internal storage capacity when changing settings.
	10123	The internal memory became insufficient while performing mathematical operations. The capture and measurement processing time may be substantially longer.	On the Vision Dashboard, a calculation with a large number of cells used or a complex calculation is being performed. This may be improved by reducing the number of calculations and content.

Tasks

Category	Error Code	Message	Cause/Countermeasure
	10130	A Tool Overall Error occurred.	A tool error occurred with the tool specified in the task's tool overall error settings (ToolExecutionError in system property was set to 1). Review the settings so that a tool overall error does not occur in the tool in which the tool overall error occurred.
	10131	Cannot store the event because the event buffer is full.	The event buffer overflowed because too many soft events were accumulated by SEI commands and others. Consume soft events before executing them.

Internal Storage

Category	Error Code	Message	Cause/Countermeasure
	10150	Cannot access the internal storage.	A problem occurred in accessing the internal storage, or there is an abnormality in accessing the internal storage. Contact your local KEYENCE office as a malfunction is suspected.
	10151	The space of the internal storage is insufficient.	There is not enough internal storage capacity. Delete data from the internal storage to free up space.

SD Card

Category	Error Code	Message	Cause/Countermeasure
	10170	Insert the SD card.	• An SD card is not inserted into the SD slot, or a microSD card has not been re-inserted into the SD slot after [Remove SD Card] was executed. Insert the microSD card correctly into the SD slot. • A microSD card that is not guaranteed to function is in use. Commercially available microSD cards cannot be guaranteed to function as the microSD cards for the device. • A large number of files were output to one folder. Divide the data output destination folder into multiple folders and output the data again.
	10171	Cannot access the SD card.	• A problem occurred in accessing the microSD card. Select the microSD card drive in the folder tree of the [Manage Files] dialog and execute [Check] from the context menu. If it still does not function properly, execute [Format] on the microSD card (note that all data on the microSD card will be erased). If neither method solves the problem, contact your local KEYENCE office. • A microSD card that is not guaranteed to function is in use. Commercially available microSD cards cannot be guaranteed to function as the microSD cards for the device.
	10172	Cannot recognize the format type of the SD card. Please format the SD card in the Manage Files screen.	The format type of the microSD card is a type that cannot be recognized by the camera. Select the microSD card drive in the folder tree of the [Manage Files] dialog and execute [Check] from the context menu. If it still does not function properly, execute [Format] on the microSD card (note that all data on the microSD card will be erased). If neither method solves the problem, contact your local KEYENCE office.
	10173	The file on the SD card is set to read-only.	The destination output file is set to read-only. Remove the read-only setting for the file.
	10174	The output buffer for the SD card is full.	The buffer for outputting to the microSD card is full. Reduce the amount of data to be output so that the rate of data output per measurement does not exceed the rate of writing to the microSD card, or extend the time between triggers (results data are not output when the buffer is full).

Category	Error Code	Message	Cause/Countermeasure
	10175	The space of the SD card is insufficient. Or, the upper limit for the number of files within the same folder has been reached.	The space of the microSD card is insufficient. Delete data from the microSD card to free up space.
	10176	The SD card is write-protected.	The microSD card is write protected. Remove the write protection from the microSD card.
	10177	Execute the Remove SD Card operation before removing the SD card. The card and files may be damaged.	The microSD card was removed without executing [Remove SD Card]. Select the microSD card drive in the folder tree of the [Manage Files] dialog and execute [Remove] from the context menu. Removing the microSD card while it is still powered may damage the microSD card and the data stored on it.

Command

Category	Error Code	Message	Cause/Countermeasure
	10190	An external command error occurred.	A command error occurred in the execution of the command entered from non-procedural communication or industrial Ethernet. Review the command itself, or the settings of the program setting.
	10191	An internal command error occurred.	A command error occurred in the execution of the command issued by a Control tool. Review the command itself to be issued, or the settings of the program setting.

Terminal

Category	Error Code	Message	Cause/Countermeasure
	10210	Terminal output buffer is full.	The buffer for outputting to the terminal is full. Reduce the amount of data to be output so that the rate of data output to the terminal exceeds the rate of data output from the flow, or extend the time between triggers (measurements will be delayed until the buffer is empty).

FTP

Category	Error Code	Message	Cause/Countermeasure
	10250	Failed to connect to the FTP/SFTP server.	• The FTP/SFTP server is not working, or an abnormality occurred in the LAN connection to the FTP/SFTP server. Check the following. – Whether the LAN cable, VS camera, and FTP/SFTP server computer or NAS are connected. – Whether the LAN cable is not broken. – Whether the orange light on the Ethernet connector is lit. • The IP address specified for the FTP/SFTP server is incorrect. Check the server IP address setting made in the FTP/SFTP settings.
	10251	Failed to log in to the FTP server.	The user name and/or password for logging in to the FTP server is incorrect. • Check that the user name and password set in the FTP server settings match those set on the FTP server. • If there is a firewall on the FTP server or on the network route to the FTP server, connection may fail. In this case, you need to disable the firewall or take other measures. For details, check with your network administrator or computer manufacturer.
	10252	Failed to connect via SFTP.	The user name and password are set correctly for the SFTP server, but the SFTP connection fails. Check with the server administrator or network administrator of the SFTP server regarding the SFTP connection settings (such as IP addresses and user names allowed for connection).
	10253	A timeout error occurred during output to the FTP/SFTP server.	Login to the FTP/SFTP server was successful and file creation was also started, but the process does not complete within the predetermined time. • Check the connection between the VS camera and the FTP/SFTP server. • Make sure the FTP/SFTP server is operating correctly. • If there is a firewall on the FTP/SFTP server or on the network route to the FTP/SFTP server, connection may fail. In this case, you need to disable the firewall or take other measures. For details, check with your network administrator or computer manufacturer.

Category	Error Code	Message	Cause/Countermeasure
	10254	Failed to output the file to the FTP/SFTP server.	• Login to the FTP/SFTP server was successful, but file creation failed. – Make sure the user set on the FTP/SFTP server has write permission. – Check the remaining capacity of the FTP/SFTP server. – Check the connection between the VS camera and the FTP/SFTP server. – Make sure the FTP/SFTP server is operating correctly. – If there is a firewall on the FTP/SFTP server or on the network route to the FTP/SFTP server, connection may fail. In this case, you need to disable the firewall or take other measures. For details, check with your network administrator or computer manufacturer. • The attempt to output to an FTP/SFTP server that does not support APPE commands failed. Use an FTP/SFTP server that supports APPE commands.
	10255	FTP/SFTP output failed due to a full output buffer.	The buffer for outputting to FTP/SFTP is full. Reduce the amount of data to be output so that the rate of data output to FTP/SFTP exceeds the rate of data output from the flow, or extend the time between triggers (results data are not output when the buffer is full).

EtherNet/IP

Category	Error Code	Message	Cause/Countermeasure
	10231	The cable for Ethernet is not connected.	When outputting data from the Ethernet port as the output destination of the data output tool, an abnormality occurred with the LAN cable. Check the following. • Whether the LAN cable, VS camera, and computer are connected. • Whether the LAN cable is not broken. • Whether the LAN cable is correctly identified as cross or straight. • Whether the orange light on the Ethernet connector is lit.
	10233	Ethernet communication failed.	An abnormality occurred in Ethernet communication when outputting data from the Ethernet port as the output destination of the data output tool. Check the following. • Whether the target computer is in a state where it cannot send or receive data. • Whether the Ethernet communication software is running on the computer, and it is connected to the VS camera.
	10235	A timeout error occurred during Ethernet communication.	When outputting data from the Ethernet port as the output destination of the data output tool, Ethernet communication has not been possible for 10 seconds or longer. Check the following. • Whether the target computer is in a state where it cannot send or receive data. • Whether the Ethernet communication software is running on the computer, and it is connected to the VS camera.
	10236	Ethernet output buffer is full.	The buffer for outputting to Ethernet is full. Reduce the amount of data to be output so that the rate of data output to Ethernet exceeds the rate of data output from the flow, or extend the time between triggers (measurements will be delayed until the buffer is empty).
	10270	EtherNet/IP communication failed.	Cyclic communication was interrupted. (When recovery is possible, recovery occurs automatically.) Check the following. • Whether the Ethernet cable is connected correctly. • Whether both the device and the master side were restarted after the communications settings were updated. • Whether there are any problems with the cycle and timeout period of cyclic communication on the PLC side.

Category	Error Code	Message	Cause/Countermeasure
	10271	EtherNet/IP output buffer is full.	The buffer for outputting to EtherNet/IP is full. Reset the RPI so that the rate of data output to EtherNet/IP exceeds the rate of data output from the flow, or extend the time between triggers (measurements will be delayed until the buffer is empty).

PROFINET

Category	Error Code	Message	Cause/Countermeasure
	10290	PROFINET communication failed.	Cyclic communication was interrupted. (When recovery is possible, recovery occurs automatically.) Check the following. • Whether the Ethernet cable is connected correctly. • Whether both the device and the master side were restarted after the communications settings were updated. • Whether there are any problems with the cycle and timeout period of cyclic communication on the PLC side. • Whether there are any problems with flow content or trigger intervals.
	10291	PROFINET output buffer is full.	Reset the RPI so that the rate of data output to PROFINET exceeds the rate of data output from the flow, or extend the time between triggers (measurements will be delayed until the buffer is empty).

PLC-Link

Category	Error Code	Message	Cause/Countermeasure
	10410	Failed to establish a link with the PLC.	An abnormality occurred with the connection with the PLC. • Check the connection with the PLC and the PLC settings. • If PLC-Link is not used, disable [PLC-Link] in [Industrial Ethernet Settings]. • If it is displayed in conjunction with the trigger input, check whether the data memory to which data is written is specified within a range that matches the PLC format.
	10411	PLC-Link output buffer is full.	The buffer for outputting to the PLC-Link communication is full.
	10412	The IP address of the device and the IP address of the communication target PLC are the same.	Change either the IP address of the device or that of the destination PLC to prevent them from overlapping.

Hardware

Category	Error Code	Message	Cause/Countermeasure
	10378	The remaining internal battery life has fallen below the prescribed value.	The internal battery of the device is depleted. Contact your local KEYENCE office.

OPC UA

Category	Error Code	Message	Cause/Countermeasure
	10430	Failed to connect with the OPC UA client.	The following causes are possible. Please resolve them. • Application authentication with the OPC UA server failed. • User authentication with the OPC UA server failed.

Other

Category	Error Code	Message	Cause/Countermeasure
	10390	Failed to synchronize the time.	The following causes are possible. Please resolve them. • IEEE1588 No grandmaster clock is input. • SNTP – The SNTP server is not working. – The SNTP Server IP Address specification is incorrect. • Common – An abnormality occurred in the LAN connection. – The date is set to a date that is earlier than the end date of the trial period for AI Activation
	10391	A firmware update is necessary. Please perform the firmware update from the "Connect to Device" screen.	A device that requires firmware update is connected to the device being displayed.
	10393	Failed to connect to the DNS server.	The following causes are possible. Please resolve them. • The DNS server is not working. • An abnormality occurred in the LAN connection with the DNS server. • The DNS server IP address specification is incorrect.
	10394	Could not resolve the name by means of the DNS server. (FTP)	The following causes are possible. Please resolve them. • The DNS server is not working. • An abnormality occurred in the LAN connection with the DNS server. • The host name specified in Target FTP Settings is incorrect.
	10395	Could not resolve the name by means of the DNS server. (SNTP)	The following causes are possible. Please resolve them. • The DNS server is not working. • An abnormality occurred in the LAN connection with the DNS server. • The host name specified in the SNTP settings is incorrect.

Setting Error

#O138

Common to Tools

Category	Error Code	Message	Cause/Countermeasure
General Setting Items	20000	The reference setting is invalid.	The following causes are possible. Please resolve them. • A non-existent setting parameter or result data, or a cell with a non-existent value was referenced. • A reference error has occurred by deleting a set tool. • A type that cannot be referenced between a scalar type and the structure was referenced. • A setting that should not be usable is specified. • A circular reference is set.
Reference Region Tool	20001	The reference setting for the Region tool is invalid.	The shared region tool reference is set to "None” or references a shared region tool that does not exist. Reference a shared region tool that exists or turn the shared region tool reference OFF.
Reference Image Region Tool	20002	The reference setting for the Image Region tool is invalid.	The image region tool reference is set to "None” or references an image region tool that does not exist. Reference an image region tool that exists or turn the image region tool reference OFF.
Color Extraction	20003	The color extraction method is invalid.	The extraction method for the current image is invalid.
MultiSpectrum Color Extraction	20004	The state of Measurement Color is invalid.	All lighting colors of the capture tool that were selected when MultiSpectrum Color Extraction was set up have been disabled. Perform color extraction again or review the lighting colors of the capture tool.
Select Model Image	20006	The Model Image is not registered.	The selected model image is unregistered. Select an existing model image from the Edit Pattern Region or register a model image.
Execute After the Following Tool	20007	The tool is not set.	The target tool for [Execute After the Following Tool] does not exist. Add the target tool or set the execution timing to "Resolve Automatically".
Current Image	20008	The setting for the Current Image is invalid.	The tool reference for the image conversion category selected for the current image is invalid. Reselect the current image.

Category	Error Code	Message	Cause/Countermeasure
Tools in General	20009	The processing memory is insufficient.	Processing memory overflow occurred in the tool. • Work memory is consumed each time a measurement/mask region is added or pattern region, subtraction filter, or library data is set. • Delete unnecessary regions or data, or reduce the shape or number of registrations.

Capture

Category	Error Code	Message	Cause/Countermeasure
ZoomTrax Settings	20101	The ZoomTrax file is invalid.	The specified ZoomTrax setting file could not be loaded in a capture tool set with a zoom camera (due to file corruption, lost file, or other causes).
	20102	Could not find the specified ZoomTrax file.	The ZoomTrax setting file could not be loaded.
	20103	The ZoomTrax file is of an unsupported version.	An unsupported version of the ZoomTrax setting file was loaded.
	20104	The pixel count/size registered in the ZoomTrax file is different from the configuration setting.	The ZoomTrax setting file existed, but there are differences in resolution between the program setting and the file.
	20105	The model registered in the ZoomTrax file is different from the configuration setting.	The ZoomTrax setting file existed, but there are differences in color and monochrome between the program setting and the file.
Camera Configuration Settings	20106	The connected camera(s) and the camera configuration setting(s) do not match.	There is a mismatch between connected cameras (Global Settings) and cameras set in the program setting. Check the type of camera connected and its settings.
Capture Mode	20107	The light does not support the current capture mode.	The following possibilities may be applicable, so check that the lighting selected as LumiTrax lighting is connected to CA-DE*X/CA-DRM*X/ CA-DQW40X. • A light which does not support LumiTrax was selected in LumiTrax Mode. • A light which does not support MultiSpectrum was selected in MultiSpectrum Mode. • A light which does not support Flickerless was selected in Flickerless Mode.
Trigger Mode	20108	"Screen Update in Run Mode" cannot be set to "Live Image" when Internal is set as the trigger mode.	Internal triggers and screen updates in Run Mode by continuous updates are used at the same time.
Flickerless Mode	20109	The Flickerless Mode cannot be used with a size greater than 15 megapixels.	The pixel count is set to 15M or 25M in the Capture tool.
	20110	The Flickerless Mode cannot be used together with other capture modes.	Flickerless Mode is used in at least one of the Capture No.
	20111	The internal trigger cannot be used in Flickerless Mode.	The internal trigger is set in Flickerless Mode.
Light Settings	20100	The light is not set.	Check the following possibilities. • A directly connected light is not connected. • A LumiTrax light/MultiSpectrum light/flicker-free light is not set.
	20112	The connected light(s) and the light setting(s) do not match.	There is a mismatch between connected lights (Global Settings) and lights set in the program setting.
	20113	The light cannot be used in the state where Volume Limit is OFF and Continuous Lighting is enabled.	Volume Limit is OFF and Continuous Lighting is ON.

Category	Error Code	Message	Cause/Countermeasure
Fine HDR	20114	A light which supports Ambient Light Cut of Fine HDR is not enabled or connected.	Ambient Light Cut is enabled, and the Camera-Connected Light Conversion Unit (CG-LC10, CG-LC20) or the Environmentally-Resistant Lighting Controller (CG-LC100) is enabled as the light.
	20115	A light which supports a capture image count of 2 or more for Fine HDR is not enabled or connected.	The Capture Image Count is 2 or more, and the Camera-Connected Light Conversion Unit (CG-LC10, CG-LC20) or the Environmentally-Resistant Lighting Controller (CG-LC100) is enabled as the light.
Reference	20116	In the Capture tool, it is not possible to reference the result data of a data input tool that is found within the same task.	In the Capture tool, the result data of a data input tool that is found within the same task is referenced.

Scaling

Category	Error Code	Message	Cause/Countermeasure
Scaling File	20200	The scaling file does not exist.	The set scaling file does not exist.
	20201	The format of the scaling file is invalid.	The format of the scaling file is invalid. Create a file again.
	20202	The scaling file is of an unsupported version.	An unsupported version of the scaling file was loaded.

Calibration

Category	Error Code	Message	Cause/Countermeasure
Calibration File	20300	The calibration file does not exist.	The set calibration file does not exist.
	20301	The format of the calibration file is invalid.	The format of the calibration file is invalid. Create a file again.
	20302	The calibration file is of an unsupported version.	An unsupported version of the calibration file was loaded.
	20303	The resolution of the calibration file does not match that of the Camera Settings.	There is a discrepancy in the resolution between the program setting and the file.

Color Detection

Category	Error Code	Message	Cause/Countermeasure
Current Image	20400	Images other than color images cannot be used.	A non-color image is specified for the current image.

Pattern Search

Category	Error Code	Message	Cause/Countermeasure
Processing Memory	20500	Registering of the image reference information is not available due to insufficient processing memory.	Check whether or not the pattern has been successfully registered. Delete unnecessary regions or data, or reduce the shape or number of registrations.
Pattern Data	20501	The pattern data is of an unsupported version.	An unsupported version of the pattern data was loaded.
	20502	The pattern data does not exist.	The set pattern data file does not exist.
	20503	The file format of the pattern data is invalid.	The format of the pattern data file is invalid. Create a file again.
	20504	Failed to register the pattern.	The pattern region extends beyond the

ShapeTrax3A

Category	Error Code	Message	Cause/Countermeasure
Processing Memory	20600	Registering of the image reference information is not available due to insufficient processing memory.	Check whether or not the pattern has been successfully registered. Delete unnecessary regions or data, or reduce the shape or number of registrations.
Pattern Data	20601	The pattern data is of an unsupported version.	An unsupported version of the pattern data was loaded.
	20602	The pattern data does not exist.	The set pattern data file does not exist.
	20603	The file format of the pattern data is invalid.	The format of the pattern data file is invalid. Create a file again.
	20605	Failed to register the pattern.	The pattern region extends beyond the border of the image.
Large Area Search Mode	20604	The Large Area Search Mode cannot be enabled when the Reduction is less than 4.	The Reduction is less than 4 when [Large Area Search Mode] is ON and [Search Sensitivity] is set to [Custom].
Reference Shared Pattern Tool	20606	The reference setting for the Shared Pattern tool is invalid.	When referencing a Shared Pattern tool, there was no reference or an invalid tool was referenced.

Defect

Category	Error Code	Message	Cause/Countermeasure
Enable Gain Setting	20700	"Enable Gain Setting" cannot be turned on when Fine Color is set as the color extraction method.	[Enable Gain Setting] is ON when Fine Color is set as the color extraction method for the color camera.

OCR2

Category	Error Code	Message	Cause/Countermeasure
OCR Library	20800	The library file does not exist.	The set library file does not exist.
	20801	The format of the library file is invalid.	The format of the library file is invalid. Create a new library file.
	20802	The library file is of an unsupported version.	The library file is of an unsupported version.

1D Code Reader

Category	Error Code	Message	Cause/Countermeasure
Code Type	20900	The Code Type is not set.	The code type is not set in the 1D Code Reader.
Code Detail	20901	The Code Detail is not set.	The detailed code type is not set in the 1D Code Reader.
Collation Pattern	20902	Two or more "!" processed as special character are set in the Collation Pattern.	Two or more "!" processed as special character are set in the Collation Pattern.

2D Code Reader

Category	Error Code	Message	Cause/Countermeasure
Code Type	21000	The Code Type is not set.	The code type is not set in the 2D Code Reader.
Code Detail	21001	The Code Detail is not set.	The detailed code type is not set in the 2D Code Reader.
Collation Pattern	21002	Two or more "!" processed as special character are set in the Collation Pattern.	Two or more "!" processed as special character are set in the Collation Pattern.

Common to AI Inspection Tools

Category	Error Code	Message	Cause/Countermeasure
Train	21100	Could not find the file needed for processing.	The files required to run the AI Inspection tool are not in the file path.
Reference Shared Region Tool	21102	Cannot reference a Shared Region tool for which position adjustment is set.	A Shared Region tool for which position adjustment was set was referenced.
	21103	Cannot reference a Shared Region tool for which image region referencing is set.	A Shared Region tool for which an image region was set was referenced.
Shared AI Training	21104	The reference setting for "Shared AI Training" is invalid.	In Shared AI Training, there was no reference or an invalid tool was referenced.

Subtraction Filter

Category	Error Code	Message	Cause/Countermeasure
Processing Memory	21201	Registering of the image reference information is not available due to insufficient processing memory.	Check whether or not the pattern of the Subtraction Filter has been successfully registered. Delete unnecessary regions or data, or reduce the shape or number of registrations.
Pattern Data	21202	The pattern data is of an unsupported version.	An unsupported version of the pattern data was loaded.
	21203	The pattern data does not exist.	The set pattern data file does not exist.
	21204	The file format of the pattern data is invalid.	The format of the pattern data file is invalid. Create a file again.
	21205	Failed to register the pattern.	The inspection region extended beyond the border of the image.
Reference Shared Region Tool	21206	Cannot reference a Shared Region tool for which position adjustment is set.	A Shared Region tool for which position adjustment was set was referenced.

Image Position Adjustment

Category	Error Code	Message	Cause/Countermeasure
Current Image	21300	A MultiSpectrum Image cannot be used.	A MultiSpectrum Image is specified for the Current Image.

Data Input (Industrial Ethernet)

Category	Error Code	Message	Cause/Countermeasure
Setting of Input Data	21400	The input data exceeds the user-defined region.	The input data item that was set exceeded the size (address) set in the user-defined region settings.
Input Source	21401	Enable the industrial Ethernet protocol in the global settings.	With the Data Input (Industrial Ethernet) tool already configured, all industrial Ethernet protocols were disabled in the Global Settings (Industrial Ethernet Settings).
	21406	The Data Input (Industrial Ethernet) tool does not support PLC-Link.	The Data Input (Industrial Ethernet) tool exists in the task with the PLC-Link enabled.

Data Output (Industrial Ethernet)

Category	Error Code	Message	Cause/Countermeasure
Format Settings	21402	The data type is invalid.	A string type was specified for numeric data or vice versa.
Destination	21403	Enable the industrial Ethernet protocol in the global settings.	With the Data Output (Industrial Ethernet) tool already configured, all industrial Ethernet protocols were disabled in the Global Settings (Industrial Ethernet Settings).
	21407	An output destination that is of a higher version is set.	The Data Output (Industrial Ethernet) tool was added in the program setting of version 1.4 or lower with the PLC-Link enabled in the global settings of version 1.5 or higher.

OPC UA

Category	Error Code	Message	Cause/Countermeasure
OPC UA I/O Data Settings	23200	The reference setting is invalid.	A reference error has occurred because the reference source does not exist. Check the reference source.
	23201	The data type is invalid.	A string type was specified for numeric data or vice versa. Specify an appropriate data type.

Archive Condition

Category	Error Code	Message	Cause/Countermeasure
Archive Count	23300	Cannot set because the total count of all archive conditions exceeds 30000.	The total number of archive count for valid archive conditions exceeds 30000.

Statistics

Category	Error Code	Message	Cause/Countermeasure
Statistics Target/ Label	21500	The statistics target or the label is not set.	Either the statistics target or the label has not been set.

Yield Rate

Category	Error Code	Message	Cause/Countermeasure
Target/ Label	21600	The statistics target or the label is not set.	Either the target or the label has not been set.

Data History

Category	Error Code	Message	Cause/Countermeasure
Archive Target	21900	The archive target or the label is not set.	Either the archive object or the label has not been set.

Simulator

Category	Error Code	Message	Cause/Countermeasure
	21700	The resource memory is insufficient.	The resource memory is overflowing. Use VS Creator to modify the program setting so that the resource memory or image memory is not exceeded.
	21701	The image memory is insufficient.	The image memory is overflowing. Use VS Creator to modify the program setting so that the resource memory or image memory is not exceeded.

Image Region (Model Image)

Category	Error Code	Message	Cause/Countermeasure
Pattern Data	21800	The pattern data is of an unsupported version.	An unsupported version of the pattern data was loaded.
	21801	The pattern data does not exist.	The set pattern data file does not exist.
	21802	The file format of the pattern data is invalid.	The format of the pattern data file is invalid. Set the pattern region again.
Referenced Shared Region Tool	21803	Cannot reference a Shared Region tool for which position adjustment is set.	A Shared Region tool for which position adjustment was set is referenced.

AI Classification

Category	Error Code	Message	Cause/Countermeasure
Processing Memory	22000	Registering of the inference model is not available due to insufficient processing memory.	Check the memory usage on the AI status bar and change the settings so that the processing memory is not insufficient.
	22001	Registering of the file necessary for executing AI tools is not available due to insufficient processing memory.	Check the memory usage on the AI status bar and change the settings so that the processing memory is not insufficient.

AI Detection

Category	Error Code	Message	Cause/Countermeasure
Processing Memory	22100	Registering of the inference model is not available due to insufficient processing memory.	Check the memory usage on the AI status bar and change the settings so that the processing memory is not insufficient.
	22101	Registering of the file necessary for executing AI tools is not available due to insufficient processing memory.	Check the memory usage on the AI status bar and change the settings so that the processing memory is not insufficient.
Fine Mode	22102	The Fine mode cannot be used because the device in use does not support it or AI activation has not been applied.	AI Detection with the fine mode selected was imported from an unactivated device/simulator or from a camera model of 1.6M or less.

AI Segmentation

Category	Error Code	Message	Cause/Countermeasure
Tool Settings	22900	AI Segmentation cannot be used because the device in use does not support it or AI activation has not been applied.	AI Segmentation was imported from an unactivated device/simulator or from a camera model of 1.6M or less.
Processing memory	22901	Registering of the inference model is not available due to insufficient processing memory.	The head model could not be stored due to insufficient processing memory.
	22902	Registering of the file necessary for executing AI tools is not available due to insufficient processing memory.	The backbone model could not be stored due to insufficient processing memory.

AI OCR

Category	Error Code	Message	Cause/Countermeasure
OCR Library	23100	Registering of the library is not available due to insufficient processing memory.	The library could not be stored due to insufficient processing memory. Work memory is consumed each time a measurement/mask region is added or pattern region, subtraction filter, or library data is set. Delete unnecessary regions or data, or reduce the shape or number of registrations.
	23101	The library file does not exist.	The set library file does not exist. Check whether the library setting file is present and check your microSD card.
	23102	The format of the library file is invalid.	The library file of the OCR tool cannot be read correctly. Generate a new library file.
	23103	The library file is of an unsupported version.	The library file is of an unsupported version.
	23104	Registering of the file necessary for executing AI tools is not available due to insufficient processing memory.	The files required to run the AI OCR tool could not be stored due to insufficient processing memory of the VS camera.

Custom Screen

Category	Error Code	Message	Cause/Countermeasure
Buttons	22200	The page to switch to is invalid.	The page to switch to is deleted.
General Setting Items	22201	Value specification is not set.	The Value setting is not set.
	22202	There is an error in the reference setting.	The Value setting has a reference error.
	22203	There is an error with the specified tool.	The set tool is not configured, has a reference error, or cannot be used.
Camera Image	22206	The tool set for initial display does not exist.	The tool set for initial display is deleted.
Archive Condition	22207	The archive condition does not exist.	The specified archive condition is deleted.
Display Generation Selection	22208	The selected display generation is invalid.	The display generation that has been deleted in Edit Display Generation is selected.
Image File	22209	The image file does not exist.	The set image file does not exist. Check whether the specified image is present.

Shared Pattern (ShapeTrax3A)

Category	Error Code	Message	Cause/Countermeasure
Processing Memory	22300	Registering of the image reference information is not available due to insufficient processing memory.	The processing memory space needed for pattern registration is not available. Delete unnecessary regions or data, or reduce the shape or number of registrations.
Pattern Data	22301	The pattern data is of an unsupported version.	An unsupported version of the pattern data was loaded.
	22302	The pattern data does not exist.	The set pattern data file does not exist.
	22303	The file format of the pattern data is invalid.	The format of the pattern data file is invalid. Set the pattern region again.
	22305	Failed to register the pattern.	The patter region extends beyond the border of the image.
Large Area Search Mode	22304	The Large Area Search Mode cannot be enabled when the Reduction is less than 4.	[Reduction] is less than 4 when [Large Area Search Mode] is ON and [Search Sensitivity] is set to [Custom]. Set the image reduction and feature reduction to 4 or higher.

Robot Coordinate Transformation

Category	Error Code	Message	Cause/Countermeasure
Calibration	22400	Calibration tool specification is not set.	The calibration tool is specified as “None”.
Transformation Target	22401	The tool ID to reference for the transformation target is not set.	The transformation target is specified as “None”.

Calibration (Robot)

Category	Error Code	Message	Cause/Countermeasure
Calibration Data	22500	The calibration file does not exist.	The referenced calibration file does not exist. Reference a different calibration file that has already been created or create a new calibration file.
	22501	The format of the calibration file is invalid.	An invalid calibration file is referenced. Reference a different calibration file that has already been created or create a new calibration file.
	22502	The robot calibration file is of an unsupported version.	An unsupported version of the calibration file is referenced. Convert the program setting to the latest version or create a new calibration file.
Calibration	22503	Cannot execute calibration because the movement interval is not set.	The movement interval is set as 0. Set the calibration movement interval to a value other than 0 using Edit Calibration.
	22504	Cannot execute calibration because Z Direction Movement Distance is not set.	The Z Direction Movement Distance is set as 0. Set the Z direction movement distance for differing height correction calibration to a value other than 0 using Edit Calibration.
	22505	Calibration is not complete.	Calibration is not complete. Complete the calibration using Edit Calibration.
	22506	The start position is not entered.	The start position is unregistered. Register the calibration start position using Edit Calibration.
	22507	The robot coordinates are invalid.	When the movement pattern is 3×3 or 5×5, the robot coordinates calculated from the start point and movement interval exceed the robot's movement range.

Pick/Place

Category	Error Code	Message	Cause/Countermeasure
Detection Position	22600	The tool to reference for the detection position is not set.	The detection position is specified as “None”, so specify an appropriate tool.
Camera Installation Position	22601	The Camera Installation Position of the specified calibration data is different from the Camera Installation Position of the tool.	The Camera Installation Position in the calibration data does not match the Camera Installation Position set in the tool.
Reference Pick/Place Position	22602	The reference position coordinates are not registered.	The reference pick/place position coordinates are not registered. Register the reference pick/place position coordinates.
Reference Capture Position	22603	The reference capture position coordinates are not registered.	The reference capture position coordinates are not registered. Register the reference capture position coordinates.
Reference Detection Position	22605	The tool to reference for Reference Detection Position is not set.	The reference detection position is specified as “None”. Set the tool to be used by specifying the reference detection position.
	22606	The reference detection position is not registered.	The reference detection position is not registered.

Grip Shift Correction

Category	Error Code	Message	Cause/Countermeasure
Detection Position Settings	22700	The tool to reference for the detection position is not set.	The detection position is specified as “None”.
Reference Capture Position	22703	The reference capture position coordinates are not registered.	The reference capture position coordinates are not registered.
Reference Place Position	22704	The reference place position coordinates are not registered.	The reference place position is not registered.
Reference Detection Position	22706	The reference detection position is not registered.	The reference detection position is not registered.
Calibration	22707	The calibration tool is not set.	The calibration tool is specified as “None”,
	22708	A calibration data where the Camera Installation Position is On-Hand is set.	A calibration data where the Camera Installation Position is On-Hand is set.

Program Setting

Category	Error Code	Message	Cause/Countermeasure
Program Setting	25000	Increase the available free space of the internal storage of the camera and then reload the program setting.	Failed to save temporary file due to insufficient internal storage capacity when changing settings.

Other

Category	Error Code	Message	Cause/Countermeasure
Unknown Error	29999	Unknown setting error. Please install the latest software.	A newer version error was detected.

Setting Failures

#O139

Common

Category	Error Code	Message	Cause/Countermeasure
General Control	30000	The image memory is insufficient.	Image memory usage exceeded 100%. Use VS Creator to modify the program setting so that the resource memory or image memory is not exceeded.
	30001	The resource memory is insufficient.	Resource memory usage exceeded 100%. Use VS Creator to modify the program setting so that the resource memory or image memory is not exceeded.
	30002	The processing memory is insufficient.	Processing memory usage exceeded 100%. Delete unnecessary regions or data, or reduce the shape or number of registrations.
	30014	The operation failed due to the invalid reference setting.	The setting was changed with an invalid value being referenced. Make sure that the operated parameter is correctly referenced. Example: A numerical value is referenced in a parameter that requires characters as input.
	30017	The string cannot be used.	A reserved word that cannot be used in Windows (such as CON) was used in the folder or file name.
	30018	The operation failed because the user does not have the editing rights.	The setting was changed while the user does not have the editing rights.
Dialog in General	30016	Failed to cancel.	Failed to execute the cancel operation of the dialog.

Category	Error Code	Message	Cause/Countermeasure
File Operation	30004	The operation failed due to insufficient free space on the PC.	Free space was insufficient to temporarily extract the file when loading.
	30005	The operation failed due to insufficient free space or inability to find the save destination.	Check the following possibilities. • Free space was insufficient when saving or loading files. • Cannot find the destination to save or load the file.
	30006	The operation failed due to inability to access the save destination.	You do not have the access rights to the save destination or writing is not permitted.
	30007	The operation failed due to inability to find the loading source.	The load source could not be found.
	30008	"File Name" File not found. Please check the file name and then try again.	The file specified as the load source could not be found.
	30009	The operation failed due to inability to access the loading source.	You do not have the access rights to the load source or writing is not permitted.
	30010	The operation failed due to the invalid file format.	The file format when referencing or reading is invalid.
	30011	The operation failed due to write protection.	File operations were performed on an SD card that is write-protected.
	30012	The operation failed due to inability to communicate with the device.	Communication was cut off during file operations and access was not possible.
	30015	The operation failed because the specified name is invalid or too long.	Shorten the processing space name and program name.
Model Image	30013	Failed to save due to absence of image.	No current image was available at the time of registration.

Task

Category	Error Code	Message	Cause/Countermeasure
Add Tool	30100	Only one Capture tool can be set in a Task.	Attempted to add more than one Capture tool for the task.
Grouping	30101	Failed to create the group because the upper limit for the number of groups will be exceeded.	The maximum number of groups was exceeded during grouping.
Paste	30102	Failed to paste the group(s) because the upper limit for the number of groups will be exceeded.	The maximum number of groups was exceeded when pasting a group.
	30108	Cannot paste a tool copied or cut from a program setting of a higher version.	Attempted to paste a tool that was copied or cut from a program setting of a higher version to a program setting of a lower version.
Partial Paste	30103	There is no corresponding parameter in the paste target tool.	There is no corresponding setting parameter in the paste target tool.
	30104	Cannot paste because the paste target parameter is unused.	The paste target parameter depends on other settings and becomes unused, so it cannot be pasted.
	30105	The pasted value is out of the setting range.	The pasted value is out of range and automatically clipped to fit within the range, or out of option range.
	30107	Partial paste failed.	Partial pasting was attempted to an item which cannot be set. For example, when attempting to paste a camera setting to an inspection tool.
Add Tool	30110	Failed to add the tool.	Failed to add the tool. For example, AI Segmentation was added with AI Activation trial period expired.

Subtask

Category	Error Code	Message	Cause/Countermeasure
Execute Selected Subtask	30109	Cannot execute when multiple subtasks are selected.	An attempt was made to execute a subtask from the main screen while multiple subtasks are selected.

Data List

Category	Error Code	Message	Cause/Countermeasure
Drag & Drop	30200	Cannot perform the operation which includes both referencing from Properties and referring to Properties at the same time.	Several setting parameters of different reference conditions were selected and dragged onto the Vision Dashboard.

Capture

Category	Error Code	Message	Cause/Countermeasure
ZoomTrax Settings	30300	Failed.	Automatic brightness adjustment, autofocus, field of view value specification, or field of view measurement was performed with a setting error or execution error.
	30301	Failed to automatically adjust the brightness because Exposure Time is in linked state.	The Exposure Time is set with a link and so the setting change failed.

OCR2

Category	Error Code	Message	Cause/Countermeasure
OCR Library	30500	The library file capacity was exceeded. Cannot register.	The number of characters that can be registered in the library file has been exceeded. The total number of characters that can be registered in one library is 600 for all character types, but this number may be less depending on the settings. Reduce the number of registered characters.
	30501	The number of characters that can be registered for 1 character was exceeded. Cannot register.	Attempted to register equal to or more than 201 character patterns in one character type. Reduce the number of registered characters per character to 200 or less.
	30502	Failed to save the library.	Failed to save the library file. There may be insufficient space in the save destination. Delete data from the save destination to free up space.
	30503	Failed to load the library file.	The set library may not be present or may be corrupt. Create a new library file again.

1D Code Reader

Category	Error Code	Message	Cause/Countermeasure
Auto-tuning	30600	Auto-Tuning failed. Check whether the code set in "Code Type" was captured correctly and retry Auto-Tuning, or adjust the tuning parameters manually. (*.* pixels or more of code resolution is recommended for capturing.)	Auto-tuning failed.
	30602	Auto-Tuning failed. Check whether the code set in "Code Type" was captured correctly and retry Auto-Tuning, or adjust the tuning parameters manually. (*.* pixels or more of minimum code resolution is recommended for capturing.)	Auto-tuning failed.

2D Code Reader

Category	Error Code	Message	Cause/Countermeasure
Auto-tuning	30601	Auto-Tuning failed. Check whether the code set in "Code Type" was captured correctly and retry Auto-Tuning, or adjust the tuning parameters manually. (*.* pixels or more of code resolution is recommended for capturing.)	Auto-tuning failed.
	30603	Auto-Tuning failed. Check whether the code set in "Code Type" was captured correctly and retry Auto-Tuning, or adjust the tuning parameters manually. (*.* pixels or more of minimum code resolution is recommended for capturing.)	Auto-tuning failed.

Common to AI Inspection Tools

Category	Error Code	Message	Cause/Countermeasure
Dataset	30700	The operation failed due to inability to access the loading source.	You do not have access rights to the dataset that you tried to reference.
	30701	The dataset is of a version that cannot be loaded.	A dataset of an unsupported version was attempted to be loaded.
	30702	The training setting data is of a version that cannot be loaded.	A training configuration data file (Annotation.ant) of an unsupported version was attempted to be loaded.
	30706	A dataset with the same name already exists.	The dataset name was set with a name that is already registered.
	30739	Could not save the dataset images to the PC.	Saving of a dataset image in the computer failed due to the shortage of storage, access rights, or other reasons.
Image Group	30707	The following characters cannot be used in the image group name. \ / : * ? " < > |	The image group name was set with prohibited characters entered.
	30708	Cannot set an empty image group name.	The image group name was set with no name entered.
	30709	The number of characters that can be set for the image group name was exceeded. Cannot set.	The image group name was set with the number of characters exceeding the character limit (UTF-8, 1024 bytes).
	30710	An image group name of the same name already exists.	The image group name was set with the same image group name already existing in the same dataset.
	30711	Failed to create the image group because the upper limit for the number of image groups will be exceeded.	New image groups were added with image groups registered up to the maximum number that can be registered.

Category	Error Code	Message	Cause/Countermeasure
Image Addition	30712	The operation failed due to insufficient free space.	There is insufficient free space on the VS Camera. Delete unnecessary settings to free up space.
	30713	The operation failed due to inability to access the save destination.	Set access rights for the folder as you do not have access rights.
	30738	Failed to add the image because the upper limit for the number of images that can be added to a dataset will be exceeded.	When registering images, the number of images exceeded the upper limit (1000 images) of the dataset.
	30740	Could not add because the Capture No. is invalid.	The image that was attempted to be added had a file name in accordance with the naming rule, in which segments are delimited by underscores, but the fifth segment (capture no.) had a string other than 1 to 10.
	30741	Could not add because the image type is invalid.	The image that was attempted to be added had a file name in accordance with the naming rule, in which segments are delimited by underscores, but the seventh segment (image type) had a string other than those of image types.
	30742	Could not add because there is no right of access to the image.	Set access rights for the image as you do not have access rights.
	30743	Could not add because the file name or the file path is too long.	Images exceeding the maximum file name limit (extension included UTF-8, 75 bytes) were added. Or images exceeding the maximum file path limit (up to 260 characters regardless of one-byte/two-byte characters) were added.
	30744	Could not add due to insufficient free space on the PC.	An image was attempted to be added when there was not enough free space in the computer.
	30745	Could not add the image(s).	Failed in adding an image unexpectedly.
	30746	Failed to add the image because this image size cannot be added to a dataset.	An attempt was made to add an image that did not fit within the image size range of “Height: 1 to 16384, Width: 32 to 16384”.
	30752	Could not add because there is no write permission to the image.	Set access rights for the image as you do not have access rights.
Region	30714	Cannot edit the region of an AI tool from the Image Viewer. Please edit it from Properties.	The region was edited on the [Image Viewer].

Category	Error Code	Message	Cause/Countermeasure
Train	30716	Failed to train because no training image is added.	Training was performed without training and test images being added.
	30717	Failed to train because the Tool Protection is set.	Training was performed while tools are protected.
	30718	It may not be possible to perform AI tool training and testing with the CPU installed in your PC.	Your computer may not be supported. Check your computer's specifications.
	30732	Training failed.	Training failed unexpectedly.
	30734	Failed to train because no classification label had been set for a training image.	Training was performed with training images that do not have classification labels set.
	30737	Failed to train because the upper limit for the number of training images that can be added for 1 classification label will be exceeded.	Training was performed with 101 or more training images for each classification label.

Category	Error Code	Message	Cause/Countermeasure
Training/ Testing	30719	The operation failed due to the invalid file format.	Training or testing was performed with different bit depths for the current image settings and the images for training or testing.
	30720	The operation failed due to another application performing training or testing.	Two or more copies of this software are running on the same computer, and while training or testing on one copy, training or testing was attempted on another copy.
	30721	Training and testing cannot be performed.	Trained or tested in a state in which training or testing cannot be performed.
	30722	The operation failed due to file damage.	The file required for processing was corrupt and could not be loaded. Perform training again, and if the situation does not improve, contact your local KEYENCE office.
	30723	The operation failed due to insufficient free space or inability to access the file.	Trained or tested with no file access rights (image read and write, intermediate data, and folder creation) or no free space.
	30724	Unable to load the file needed for processing.	Failed to load the file required to run the AI Inspection Tool at training or testing.
	30725	The operation failed due to inability to access the save destination.	Set access rights for the folder as you do not have access rights.
	30726	The operation failed due to insufficient memory capacity.	Insufficient memory at training/testing.
	30727	The operation failed due to the invalid file format.	Training and testing are performed by loading images in an unsupported format. Images other than JPEG/PNG/BMP are not supported, so delete them.
	30728	Unable to load the file needed for processing.	The file required for processing could not be loaded. Perform training again, and if the situation does not improve, contact your local KEYENCE office.
	30729	The operation failed due to the tool having a setting error. Please perform the operation after resolving the setting error.	Training, testing, or image update was performed, or an attempt was made to open the image selector dialog, in a state where there is a setting error in the tool.
	30736	The operation failed because the number of images exceed the upper limit.	Training or testing was performed with 1001 or more training and test images.
	30753	The operation failed due to insufficient free space. Current free space: *GB Necessary free space: *GB	There is insufficient free space on your computer for training and testing of the AI Inspection tool, so increase the free space on your computer or reduce the number of training images to execute.
	30754	The entire inspection region is out of the image area.	Trained or tested in a state in which the dataset contains at least one image where the inspection region is set beyond the border of the image.
	30758	Cannot execute when the Shared Region tool being referenced refers to a Vision Dashboard cell.	"Refer to Shared Region Tool" is ON, and any mnemonic in the area of the shared region tool being referenced refers to a Vision Dashboard cell.

Category	Error Code	Message	Cause/Countermeasure
Shared AI Training	30751	This cannot be used in the state where "Shared AI Training" is enabled.	Attempted to use Image Selector or Multi-Tool Training while referencing or being referenced by a tool via "Shared AI Training".
	30755	The following functions and "Shared AI Training" cannot be used concurrently. • Oval/Arc/Polygon Inspection Region • Mask • Refer to Shared Region Tool	Attempted to enable "Shared AI Training" for a tool with the following setting configured. • Oval/Arc/Polygon Inspection Region • Mask • Refer to Shared Region Tool
	30756	Failed to paste because the AI tool referenced by "Shared AI Training" is not included in the items to copy.	When attempting to duplicate a tool with "Shared AI Training" enabled across program settings, pasting will fail in the following cases. • Copying only the child tools that share an inference model. • The tools copied include both a parent tool and a child tool, but the references do not match.
	30757	Failed to train because "Shared AI Training" is used across different tasks.	Training was attempted in a state in which tools using "Shared AI Training" were not in the same task.
Load Program	30730	Unable to load the program setting due to damage.	The [Edit Dataset] button was clicked in a state where a program setting with corrupt training setting data (file) was loaded. Recreate the AI tool.
Test	30731	Please execute training because the AI tool is in a state where re-training is necessary.	Test was performed with no inference model present, or the AI Inspection tool pasted across program settings was attempted to be tested.
	30733	Testing failed.	Testing failed unexpectedly.
Report	30747	Failed to output the report.	Failed to output the report unexpectedly.
	30748	To output a report, please perform training and testing once again.	The report output was executed with the need to train and test again.
Multi-Tool Training	30749	There are no images that can be displayed in the Multi-Tool Training dialog. Please add valid images for training.	An attempt was made to open the Multi-Tool Training dialog with no images available to display in the dialog.
Version Compatibility	30750	Cannot execute AI Inspection tool training and testing because an application of an incompatible version is already running. This can be resolved by ending all running VS Creators and restarting the application of the version to use. It is possible to continue usage if an AI Inspection tool will not be used.	A newer version of VS Creator was started while an older version of VS Creator was running. Or training or testing was attempted in that state.

AI Classification

Category	Error Code	Message	Cause/Countermeasure
Classification Label Name	30800	The following characters cannot be used in the classification label name. \ / : * ? " < > |	The classification label name was set with prohibited characters entered into the classification label name.
	30801	The following names cannot be used for the classification label name. NA NL	The classification was set with only the reserved words (NA, NL) of the AI Classification entered into the classification label name.
	30802	Cannot set an empty classification label name.	The classification label name was set with no name entered.
	30803	The number of characters that can be set for the classification label name was exceeded. Cannot set.	The classification label name was set with the number of characters exceeding the character limit (UTF-8, 128 bytes).
	30804	Failed to create the classification label because the upper limit for the number of classification labels will be exceeded.	A new classification label was added when the maximum number of classification labels have already been registered.
	30809	A classification label name of the same name already exists.	An attempt was made to set the same classification label name as one that already exists.
Train	30805	Failed to train because the number of classification labels set for training is insufficient.	The [Train] button was clicked with one or no classification label set for training images.
	30810	Failed to train because different classification labels have been set for the same training image.	Training was attempted to be executed with different labels being assigned to the same image that was set as a training image.
Test	30807	The classification label setting state is different from that at the time of training.	Performed testing with the number of currently defined classification labels being different from the number at the time of training. Perform testing again.
Classification Label Count	30811	Cannot delete because at least 2 types of classification labels are needed.	An attempt was made to delete more classification labels when the number of classification labels was 2.
Auto Image Selector	30812	To execute Image Selector, it is necessary to have 1 or more images for each classification label.	The [Image Selector] button was pressed in a state where there is a classification label with no images added for it. Or, the image update at the beginning of the training process resulted in a state where there is a classification label with no images added for it.

AI Detection

Category	Error Code	Message	Cause/Countermeasure
Specify Defective (Fail) Part	30900	There is no image that can be displayed in the Defective (Fail) Part Specification dialog.	Attempted to open the [Defective (Fail) Part Specification] dialog box when there were no images that could be displayed.
Train	30903	Failed to train because the defective (fail) part is not set in the Defective (Fail) training image.	The training was performed in a state whereby there are training images set for the Defective (Fail) classification label of which some do not have the defective (fail) part set.
Test	30904	Failed to test because the shape or size of the inspection region is different from that at the time of training.	The shape or size of the inspection region is different between the time of training and testing.
Auto Image Selector	30905	To execute Image Selector, it is necessary to have 1 or more images for each of Good (Pass) image and Defective (Fail) image.	The [Image Selector] button was pressed with zero images set for either or both of Good (Pass) and Defective (Fail). Or, the image update at the beginning of the training process resulted in either one or both of Good (Pass) and Defective (Fail) having zero images.
Fine Mode	30906	The Fine mode cannot be used in this device.	An attempt was made to switch to fine mode while using a camera model of 1.6M.

AI Segmentation

Category	Error Code	Message	Cause/Countermeasure
Train	32602	Failed to train because at least 1 training image is necessary for each of Defective (Fail) and Good (Pass).	The Train button was pressed while only one of either the defective (fail) training image or the good (pass) training image was available.
Auto Image Selector	32603	To execute Image Selector, it is necessary to have 1 or more images for each of Good (Pass) image and Defective (Fail) image.	The [Image Selector] button was pressed while there were no image set as good (pass) and/or as defective (fail). Alternatively, while updating images at the start of training, there were no image set as good (pass) and/or as defective (fail).
Specify Defective (Fail) Part	32604	There is no image that can be displayed in the Defective (Fail) Part Specification dialog.	Attempted to open the Defective (Fail) Part Specification dialog when there was no image to display.
Train	32605	Failed to train because the defective (fail) part is not set in the Defective (Fail) training image.	The training was performed in a state whereby there are training images set for the Defective (Fail) classification label of which some do not have the defective (fail) part set.
Test	32606	Failed to test because the shape or size of the inspection region is different from that at the time of training.	The shape or size of the inspection region is different between the time of training and testing.
	32607	An unsupported anomaly size is set. Set the width/height of the inspection region to 2544 or lesser, or set the anomaly size to 10 or greater.	Training was performed with the width and height of the inspection region set to 2545 or more and the anomaly size set to 9 or less.
	32608	Failed to test because the anomaly size is different from that at the time of training.	The anomaly size is different between the time of training and testing.
Execute Tuning of Anomaly Size	32609	The operation failed because no training image is added.	Tuning was executed without training and test images being registered.
	32610	The operation failed because no classification label had been set for a training image.	Tuning was executed in a state in which there are training images that do not have classification labels set.
	32611	The operation failed because at least 1 training image is necessary for each of Defective (Fail) and Good (Pass).	Tuning was executed in a state in which there are either no Defective (Fail) training images or there are no Good (Pass) training images available.
	32612	The operation failed because the defective (fail) part is not set in the Defective (Fail) training image.	Tuning was executed in a state in which there are training images for which the classification label Defective (Fail) was set but the defective (fail) part was not set.
	32613	Tuning execution failed.	Failed to execute tuning due to other factors.

AI OCR

Category	Error Code	Message	Cause/Countermeasure
Additional Training	32900	Training failed.	Training failed unexpectedly.
	32901	The operation failed because the region for additional training is set outside the range of the inspection region.	Training was attempted in a state in which the region to be additionally trained goes beyond the inspection region.
	32906	Training failed because the region to be additionally trained was too large or too small for the character size setting.	Training was performed while the region to be additionally trained was less than 0.05 times or more than 2.0 times the character size setting.
OCR Library	32902	Failed to save the library.	Failed to save the library file.
	32903	Failed to load the library file.	Failed to load the library file. Example: The set library does not exist. The library is corrupt.
	32904	The library file capacity was exceeded. Cannot register.	The number of characters that can be registered in the library file has been exceeded.
	32905	The number of characters that can be registered for 1 character was exceeded. Cannot register.	Attempted to register equal to or more than 201 character patterns in one character type.

Image Position Adjustment

Category	Error Code	Message	Cause/Countermeasure
Update Reference Position	31000	Cannot update the reference position because the detection point was not detected.	The [Update Reference Position] button was clicked in a state in which the reference detection point was not detected.
	31001	In order to update the reference position, release the reference setting for the reference position.	The [Update Reference Position] button was clicked in a state in which the reference was set at the reference position.

Image Output (FTP/Storage)

Category	Error Code	Message	Cause/Countermeasure
Output Image Selection	31100	The number of images selected exceeds the number that can be output. Set 32 or less images.	An attempt was made to set the setting with more than 32 selections on the list.

File Operation

Category	Error Code	Message	Cause
Open Program Setting	31200	Unable to load the program setting due to damage.	Attempted to load a corrupted program setting. Create a program setting file again.
	31201	The program setting is of a version that cannot be loaded.	Attempted to load a program setting of a higher version. Create a program setting file for a supported version.

Manage Files

Category	Error Code	Message	Cause/Countermeasure
Move Folder	31300	The operation failed due to inability to use "path".	The folder in the target path did not exist when the [<], [>] or [↑] button was clicked.

Light Registration

Category	Error Code	Message	Cause/Countermeasure
Light ID	31400	The Light ID is redundant. Please reconfigure it to prevent duplication.	An already registered light ID was set.
	31401	Only up to 5 lighting controllers can be registered.	The number of lighting controllers to be registered has exceeded 5.

Terminal I/O Settings

Category	Error Code	Message	Cause/Countermeasure
	31500	Failed to reflect.	Failed to apply the settings.

Date and Time Settings

Category	Error Code	Message	Cause/Countermeasure
SNTP Server IP Address	31600	The address specified is the same as the device's IP address. Modify the address or cancel the change.	Attempted to set the same IP address as the device to the server's IP address.
AI Activation	31601	The date and time settings cannot be changed during the trial period for AI activation.	Attempted to open the Date and Time Settings dialog box during the trial period for AI activation.
	31602	Cannot change to a date prior to the end date of the trial period for AI activation.	Attempted to change to a date earlier than the trial expiration date after the AI activation trial period has expired.

Layout

Category	Error Code	Message	Cause/Countermeasure
Copy Current Layout	31900	The name cannot be used.	Prohibited characters are entered for the layout name. Do not use ? / : * ? " < > ¦.
	31901	It exceeds the upper limit for the number of layouts.	Attempted to copy when 10 layouts were already added.

[Connect to Device] Screen

Category	Error Code	Message	Cause/Countermeasure
Activation	32100	The activation code is invalid. Please check the activation code.	Attempted activation with an invalid activation code.
Connection	32101	Cannot connect because the maximum number of connections has been reached.	Attempted to connect more than five clients.
IP Address	32102	Failed to change the IP address.	The primary setting of the change of IP address (setting to the volatile part) failed.
	32103	Failed to log in and also failed to perform the cancel operation for the IP address change. Please try the operation again after rebooting the device.	The primary setting of the change of IP address (setting to the volatile part) was successful, but the login failed and the primary configuration could not be cancelled (written back). Restart your device and try the operation again.
AI Activation	32104	Please update the firmware in order to perform activation.	Attempted to perform AI Activation to a device with firmware version 1.3 or earlier.
	32105	Activation is already applied.	AI activation was performed on a device or simulator that has already had AI Activation performed, and the application failed.
	32106	The operation failed because the device does not support it.	Attempted to perform AI Activation to a device with a camera model of 1.6M.

Add Simulator

Category	Error Code	Message	Cause/Countermeasure
Simulator Name	32200	A simulator with the same name already exists.	A simulator with the specified simulator name already exists.
Add	32201	The file needed for adding a simulator is not included.	Files required for adding a simulator to the specified file were insufficient. Make sure you drag and drop the file that was output in the export settings.

Version

Category	Error Code	Message	Cause/Countermeasure
Version	32301	The operation failed because the device's firmware version does not support it.	Attempted to execute a function that is not supported by the device from the VS Creator.

Custom Screen

Category	Error Code	Message	Cause/Countermeasure
Add Part	32401	Failed to add the result part. It exceeds the maximum number of result parts that can be contained in 1 page.	An attempt was made to create (add) beyond the upper limit for the number of parts. Limit the number of result parts in one display pattern to 1,000 or less.
	32404	Failed to paste the result part. It exceeds the maximum number of result parts that can be contained in 1 page.	An attempt was made to create (paste) beyond the upper limit for the number of parts. Limit the number of result parts in one display pattern to 1,000 or less.
Add Camera Image Part	32402	Failed to add the camera image. It exceeds the maximum number for camera images.	An attempt was made to create (add) beyond the upper limit for the number of camera image parts.
	32405	Failed to paste the camera image. It exceeds the maximum number for camera images.	An attempt was made to create (paste) beyond the upper limit for the number of camera image parts when adding them.
Load Page	32407	Failed to load the page.	The page settings are damaged or deleted.
	32408	The page is of a version that cannot be loaded.	An attempt was made to load a page of a higher version.

Robot Calibration

Category	Error Code	Message	Cause/Countermeasure
Execute Individual Detection	32500	Could not detect the detection point because the detection tool is not properly set.	The detection tool is not set or has a reference error.
	32501	Could not detect the detection point.	The detection tool could not detect the detection point.
Calibration	32502	Calibration calculation failed.	All registration points have been registered but calibration calculation failed. Redetect calibration points and execute again.
Tool Center Calculation	32503	Failed to calculate the tool center.	All registration points have been registered but tool center calculation failed.

Image Output with Graphics (FTP/Storage)

Category	Error Code	Message	Cause/Countermeasure
Select Tool and Display Image	32700	Cannot add because the number of graphics and processed layers will exceed the upper limit.	Attempted to add graphics and processed layers which will result in there being more than the 500 allowed.

Eraser Tool

Category	Error Code	Message	Cause/Countermeasure
Eraser Tool	32800	Failed to set the eraser information.	The eraser tool was set when there was not enough free space in the save destination for the settings. Increase the free space in the save destination and execute again.

PC Operating Environment

Category	Error Code	Message	Cause/Countermeasure
General	33200	The amount of free space remaining is insufficient for that required for starting the application.	The space on the installed drive is insufficient when starting VS Creator.
	33201	The RAM capacity of your PC does not meet the system operating environment requirement. The operations may not be stable due to insufficient memory.	Memory capacity is insufficient when starting VS Creator or during startup.
	33202	The memory capacity is insufficient. Please try the operation again after ending other applications or after restarting the PC.	Memory capacity is insufficient when starting VS Creator or during startup.
	33203	Cannot display the Image Viewer content due to insufficient memory capacity. Recovery from this condition may be possible by doing the following: • Close a dialog • Reduce the number of items displayed in the Image Viewer	Memory capacity is insufficient during startup of the display expansion unit.

Other

Category	Error Code	Message	Cause/Countermeasure
Unknown Error	39999	The operation failed due to an unknown cause. Please install the latest software.	A newer version error was detected.

Execution Error

#O140

Common to Tools

Category	Error Code	Message	Cause/Countermeasure
	0	Normal End	No execution error.
	40000	A reference error occurred.	The following possibilities may be applicable. Check the check results or the status of the referenced destination. • When referencing a result data or setting parameter, the referenced result data or setting parameter became no longer available. • An invalid data is referenced. • An invalid image is referenced for the current image.
	40001	Setting value type conversion failed.	Type conversion failed at the time of resolving the reference of the setting value. The following causes may be applicable. • A character is set in a numeric type cell. • A numeric value is set in a character type cell.
	40002	A setting range error occurred.	The setting value range was exceeded. Reduce the setting range of the region.
	40003	The processing memory is insufficient.	The processing memory is overflowing. • Reduce the size and number of various regions used in Pattern Search, ShapeTrax3A, and subtraction filters. • Check whether the VS camera type in the processing space is not a model with less memory capacity than the model actually used.
	40004	Region generation failed.	The shape generated when referencing a region is very complex. Reference the [Image Region (Current Image)] tool or the [Image Region (Model Image)] tool to simplify the shape of the region to be generated.
	40005	The Blob Filter of Image Enhance failed because the current image is complex.	Blobs were detected in large quantities by the Blob Filter. To reduce the number of detected blobs, reduce the noise in the current image or reduce the size of the region.
	40006	The Convex Hull of Image Enhance failed because the current image is complex.	Due to the Convex Hull using a common process as the Blob Filter, blobs were detected internally in large quantities. To reduce the number of detected blobs, reduce the noise in the current image or reduce the size of the region.

Category	Error Code	Message	Cause/Countermeasure
	40007	The value of Reduction of Noise Isolation is too small.	For camera pixel counts above 5 megapixels, the reduction value must be set to 2 or higher.
	40008	An invalid data judgment error occurred in Judgment Conditions.	The judgment was made for non-numbers under the judgment conditions.
	40009	The number of regions in the program setting exceeded the upper limit.	The number of regions has exceeded 10,000.
	40010	All tools cannot be executed correctly because there is a circular reference error.	A circular reference error has occurred, but no direct circular reference error has occurred in the selected tool. Track the input sources and output destinations of each tool and correct any circular paths.
	40011	An error occurred due to the exceeding of the maximum number of references.	The maximum number of references possible was exceeded.
	40013	Cannot specify a Calibration tool where "Lens Only" is specified for Distortion Correction.	The scaling setting of the tool is referring to a calibration tool where "Lens Distortion" is specified for distortion correction.
	40014	Failed to generate the pattern region.	Failed to generate the shared-pattern pattern region. Reduce the noise in the current image or reduce the size of the region.
	40015	The reference tool was not executed.	When referencing a setting value in Pick/Place, Grip Shift Correction, or Robot Coordinate Transformation, the reference tool was unexecuted.
	40016	The Current Image is invalid.	Current images that cannot be set as current images for AI Classification, AI Detection, AI Segmentation, or Subtraction Filter are set.

Capture

Category	Error Code	Message	Cause/Countermeasure
	40100	Failed to track the moving object.	Moving object tracking failed with the LumiTrax or MultiSpectrum Track Moving Object settings. Reduce the size of the region or the search sensitivity.

Scaling

Category	Error Code	Message	Cause/Countermeasure
	40200	The scaling correction value exceeded the settable range.	One of the scaling correction values (X, Y, or Lengthwise) is outside the setting range or zero.

Color Detection

Category	Error Code	Message	Cause/Countermeasure
	40300	The Current Image is invalid.	An inappropriate current image is selected for Current Image when color detection was performed.
	40301	The colorspace is invalid.	An inappropriate color space is selected for Colorspace when color detection was performed (for example, “RGB” is set for the MultiSpectrum current image).

ShapeTrax3A

Category	Error Code	Message	Cause/Countermeasure
	40500	It is necessary to enable the Large Area Search Mode when a search region of a size that is more than 2544 pixels wide or 2544 pixels high is set.	When “Large Area Search Mode” is not enabled, the size of the pattern region is more than 5 million pixels. Enable the large area search mode. Enable the large area search mode to set the image reduction and feature reduction to 4 or higher.
	40501	It is necessary to enable the Large Area Search Mode when the size of the region (the combination of the pattern region and the rotation feature region) is more than 2544 pixels wide or 2544 pixels high.	When “Large Area Search Mode” is not enabled and the combined region size of the pattern region and rotation feature region is greater than or equal to 5 million pixels. Enable the large area search mode. Enable the large area search mode to set the image reduction and feature reduction to 4 or higher.
	40502	A timeout error occurred.	ShapeTrax3A timeout occurred. Adjust the settings of [Timeout (sec)] in the tool's properties. If the problem is not solved, reduce the size of the region or the search sensitivity.

Edge Position

Category	Error Code	Message	Cause/Countermeasure
	40600	Could not calculate because the inspection region is too large.	The ring (or arc) region is too large for the Edge Position tool.

Edge Width

Category	Error Code	Message	Cause/Countermeasure
	40700	Could not calculate because the inspection region is too large.	The ring (or arc) region is too large for the Edge Width tool.

Edge Pitch

Category	Error Code	Message	Cause/Countermeasure
	40800	Could not calculate because the inspection region is too large.	The ring (or arc) region is too large for the Edge Pitch tool.

Edge Pairs

Category	Error Code	Message	Cause/Countermeasure
	40900	Could not calculate because the inspection region is too large.	The ring (or arc) region is too large for the Edge Pairs tool.

Profile Position

Category	Error Code	Message	Cause/Countermeasure
	41000	Could not calculate because the inspection region is too large.	The ring (or arc) region is too large for the Profile Position tool.
	41001	The circle/line exceeded the measurable range.	When Best Fit Circle/Line is enabled, the following results exceeded the measurable range of 99999.999 (treated as a detection failure). Reduce the region of circle/line detection. • Detected Line Center X/Y • Detected Line X/Y • Detected Line X1/Y1 • Detected Line X2/Y2 • Detected Line ρ • Detected Line θ • Detected Circle Center X • Detected Circle Center Y • Detected Circle Diameter

Profile Width

Category	Error Code	Message	Cause/Countermeasure
	41100	Could not calculate because the inspection region is too large.	The ring (or arc) region is too large for the Profile Width tool.

Profile Defect

Category	Error Code	Message	Cause/Countermeasure
	41200	Could not calculate because the inspection region is too large.	The ring (or arc) region is too large for the Profile Defect tool.
	41201	Failed to detect the Reference Line.	The Profile Defect tool cannot detect the reference model line because the number of detected segments is too few. Adjust the segment size and segment shift to appropriate values.

Defect

Category	Error Code	Message	Cause/Countermeasure
	41300	There are no valid segments.	The segment size exceeded the inspection region in the Defect tool. Reduce the region.
	41301	Could not calculate because the current image is complex.	A large number of defect groups were detected with the Defect tool. Reduce the noise in the current image or reduce the size of the region.
	41302	The entire inspection region is out of the image area.	Adjust the region so that it fits within the image capture range. Reduce the noise in the current image or reduce the size of the region.
	41303	The Gain setting cannot reference nor be set to a value other than 1.0 because an inspection region of a size that is more than 2544 pixels wide or 2544 pixels high is set.	The size of the inspection region exceeds a width or height of 2544 pixels, the gain setting is ON, and the gain value is a value other than 1.0 or there is a reference setting.
	41305	An error occurred during the execution of the tool.	Failed to process the tool due to insufficient internal memory at execution with the specified region size and parameters. Reduce the size of the region or the detection conditions.

Blob

Category	Error Code	Message	Cause/Countermeasure
	41400	Could not calculate because the current image is complex.	Blobs were detected internally in large quantities by the Blob tool and/or the Blob Filter. Reduce the noise in the current image or reduce the size of the region.

Grayscale Blob

Category	Error Code	Message	Cause/Countermeasure
	41500	There are no valid segments.	The segment size exceeded the inspection region in the Grayscale Blob tool. Adjust the segment size so that it fits within the inspection region.

OCR2

Category	Error Code	Message	Cause/Countermeasure
	41600	The measurable region setting range has been exceeded.	The size of the Rectangle/Arc region has been exceeded. Reduce the region of the Rectangle/Arc.
	41601	There is no library data registered.	Create a library file. Reduce the region of the Rectangle/Arc.
	41602	It is necessary to enable the Large Area Mode when an inspection region of a size that is more than 2544 pixels wide or 2544 pixels high is set.	Attempted to use a region that exceeded the limit with the large area search mode set to OFF.
	41603	Failed to block characters.	Failed to block characters. Adjust the image appearance and parameters.
	41604	A character which cannot be used in Registered String is set.	A character which cannot be used as a judgment character in Registered String is set.

1D Code Reader

Category	Error Code	Message	Cause/Countermeasure
	41700	The Code Resolution parameter is invalid.	1D: The Code Resolution is less than 1.2.
	41701	It is necessary to enable the Large Area Mode when an inspection region of a size that is more than 2544 pixels wide or 2544 pixels high is set.	With the large area search mode disabled, the size of the inspection region exceeds a width or height of 2544 pixels. Enable the large area search mode.
	41702	The "Large Area Mode" and "Verification" cannot be used at the same time.	Both the large area mode and verification are enabled.
	41703	A timeout error occurred.	A timeout occurred. Adjust the settings of [Timeout (sec)] in the tool's properties. If the problem is not solved, reduce the size of the region or adjust the detection parameters.
	41704	The Code Type is not set.	The code type is not set in the 1D Code Reader.
	41705	The Code Detail is not set.	The detailed code type is not set in the 1D Code Reader.

2D Code Reader

Category	Error Code	Message	Cause/Countermeasure
	41800	The Code Resolution parameter is invalid.	The following possibilities may be applicable. • 2D: The Code Resolution is less than 1.2 (for PDF417, MicroPDF417, and Composite Code). • The Code Resolution is less than 1.0 (for QR, Micro QR, DataMatrix, and Rectangular DataMatrix).
	41801	It is necessary to enable the Large Area Mode when an inspection region of a size that is more than 2544 pixels wide or 2544 pixels high is set.	With the large area mode disabled, the size of the inspection region exceeds a width or height of 2544 pixels. Enable the large area search mode.
	41802	The "Large Area Mode" and "Verification" cannot be used at the same time.	Both the large area mode and verification are enabled.
	41803	A timeout error occurred.	A timeout occurred. Adjust the settings of [Timeout (sec)] in the tool's properties. If the problem is not solved, reduce the size of the region or adjust the detection parameters.
	41804	The Code Type is not set.	The code type is not set in the 2D Code Reader.
	41805	The Code Detail is not set.	The detailed code type is not set in the 2D Code Reader.

Common to AI Inspection Tools

Category	Error Code	Message	Cause/Countermeasure
	41900	Unable to load the file needed for processing.	The inference model is corrupt. Execute the training again.
	41901	Unable to load the file needed for processing.	The files required to run the AI Inspection tool are corrupt. If you have a backup file, try loading it and executing it. If the situation does not improve, contact your local KEYENCE office.
	41902	Training was not completed.	The AI Inspection tool has not yet been trained. Execute the training.
	41903	Unable to load the file needed for processing due to unsupported version.	The compatibility of inference model is lost.
	41904	Unable to load the file needed for processing due to unsupported version.	The compatibility of the files required to run the AI Inspection tool is lost.
	41905	Could not calculate because the inspection region is too large.	The inspection region set in the AI Inspection tool exceeds the size that can be processed.

AI Detection

Category	Error Code	Message	Cause/Countermeasure
	42100	The shape or size of the inspection region is different from that at the time of training.	Restore the inspection region of the AI Inspection tool to the same state as it was at the time of training, or execute the training again.

AI Segmentation

Category	Error Code	Message	Cause/Countermeasure
	42700	The shape or size of the inspection region is different from that at the time of training.	Restore the inspection region of the AI Inspection tool to the same state as it was at the time of training, or execute the training again.
	42701	The anomaly size is different from that at the time of training.	Set the Anomaly Size setting of the AI Inspection tool to the same setting as it was at the time of training, or execute the training again with the current anomaly size.
	42702	Cannot simulate in the display expansion unit.	AI Segmentation was simulated with the Display Expansion Unit.

AI OCR

Category	Error Code	Message	Cause/Countermeasure
	42800	The measurable region setting range has been exceeded.	The region size of the rectangle/arc has exceeded the limit in the AI OCR tool.
	42801	There is no library data registered.	The AI OCR library data may have been deleted. Generate a new library file.
	42802	Processing was aborted due to the occurrence of a timeout error or the possibility of a timeout error occurring.	A timeout has occurred or is expected to occur in AI OCR. Extend the timeout settings.
	42803	Cannot simulate in the display expansion unit.	AI OCR was simulated with the Display Expansion Unit.
	42804	An error occurred during the execution of the tool.	Failed to execute the tool unexpectedly.

Measurements & Dimensions

Category	Error Code	Message	Cause/Countermeasure
	42200	Failed to calculate the line with the Measurements & Dimensions tool.	Failed to calculate the line passing two points.
	42201	Failed to calculate the quadrangle with the Measurements & Dimensions tool.	Failed to calculate the quadrangle.
	42202	Failed to calculate the intersection with the Measurements & Dimensions tool.	Failed to calculate the two lines intersection.

Data Output

Category	Error Code	Message	Cause/Countermeasure
	42300	The type of the output data and the setting do not match.	Output a string for a numeric type item or a numeric value for a string type item. Select a data type that is appropriate for the output data.

Image Output

Category	Error Code	Message	Cause/Countermeasure
	42400	Could not output some of the images and graphics.	An error may be occurring in the tool that is generating the output target. Resolve the error in the tool that is generating the output target.

Data Input

Category	Error Code	Message	Cause/Countermeasure
	42500	The number of input data is insufficient.	The number of entered data has not reached the number of setting items.
	42501	The data type did not match.	A value that cannot be converted to a numeric value was entered into a numeric type setting item. A value enclosed in double quotation marks was entered into a numeric type setting item.
	42502	A timeout while waiting for data reception has occurred.	The given amount of time has elapsed before receiving the end delimiter.

Vision-Guided Robotics

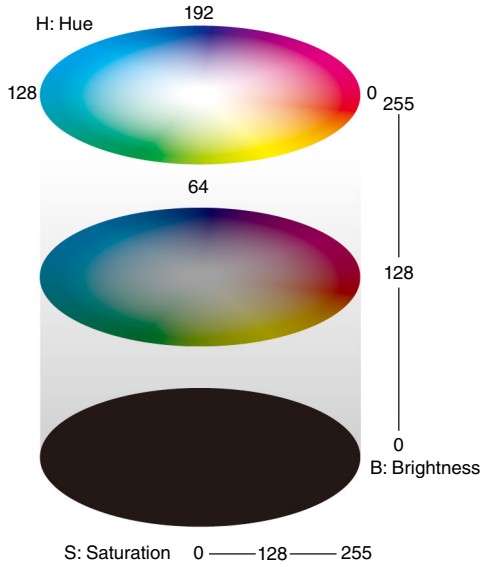
Category	Error Code	Message	Cause/Countermeasure
	42601	Calibration is not complete.	The specified calibration data status is not yet completed. Complete the specified calibration data or refer to calibration data that has already been completed.
	42602	The calibration data is invalid.	Calibration data that cannot be used for coordinate calculation is specified.
	42603	Failed to calculate the robot coordinates.	The robot coordinates could not be calculated from the detected points using calibration data.
	42604	The Differing Height Correction is in an invalid state.	The differing height correction is enabled, but the calibration data with the differing height correction set to ON is not set. Set the differing height correction to ON and execute calibration again, or set an appropriate calibration data.
	42606	The Camera Installation Position of the specified calibration data is different from the Camera Installation Position of the tool.	The Camera Installation Position in the calibration data is different from the Camera Installation Position set in the tool. Set the calibration data that corresponds to the camera installation position set in the tool.
	42607	A calibration data where the Camera Installation Position is On-Hand is set.	The Camera Installation Position in the calibration data is different from the Camera Installation Position set in the tool. Set the calibration data that corresponds to the camera installation position set in the tool.

Technical Description

What is the HSB color system?

#O141

If [Colorspace] is set to [HSB] in the Color Detection tool, the measurement results are processed in the HSB color system. The HSB color system is a way of representing a color based on H (hue), S (saturation), and B (brightness).



The HSB selection range is automatically determined by selecting the colors that you want to extract directly from the image, but setting the color range to be extracted numerically makes the extraction more stable.

Tips for specifying numerical values

Consider the following points when specifying the color range to be extracted using numerical values.

- H (Hue): The most important parameter that determines the color to be extracted. As the other parameters (Saturation and Brightness) are applied relative to the range specified for Hue, be sure to set the H value accurately.
- S (Saturation): This is essentially the quantity of color contained in the color. This parameter determines the tolerance for object color variation and washed-out color caused by halation. By excluding the area with low saturation (little color and nearing white) from the selection range, the white portions of the color caused by halation can be excluded from the extraction range.
- B (Brightness): This sets the level of black contained in the selected color. This parameter determines the tolerance for overall brightness fluctuation. By broadening the selection range, stable color extraction and inspection even with brightness fluctuations due to such factors as lighting deterioration becomes possible.

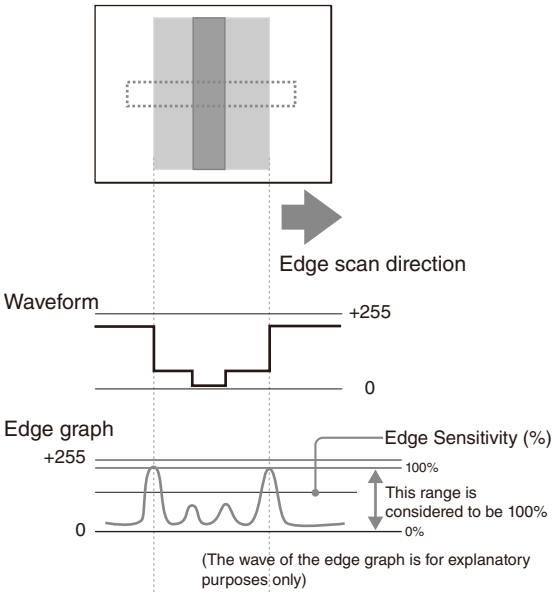
What is an Edge?

#O142

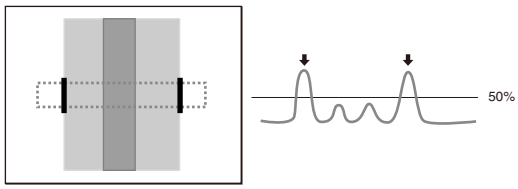
The process of detecting boundaries (edges) within the inspection region is performed by the Edge Position tool, Edge Width tool and the like.
Edge detection is performed not based on the absolute value of intensity but based on the amount of change of the average intensity derived from the projection processing done in the inspection region perpendicular to the edge scan direction. This amount of change detected is called "Edge Intensity".

Edge Sensitivity

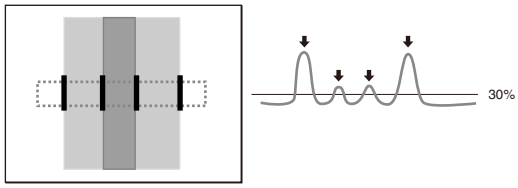
"Edge Sensitivity" refers to the percentage level of intensity for detecting as an edge, where the maximum value of edge intensity (place where shading change is the greatest) in the region represents 100%. In addition to having the edges detected based on the amount of change in shading, by relative specification of the edge sensitivity (edge recognition criterion) as a percentage of the maximum edge intensity in the region, edge detection is stable even when there are fluctuations in illuminance in the image as a whole.



Edge sensitivity 50% (detects 2 edges)



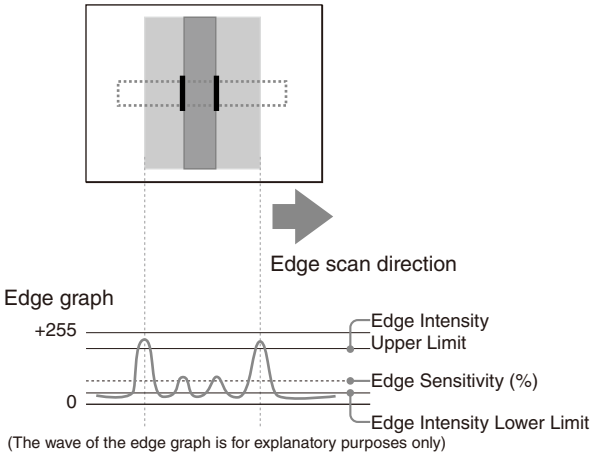
Edge sensitivity 30% (detects 4 edges)



Edge Intensity Upper Limit/Lower Limit

For increased functionality, edges can be filtered out based on their edge intensity value. The detection upper limit value on this differential waveform is called "Edge Intensity Upper Limit", and is the upper limit value for recognizing as an edge. Similarly, the detection lower limit value is called "Edge Intensity Lower Limit", and is the lower limit value for recognizing as an edge.

Only the edges that lie between the upper and lower limit will be detected. Any edge outside this range will be ignored.



Difference between Edge Sensitivity and Edge Intensity Upper Limit/Lower Limit

They are different in that while the Edge Sensitivity is specified by a relative value which deems the maximum edge intensity value as 100%, the Edge Intensity Upper Limit/Lower Limit are specified by an absolute value of edge intensity.

Point Edges excluded from detection due to the edge intensity upper limit are also excluded from the edge sensitivity calculation. Thus, if the edge intensity upper limit is changed, the edge detection result may also change.

Checking the Edge Intensity

The maximum edge intensity value within the inspection region can be checked by the numeric value displayed next to the edge graph in the Image Viewer.

Edge Filter Width

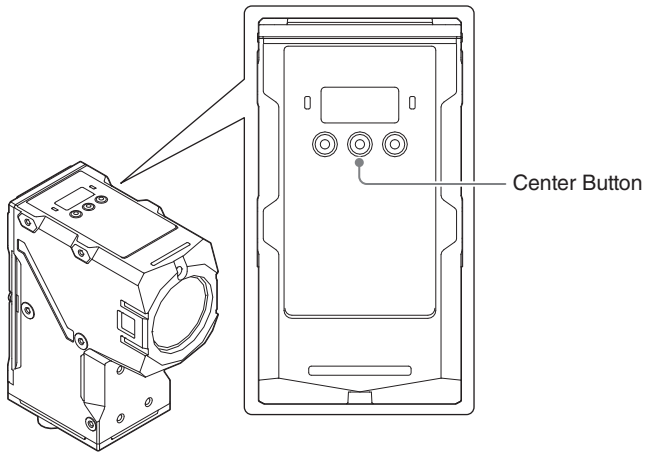
By changing the edge filter width, the edge graph can be averaged as desired helping to eliminate noise. As the edge filter width is increased, more data is used and noise has less of an impact on the edge detection.
To avoid mis-detection for rounded or angled targets where there is a gradual change in contrast, the edge filter width can also be adjusted accordingly.
Furthermore, to detect gently sloping edges such as in the case where the inspected object is tilted, increasing the edge filter width will make it easier to detect shading changes across a wide range as an edge.

Restoring Factory Default Settings

This section describes how to restore the device to its factory default settings.

VS Camera

To restore the VS camera to its factory default settings, turn on the power while pressing the center control button.



A confirmation message will appear on the display.

Format
EM?
Y N

Pressing the left button (selecting “Y”) within 5 seconds will initialize the EM folder and return the VS camera to the factory default settings.

Point

- The microSD card will not be initialized. To initialize the microSD card, on the main screen menu bar select [File] - [Manage Files] and select [Format] from the context menu of [SD Card] in the [Manage Files] dialog box that appears.
- After initialization, the VS camera automatically reboots and starts up in the initialized state.

Revision history

Date printed	Revision number	Revision contents
April 2024	2nd edition	Ver. 1.1.0000 reflected
June 2024	4th edition	Ver. 1.2.0000/1.2.0010 reflected
August 2024	5th edition	Ver. 1.3.0000 reflected
November 2024	6th edition	Ver. 1.4.0000 reflected
March 2025	7th edition	Ver. 1.5.0000 reflected
June 2025	8th edition	
August 2025	9th edition	Ver. 1.6.0000 reflected

WARRANTIES AND DISCLAIMERS

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