KEYENCE

D52GB

Safety Controller

GC Series

User's Manual

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Introduction

This user's manual describes handling, operation, and precautionary information for the GC Series Safety Controller ("GC"). Read this manual carefully and thoroughly to understand the proper usage of the GC Series and the full extent of its capabilities.
Always keep this manual in a safe place for future reference.
Also, ensure that the end user of this product receives this user's manual.

■ Related manuals

Read the following related manuals when using the GC Series.
The PDF versions of all the following manuals can be opened via the Help section of the GC Configurator.
Also, the latest manuals can be downloaded from the KEYENCE web site.

Name	Details
GC Series User's Manual (This Manual)	Describes the system configuration, specifications, steps for startup, etc. for the GC Series and the GC Configurator operation methods.
GC Series Function Block Reference Manual	Describes the function blocks which can be used when programming.

Symbols

The following symbols alert you to important messages.

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.**
CAUTION	**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.
	Indicates a reference page or section in this manual.

Safety Precautions

General Precautions

DANGER	• This product is not intended for use as an explosion-proof device. Do not use this product in a hazardous location and/or potentially explosive atmosphere. • If this product is not used in the manner specified by KEYENCE, or if this product is modified, we cannot guarantee the function and performance of the product. • Do not use the GC Series to control (stop forward motion, etc.) trains, cars and other transportation vehicles, aircraft, equipment for use in space, medical devices, or nuclear power generation systems.
WARNING	• A failure in the output circuit or internal circuit may prevent the normal control operation. Be sure to install additional safeguards on any controls or systems that may result in serious accidents or fires. • This product may become very hot while an electric current is applied and may still be hot immediately after stopping the unit. Do not touch it. • When you use network communications with the GC Series, it must be performed in an environment ensuring security against threats.
Important	• When you dispose of the GC Series, always follow the applicable requirements of the laws, rules, regulations, and standards for disposing of industrial waste in the country or region where the GC Series is used.
NOTICE	• When using network communication with the GC Series, use it in an environment that is secure against network threats. • When this product is used in combination with other instruments, functions and performance may be degraded, depending on the operating conditions and surrounding environment.

Person Responsible for Safety Management and User

DANGER	• The person responsible for safety management must train the assigned personnel for the correct use, installation, maintenance, and operation of the safety control system and the GC Series.
	• The person responsible for safety management must have a sufficient understanding of the target utility, safety device, related laws and regulations, and safety standards. He/She must also have the necessary qualifications, authority, and responsibility to ensure safety in each stage: design, installation, operation, maintenance and disposal of the machine.
	• Depending on the type of machine on which the GC Series is installed, there may be special safety regulations related to the use, installation, maintenance, and operation. The person responsible for safety management must introduce the GC Series in strict compliance with such safety regulations.
	• The person responsible for safety management must check that the risks have been reduced sufficiently following the steps below, in accordance with the ISO 13849-1/-2 requirements. The person responsible for safety management is responsible for checking/approving that risks have been reduced sufficiently.
	  • Perform a risk assessment.
	  • Define the safety functions executed by the control system and the safety levels to achieve when implementing protective measures by the control system as a result of risk assessment.
	  • Check that a program created by the PC software satisfies all of the safety functions and safety levels.
	  • Check that the implementation of protective measures does not generate new hazards.
	  • Check that all of the risks have been reduced appropriately. If there are some risks which have not been reduced sufficiently, repeat the above steps until all of the risks are reduced appropriately.
	• The person responsible for safety management must approve and confirm that a program created by the GC Configurator matches the program displayed on the approval screen when transferring the program to the GC Series.
	• The person responsible for safety management must perform a safety confirmation test (user test) before operating the system and check that all of the GC Series configuration data and the operations are correct.

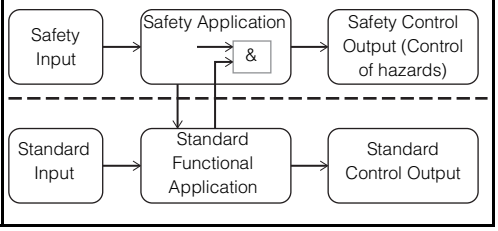
DANGER	• The user of the machine must receive specialized training related to the GC Series, and must then understand and adhere to the safety restrictions, laws, and regulations in the country or area where the GC Series is used. • The machine operators must verify that the GC Series is operating correctly in terms of functionality and performance before the start of machine and the operation of the GC Series. If any abnormality is detected in startup, while starting the operation, or while running the machine, the user must stop the machine immediately and report the situation to the person responsible for safety management.

Connection Device and Wiring

DANGER	• Connect the appropriate input and output devices in order to achieve the required safety functions as determined by the risk assessment. When using an external device that has not met the appropriate safety level, the system will not meet the required safety level as determined by the risk assessment. • For the input/output device settings, select an appropriate input device and set it with the GC Configurator according to the required safety requirement specifications and safety level. The achieved safety level varies with the settings of the device. • For the output device setting, select an appropriate output device and set it with the GC Configurator according to the required safety requirement specifications and safety level. The achieved safety level varies with the settings of the device. • The GC Series assumes that all of the safety inputs are OFF when an internal error occurs. Therefore, only the devices such as a safety light curtain, which forces the output OFF when an operator enters a hazardous area, and an emergency stop switch, which turns OFF in an emergency situation and forces the output OFF in a safe state, can be connected as input devices. • The GC Series forces the safety output OFF when an internal error occurs. Therefore, only the devices which eliminate a hazardous situation when the input turns OFF can be connected to the safety output as control devices. • Use certified products for the devices/parts related to the safety functions which conform to the safety standards, etc. applicable to the purpose of use, in accordance with the safety restrictions, laws, and regulations in the country or area where the GC Series is used.

DANGER	• Connect a dry contact or PNP output device to the devices that can connect to GC Series. A NPN output device cannot be connected. • If a safety level of SIL2, PLd or higher needs to be achieved when connecting a PNP output device, use a device that provides the inter-system short-circuit detection function of two OSSD outputs on the PNP output device side, such as Type 3 safety laser scanner and Type 4 safety light curtain. • The safety output has a built-in diode to protect from surges caused by inductive loads. When using a surge absorber separately, connect it in parallel to the load. Note that a capacitive surge absorber with a built-in capacitor may cause a malfunction. It must be used within the range of specification. • The safety output uses a PNP output. Therefore, be sure to connect a load between the safety output and 0 V. If the load is incorrectly connected between the safety output and +24 V, the safety output operation will be reversed, meaning the output will switch to the ON-state when it should be OFF, causing a very dangerous situation. • To achieve a safety level of SIL3, PLe with a single safety output, apply protection to avoid short circuit between the safety output of the GC Series and the power line, according to ISO 13849-2. • To prevent malfunctions caused by ground faults, perform wiring in a manner such that the requirements specified in IEC 60204-1 are met.

Safety Control

DANGER	• When operating the safety output with a non-safety rated signal from a general-purpose PLC, etc. without using the muting function, only the following case is accepted. 

Precautions on Regulations and Standards

CE Marking

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

Machinery directive

The GC Series is a safety component defined in the EU Machinery Directive Annex V.
The GC Series complies with the following EN Standards and has been certified by TÜV SÜD Product Service GmbH.

- EN 61508 SIL 3
- EN 62061 SIL CL3
- EN ISO 13849-1 Category 4, PLe
- EN 61131-2
- EN 61131-6
- EN 61010-1
- EN 61010-2-201

Be sure to consider the following specifications when using this product as a product certified by TÜV SÜD.

- Use this product under pollution degree 2.
- Install this product at the altitude of 2000 m or less.
- Indoor use only.
- When using this product, use the following power supply. CSA or UL certified power supply that provides Class 2 output as defined in the CEC (Canadian Electrical Code) and NEC (National Electrical Code)
- Install this product in an enclosure rated IP54 or better (e.g. control panel) (remote I/O module excluded).
- Ensure that the circuits to be connected to the input/output terminals (except for the relay output terminals of GC-1000R and GC-S1R) of this product are SELV circuits.
- Perform wiring of the GC-1000R and GC-S1R relay output terminals using an electric wire of AWG12 to 26 having temperature rating of 80 °C or higher.

EMC directive

- EN61131-2 Class A Zone B
- Install the main controller or expansion unit of the GC Series in an enclosure rated IP54 or better (e.g. control panel).
- Use the specified cable for the cable between the main controller and remote I/O module and also bus extension unit cable among the signal wires that come out of the enclosure (e.g. control panel).
- Be sure to use a shielded cable for the Ethernet cable.
- For the unit equipped with FE terminal, be sure to ground the FE terminal.

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

North American Regulations

The GC Series complies with the following North American regulations.

- FCC Part15 Subpart B, Class A Digital Device
- ICES-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.

UL and CSA Certificate

The GC Series complies with the following UL and CSA standards and has been certified by UL and CSA.

- UL61010-1
- UL61010-2-201
- CAN/CSA C22.2 No.61010-1
- CAN/CSA C22.2 No.61010-2-201

Additionally, the GC Series complies with the following standards and has been certified by UL.

- IEC61508 SIL3
- IEC62061 SIL3 CL3
- ISO13849-1 Category 4, PLe
- IEC61131-6
- UL1998

UL and C-UL certification:

- UL File No. E207185
- Category NRAQ, NRAQ7, FSPC, FSPC7

Be sure to consider the following specifications when using this product as a product certified by UL and CSA.

- Use this product under pollution degree 2.
- Install this product at the altitude of 2000 m or less.

- Indoor use only.
- Use a UL or CSA certified power supply with Class 2 output defined in NEC (National Electrical Code) and CEC (Canadian Electrical Code).
- Install this product in an enclosure rated IP54 or better (e.g. control panel) (remote I/O module excluded).
- Ensure that the circuits to be connected to the input/output terminals (except for the relay output terminals of GC-1000R and GC-S1R) of this product are SELV circuits.
- Perform wiring of GC-1000R and GC-S1R relay output terminal block using an electric wire of AWG#12 to 26 having temperature rating of 80°C or higher. The marking "⚠" beside the terminal block intends to indicate this instruction.

Radio Law in South Korea

Class A device

Note that this device is an industrial electromagnetic wave generator (Class A), and it is not intended for the home use.

A급 기기 (업무용 방송통신기자재)

이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며 , 가정외의 지역에서 사용하는 것을 목적으로 합니다 .

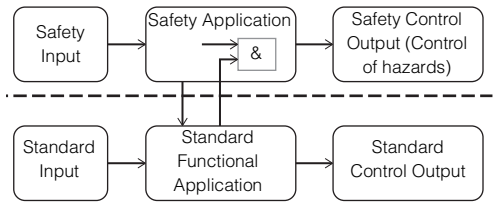
Safety Precautions

Safety Precautions

The person responsible for safety management must perform a risk assessment according to ISO 12100, determine the points of risk reduction based on the control system, understand each paragraph of "4. Design Considerations" of ISO 13849-1:2015 and requirements of other related standards, and perform the following:

- Create the safety requirement specifications that specify the required safety functions and safety levels to achieve.
- Create a program meeting the safety requirement specifications.
- Perform validation according to ISO 13849-2.

When creating a program that includes both a safety related part of the control system and a part other than that, separate the safety related part from the non-safety related part as much as possible as shown in the following figure. To use a signal from the non-safety related part for the safety related part, programming must be performed so that turning the safety output ON by the non-safety related part is allowed only when the signal from the safety related part is TRUE (state where the output can be turned ON).



The safe state of the GC Series is defined as follows:

- S-OUT is in the OFF state.
- The output of the function block is in the OFF state.
- The input of the GC Series is in the OFF state.

Therefore, connect a device which turns the output OFF when a hazard is detected (e.g. safety light curtain that turns the OSSD OFF when a person is detected or an emergency stop switch that forces the output OFF when it is activated) to the input of the GC Series.
Likewise, select a device which enters into a safe state when the input is OFF (motor or robot stops) as the device that connects the safety output of the GC Series.

If the safety output state changes by the rising or falling edge of a signal, an unexpected startup due to a disturbance such as noise or unexpected switching of the operation mode may occur. The person responsible for safety management must check that all of the operation modes provide the intended operations and reduce risks using a function such as an enable input, as needed.

Precautions for Using Input Block (Input Device)

■ Mode selecting switch

To use the mode selecting switch, the following points need to be considered.
Excerpt from IEC 60204-1(2016)/JIS B9960-1(2019) Paragraph 9.2.3.5 "Operating modes"

- Where machinery has been designed and constructed to allow its use in several control or operating modes requiring different protective measures and having a different impact on safety, it must be fitted with a mode selector which can be locked in each position (for example key operated switch). Each position of the selector must be clearly identifiable and must correspond to a single operating or control mode.
- Mode selection by itself must not initiate machine operation. A separate actuation of the start control is required.
- For each specific operating mode, the relevant safety functions and/or protective measures must be implemented.
- Indication of the selected operating mode must be provided (for example the position of a mode selector, the provision of an indicating light, a visual display indication).

■ Two hand control device

To use the two hand control, the following points need to be considered. As requested in ISO 13851/JIS B9712, arrangement of two switches needs to be considered to prevent machine startup by the following:
Example

Operation with only one hand
Possible combinations of one hand and other parts of the human body or just other parts of the human body
Combinations of one hand or another part of the human body and simple auxiliary tool (plate/bar/bridge, cord/string, tape, etc.)
Startup caused by accidental operation

The measures against the listed startup examples are specified in ISO 13851/JIS B9712. The requirements above, as well as the requirements of ISO 13851/JIS B9712, must be met when designing an actual machine.
To comply with ISO 13851, [Discrepancy time] in the two hand control device setting must be set within the range of 0.3 to 0.5 seconds.

■ GS closed state input (when connecting GS Series to GC-Link port)
■ GS locked state input (when connecting GS Series to GC-Link port)
■ Signal from industrial Ethernet communication

The output from this function block uses a non-safety rated signal. This output cannot be used as a safety output of the safety-related control system.
When transmitting a reset signal via industrial Ethernet communications, the use of an enabling code is recommended to prevent unexpected startup.

Precautions for Using Function Block

■ OR

When using the OR function block, do not create a program that causes a safety signal to turn ON with a non-safety rated signal.

■ NOT

For the case where the NOT function block is used for a signal from a safety device such as an emergency stop switch or safety light curtain, if the cable connecting the safety device with the GC Series is disconnected, the output of the NOT block turns ON. Create a program so that the unexpected startup of machine does not occur in a failure situation like this.

■ Sequential muting
■ Muting for exit

- The positions of the safety light curtain and the muting sensor(s) must be in accordance with the requirements of IEC 61496-1/JIS B9704-1 and IEC 62046.
- The peripheral devices used to enable the muting function (muting sensors) and the installation must comply with the instructions in this manual and all of the requirements of the laws, rules, regulations and standards in the country or region where the GC Series is used and also those specific to the machine to be installed.
- The installation of a muting lamp may be required by the laws, rules, and standards in the country or region where the GC Series is used and also those specific to the machine to be installed, or the need of a muting lamp may be determined by the result of the risk assessment.
- Each muting function block must be set appropriately after performing a risk assessment.
- When the maximum muting period is set to one hour or not specified, the setting must be performed so that muting ends when the state of safety light curtain is changed from blocked to unblocked state during muting, or the muting enabling function must be used. An appropriate guard to prevent human access to the hazardous areas through the gaps between the safety light curtain and the object during muting must be used. Check if new risks, such as the risk of being caught in the gaps between the safety light curtain and the object have the possibility of occurring.
- When using the override function, the target safety light curtain and the hazardous areas must be set so that they are visually recognizable, and a hold-to-run device must be used for startup so that the hazardous areas cannot be entered while the hold-to-run device is activated.
- The following conditions must be met when installing the override function start device in a location where the hazardous areas cannot be checked visually.
  - Install a spring return key operated switch (or momentary action pushbutton) in a location where the target safety light curtain can be checked visually.
  - Check that no one remains in the hazardous areas before starting the override.
  - Do not allow access to the hazardous areas during the override sequence.
  - Install an emergency stop switch in the immediate vicinity of the start switch.
- The muting function must be started by signals from two or four independent sensors that detect an object. The use of a signal created only by software, such as a sequence control signal, as a muting signal is not accepted for safety reasons.

■ Parallel muting
■ Cross-muting

In addition to the precautions for sequential muting, the following points need to be considered for the parallel muting and cross-muting.

- Implement any of the following measures to avoid a dangerous situation caused by short-circuit of signal cables from M1 and M2 and also from M3 and M4 muting sensors for the parallel muting, or from M1 and M2 muting sensors for the cross-muting when allowing simultaneous turn-ON of the muting inputs.
  - Use a combination of N.O. output and N.C. output types for the two muting sensors.
  - Protect the two cables with different cable ducts or protection tubes.
  - Use different multicore cables.
  - Use independent, grounded shielded cables.
- IEC 62046 recommends the use of sequential muting instead of cross-muting when the time period between muting inputs needs to be set to four seconds or more.

■ Position detection muting

- The position of the muting sensors must be in accordance with the requirements of the muting sensors in IEC 61496-1 and IEC 62046.
- When [Permit to start muting upon start-up] is enabled, this function does not comply with the requirements of the muting function in IEC 61496-1. The person responsible for safety management must ensure that risks has been adequately reduced through conducting a risk assessment.
- This function block allows a human body or a part of human body to access hazardous areas under the following conditions: in a non-hazardous state in the machine cycle (e.g. upstroke of a press), or when safety is maintained by other means.
- The installation of a muting indicator may be required by the laws, rules, regulations and standards in the country or region where the GC Series is used.
- An appropriate guard to prevent human access to the hazardous areas must be provided if the maximum time of this function is not specified.
- When using the override function, the target safety light curtain and the hazardous areas must be set so that they are visually recognizable, and a hold-to-run device must be used for startup so that the hazardous areas cannot be entered while the hold-to-run device is activated.
- The following conditions must be met when installing the override function start device in a location where the hazardous areas cannot be checked visually.
  - Install a spring return key operated switch (or momentary action pushbutton) in a location where the target safety light curtain can be checked visually.

- Check that no one remains in the hazardous areas before starting the override.
- Do not allow access to the hazardous areas during the override sequence.
- Install an emergency stop switch in the immediate vicinity of the start switch.

- The muting must be started by signals from two independent sensors that detect a non-hazardous state in the machine cycle. The use of a signal created only by software, such as a sequence control signal, as a muting signal is not accepted for safety reasons.
- Take any of the following measures for signal cables from muting sensors.
  - Use a combination of N.O. output and N.C. output types for the two sensors.
  - Protect the two cables with different cable ducts or protection tubes.
  - Use different multicore cables.
  - Use independent, grounded shielded cables.
  - Use safety sensors like the KEYENCE GS Series.
- To enable [Permit to start muting upon start-up], use safety sensors having appropriate safety parameters (SIL and/or PL), such as the KEYENCE GS Series, for the sensors that start muting at start-up.

■ Reset

● Reset (with AND)

● Master ON

- Use this function block in accordance with paragraph 5.2.2 of ISO 13849-1:2015.
- In the case where the input cable from the reset switch is short-circuited with +24 V power or another signal cable, unexpected reset clearing may occur. If there is such a risk, include one or more of the following measures for protection.
  - Introduce an appropriate measure to protect the cable from short-circuit with other signal cables.
  - Use the test output and activate the monitoring function to detect a short-circuit failure.
  - Select the pulse input in the reset input setting.
- When an edge input is selected for the reset input setting, this function does not comply with the requirements of paragraph 5.2.2 of ISO13849-1:2015. Unexpected reset clearing may occur due to noise or other such momentary pulse signals. Therefore, it is recommended to use the pulse input setting except in cases where not doing so is permissible based on the results of a risk assessment. If the use of an edge input is unavoidable, it is recommended to use the reset enable input function to avoid the previously mentioned risks.
- The reset input of this function block must be performed with a manually operated device.
- The manually operated device for reset clearing (actuator or switch) must be situated outside the hazardous areas and in a position where the operator is able to check that no one is within the hazardous area.
- The installation of an interlock state indicator may be required by the laws, rules, regulations and standards in the country or region where the GC Series is used.

■ Dual reset

In addition to the precautions for reset function block, the following points need to be considered for the dual reset function block.

- The manually operated device for reset 2 (actuator or switch) must be situated outside of the hazardous areas.
- An operator who exits from the hazardous area last must operate the manually operated device for reset 1 (actuator or switch).
- It is recommended that the manually operated device for reset 2 (actuator or switch) be installed in a position where the operator is able to check that no one is within the hazardous area if it is possible that more than one operator may enter the hazardous areas.
- This function block should not be used in applications where a person may enter a hazardous area before the operator operates the reset 2 manually operated device after operating reset 1.

■ Existence detection reset

In addition to the precautions for reset function block, the following points need to be considered for the existence detection reset function block.

- For the "Reset Enable" input, apply a signal from a presence sensing device such as safety laser scanner or safety light curtain.

■ Mode changing control

In addition to the precautions for mode selecting switch, the following points need to be considered for the mode switching control function block.
Unintentional mode change might occur due to the disconnection of a cable from an input device, depending on the setting of this function block. Unintentional mode change can be prevented by setting "Mode 4". This mode, which is not commonly used (as shown below), can be used to prevent unintentional mode changes that may occur through disconnected cables.

	IN1	IN2	IN3	Description
Mode Output 1	✓			Output with Mode 1 selected
Mode Output 2		✓		Output with Mode 2 selected
Mode Output 3			✓	Output with Mode 3 selected
Mode Output 4				When this mode is selected and a program causing all the safety outputs of the GC Series to turn OFF is used, unintentional mode change at cable disconnection, etc. can be prevented.

■ Manual mode

- The person responsible for safety management must confirm the compliance with the requirements of "Suspension of safety functions and/or protective measures" specified in IEC 60204-1 and also the requirements of "Operational modes" specified in ISO 10218-1 for robot application using an actual program.
- Unexpected startup of the machine may occur in mode switching from the manual to auto mode when the restart input is set to [Not used]. If it is impermissible in the risk assessment of the machine, include another measure to prevent unexpected startup.
- Setting a suspension of the safety function for an emergency stop device is prohibited. The person responsible for safety management must confirm that all of the emergency stop devices can operate, even if in the manual mode. Create a program so that a hazard is not started by the operation other than that of a hold-to-run device in the manual mode. Startup of the machine in the manual mode is permitted through the operation of a hold-to-run device or similar device. A three-position enabling switch, momentary switch, two hand control or an equivalent can be used as a hold-to-run device.
- It is strongly recommended to avoid using more than one manual mode control (MMC) function block for one machine. If more than one manual mode control function block needs to be used for an unavoidable reason, create a program so that an unexpected startup is not caused by another manual mode control (MMC) function block while in the manual mode.
- To prevent unintended suspension of safety device, it is recommended to use a mode selecting switch with a key for selecting the manual mode.
- Install an emergency stop switch where the operator can easily reach it in the case where the operator may come close to a hazard in the manual mode.
- The installation of a manual mode state indicator may be required by the laws, rules, regulations and standards in the country or region where the GC Series is used.
- To comply with ANSI B11.19, a display or indicator which indicates the state of suspension of a safety device is required. It must be located where the operator can recognize that he/she is near the safety device of the suspension target. Periodic inspection is required for the indicator.

■ Unlock control

- The output of this function block must be used in combination with the unlock output of the guard locking switch.
- This function block can be used for both "Power-to-release" and "Power-to-lock". These are selected in the unlock output setting for guard locking switch.
- When using the lock function of the guard locking switch for a safety related part of the control system, input an unlock control signal that turns ON when no hazard exists in a protection area. The following lists the details of the state.
  - The speed of the movable part of the hazard drops below the speed with sufficiently low risk.
  - The torque of the movable part of the hazard drops below the torque with sufficiently low risk.
  - The drive source of the hazard turns OFF.
- Unlock permission delay time must be specified in consideration of machine-to-machine variations and deterioration of the machine.

■ Bypass

- To cause a suspension of a safety function using this function block, programming must be performed in compliance with the relevant standards such as "Suspension of safety functions and/or protective measures" specified in IEC 60204-1 and "Operational modes" specified in ISO 10218-1. The person responsible for safety management must ensure that the requirements of applicable standards are met and risks has been reduced sufficiently through conducting a risk assessment.
- This function block does not provide the setting items to comply with the requirements of applicable standards. It is recommended to use the manual mode control function block.
- Connect a signal from a device having appropriate safety parameters based on SIL, PLr, etc. required in the risk assessment to the "Bypass" signal of this function block. Note that when performing bypassing with a signal other than the appropriate safety signal, the safety level of entire machine is decreased to the safety level held by this signal.
- Be sure that the maximum bypass period is the minimum amount of time required for the application. When the duration time needs to be set to one hour or more, use the bypass enabling function or a signal from a safety device.
- To allow bypassing at startup, input a signal from a safety device having the appropriate safety level for the "Bypass" signal.
- This function block is not for muting function. Use muting function block for the muting function.

■ Control guard

- To use this function, the following requirements related to ISO12100 for an interlocking guard with a start function (control guards) must be met.
  - The requirements of ISO 14119 for the interlocking guard must be met.
  - The cycle time of the machine is short.
  - The auto start tolerance time must be set as short as possible (e.g. not greater than the cycle time).
  - While the guard is closed, a human body or a part of a human body must not be allowed to enter the area between the guard and hazardous area.
  - Guards that can access the same hazard (fixed (removable type) or movable guard) must be interlocking guards equipped with an interlock switch or the equivalent.
  - The guard must be securely held open using a spring or counterweight such that it cannot initiate a startup when it is closed unintentionally.
  - The interlock switch used to detect opening/closing of the guard must satisfy the appropriate safety level (SIL, PLr) according to the risk assessment result.

■ PSDI

- IEC 61496-1 Type 4 safety light curtain must be used. Safety light curtain with appropriate detection capability must be used.
- No greater than ø30 mm for hand detection or ø50 mm for leg/whole body detection (IEC 62046) No greater than ø32 mm (ANSI B11.19)
- Use this function only with machines which can be stopped immediately anywhere in their cycle.
- Install the safety light curtain with an appropriate safety distance maintained from a hazard.
- A hazard must not be accessed by a route outside the area protected by the safety light curtain.
- Guards that protect a hazard (fixed (removable type) or movable guard) must be an interlocking guards equipped with interlock switch or the equivalent.
- Use a signal with an appropriate safety level for the top dead center, bottom dead center, upstroke signal, etc.
- The GC Series has not been verified as a device specified in Chapter 4-2 Presence Sensing Device Initiation in Announcement No. 5 Safety device standards for press machines and shearing machines issued by the Ministry of Health, Labour and Welfare of Japan on January 12, 2011. Therefore, the PSDI function cannot be used on a power press machine in Japan.

■ Edge detection

- Create a program so that an unexpected startup is not caused by noise or other such momentary pulse signals.

Precautions for Using Output Block (Output Device)

■ S-OUT safety output x 1

- To achieve a safety level of SIL3, PLe with a single safety output, apply protection to avoid short circuit between the safety output of the GC Series and the power line, according to ISO 13849-2.
- If the output self-diagnosis is disabled, the achievable safety level becomes PLd, SIL2.

■ S-OUT safety output x 2

- If the output self-diagnosis is disabled, the achievable safety level becomes PLd, SIL2.

■ Unlock output

- The achievable safety level of the guard locking function varies by the selected output.

  PLe/SIL3
  - When connecting the KEYENCE GS Series power-to-release type sensor via GC-Link.
  - When connecting via a terminal block (safety output x 2) (with the output self-diagnosis enabled).

  PLd/SIL2
  - When connecting via a terminal block (safety output x 1) (with the output self-diagnosis enabled).

Precautions for Using Other Function Block

■ SZ/SZ-V Series bank output

- When using the bank switching function, someone may be able to approach a hazardous area/hazard without passing through the protection area if bank switching is performed at an unintended timing. Therefore, the responsible personnel must confirm that the appropriate protection area is set/selected for the safety laser scanner in all operation modes of the machine including the bank switching time.
- This function is available only on KEYENCE SZ-V Series.

■ Input filter (OFF-ON)

- When applying OFF-ON filter of 0.5 ms or 1 ms to an input device, attach a resistor of 2.2 kΩ or less between the safety input terminal to which the input device is assigned and 0 V.

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Manual Configuration

Chapter 1	Before Use	Provides the information for checking the package contents, product list and the overview of the GC Series.
Chapter 2	Basic Usage Procedure	Describes the basic use procedure of the GC Series.
Chapter 3	Specifications	Describes the specifications and dimensions of the main controller, expansion unit and remote I/O module.
Chapter 4	Calculating Response Time	Describes how to calculate the response time in using the GC Series.
Chapter 5	Operating Main Controller	Describes the main controller operation method and LCD display.
Chapter 6	Installation and Wiring	Describes installation, basic wiring, and the settings and wiring in using KEYENCE safety sensors.
Chapter 7	Before Using the GC Configurator	Describes the GC Configurator operating environment, installation method and program creation procedure.
Chapter 8	Basic Operations of GC Configurator	Describes the basic operations of the GC Configurator.
Chapter 9	Creating New Project with GC Configurator	Describes how to create a new project in the GC Configurator.
Chapter 10	GC Configurator [Settings] - [Configuration]	Describes how to register or set input/output devices in the GC Configurator.
Chapter 11	GC Configurator [Settings] - Programming	Describes how to create a program in the GC Configurator.
Chapter 12	GC Configurator [Settings] - Transfer	Describes the procedure for transferring a project and the log-in authentication in the GC Configurator.
Chapter 13	GC Configurator [Monitoring]	Describes how to monitor in the GC Configurator.
Chapter 14	GC Configurator [History]	Describes how to check a history in the GC Configurator.
Chapter 15	Ethernet Communication Function	Describes the settings and functions when using the Ethernet communication function.
Chapter 16	EtherNet/IP™ Communication Function	Describes the settings and functions when using the EtherNet/IP communication function.
Chapter 17	PROFINET Communication Function	Describes the settings and functions when using the PROFINET communication function.
Chapter 18	UDP Communication Function	Describes the settings and functions when using the UDP communication function.
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Chapter 21	Inspection and Maintenance	Describes the inspection and maintenance procedures for the GC Series.
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Before Use

This chapter describes the information which you should know before using this product, such as package contents and overview of the GC Series.

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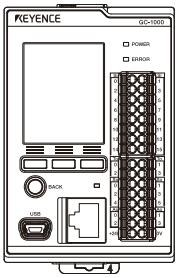
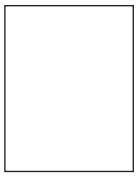
1-1 Checking the Package Contents

Main controller

GC-1000

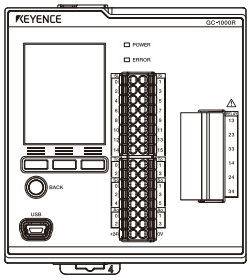


GC-1000 x 1

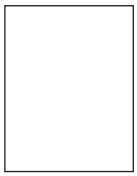


Instruction manual

GC-1000R



GC-1000R x 1



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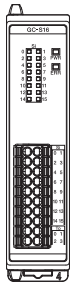
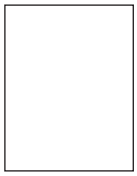
Expansion unit and remote I/O module

GC-S84/S16/S1R/A16/B30



Expansion units



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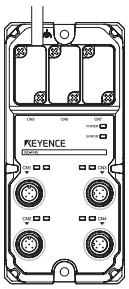
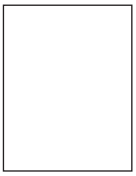
GC-R45/R48



Remote I/O modules

Waterproof caps



Instruction manual

1-2 Product List

Main controllers

Category	Product name	Model	Additional details
GC Series	Main controller	GC-1000	Safety input x 16 points / Safety output x 6 points
	Main controller (safety relay output)	GC-1000R	Safety input x 14 points / Safety output x 4 points / Safety relay output x 1 point (3a)

Expansion units

Category	Product name	Model	Additional details
Input/output	Expansion units (8 safety inputs / 4 safety outputs)	GC-S84	Safety input x 8 points / Safety output x 4 points
	Expansion units (16 safety inputs)	GC-S16	Safety input x 16 points
	Expansion units (safety relay output)	GC-S1R	Safety relay output x 1 point (3a)
	Expansion units (16 general-purpose outputs)	GC-A16	AUX output x 16 points
Bus extension	Bus extension unit	GC-B30	For bus extension, Max. 30 m
Remote I/O	Remote I/O modules (M12 5 pins)	GC-R45	M12 5 pins, 4 ports
	Remote I/O modules (M12 8 pins)	GC-R48	M12 8 pins, 4 ports

Cables

■ GC-Link connection cables

Safety sensor	Product name	Model	Quantity	Length (m)
GL-R Series	GC-Link cable for GL-R (8 pins), 0.3 m	GL-RCG03S	1	0.3
	Extension cable (8 pins), 7 m	GL-RCC7S	1 set (transmitter/receiver)	7
	GL-R main unit connection cable	GL-RPC03PS	1	0.3
GL-S Series	GC-Link cable for GL-S (8 pins), 0.3 m	GL-SCG03S	1	0.3
	Extension cable (8 pins), 7 m	GL-RCC7S	1 set (transmitter/receiver)	7
	GL-S main unit connection cable (8 pins), 0.3 m	GL-SPC03PS	1 set (transmitter/receiver)	0.3
GC Series (GS (Non-contact), GS (Lock), GS-M)	GC-Link cable for GS (5 pins), 0.3 m	GS-P5CG03	1	0.3
	M12 connector type extension cable Simple function type (5 pins)	GS-P5CC1	1	1
		GS-P5CC3	1	3
		GS-P5CC5	1	5
		GS-P5CC10	1	10
	Y-shaped connector	GS-Y11	1	--
	End connector	GS-Y12	1	--
SZ-V04(X) Simple connection	GC-Link cable for SZ-V04 (5 pins), 0.3 m	SZ-VCG03	1	0.3
	Extension cable (5 pins), 7 m	SZ-VCC7	1	7
	SZ-V04 power cable (5 pins), 0.3 m	SZ-VPC03S	1	0.3
SZ-V04(X) Advanced function connection	GC-Link cable for SZ-V04/V32 (12 pins), 0.3 m	SZ-VCG03M	1	0.3
	Extension cable (12 pins), 7m	SZ-VCC7M	1	7
	SZ-V04 power cable (12 pins), 0.3m	SZ-VPC03M	1	0.3

Safety sensor	Product name	Model	Quantity	Length (m)
SZ-V32(X)/32N(X) Advanced function connection	GC-Link cable for SZ-V04/V32 (12 pins), 0.3 m	SZ-VCG03M	1	0.3
	Extension cable (12 pins), 7 m	SZ-VCC7M	1	7
	SZ-V32 power cable (12 pins), 0.3 m	SZ-VPC03S	1	0.3
SZ-01S	GC-Link cable for SZ-V04/V32 (12 pins), 0.3 m	SZ-VCG03	1	0.3
	Extension cable (5 pins), 7 m	SZ-CC7PS	1	7
	SZ-01S power cable (5 pins), 0.3 m	SZ-PC03PS	1	0.3

■ Remote I/O module connection cables

<Connection cable between GC-1000 and remote I/O module>

Product name	Model	Quantity	Length (m)
Remote I/O module power cable	GC-RP10	1	10
	GC-RP30	1	30
Remote I/O module extension cable	GC-RS10	1	10
	GC-RS30	1	30
Remote I/O module external power cable	GC-RE10	1	10

<Connection cable between remote I/O module (GC-R45) and safety sensor>

Safety sensor	Product name	Model	Quantity	Length (m)
GL-R Series	M12 5-pin cable	GS-P5CC1	1	1
		GS-P5CC3	1	3
		GS-P5CC5	1	5
		GS-P5CC10	1	10
	GL-R main unit connection cable	OP-88300	1	0.3
GL-S Series	M12 4-pin cable	OP-85503	1	2
		OP-85504	1	5
	GL-S main unit connection cable	GL-SPC03P	1	0.3
GS-10PC	Extension cable	GS-P5CC1	1	1
		GS-P5CC3	1	3
		GS-P5CC5	1	5
		GS-P5CC10	1	10
SZ-V Series	Extension cable (5 pins), 7 m	SZ-VCC7	1	7
	SZ-V04 power cable (5 pins), 0.3 m	SZ-VPC03S	1	0.3
GC Series (SZ-01S)	Extension cable (5 pins), 7 m	SZ-CC7PS	1	7
	SZ-01S output cable (5 pins), 0.3 m	SZ-PC03PS	1	0.3

<Connection cable between remote I/O module (GC-R48) and safety sensor>

Safety sensor	Product name	Model	Quantity	Length (m)
GS-11PC GS-51PC GS-71PC GS-M51P GS-M91P GS-ML51P	Extension cable	GS-P8LC1	1	1
		GS-P8CC1	1	1
		GS-P8CC3	1	3
		GS-P8CC5	1	5
		GS-P8CC10	1	10

1-3 Overview of GC Series

The GC Series Safety Controller is a highly reliable, user-friendly programmable controller which is suitable for the safety control of small-scale and middle-scale equipment/machinery.

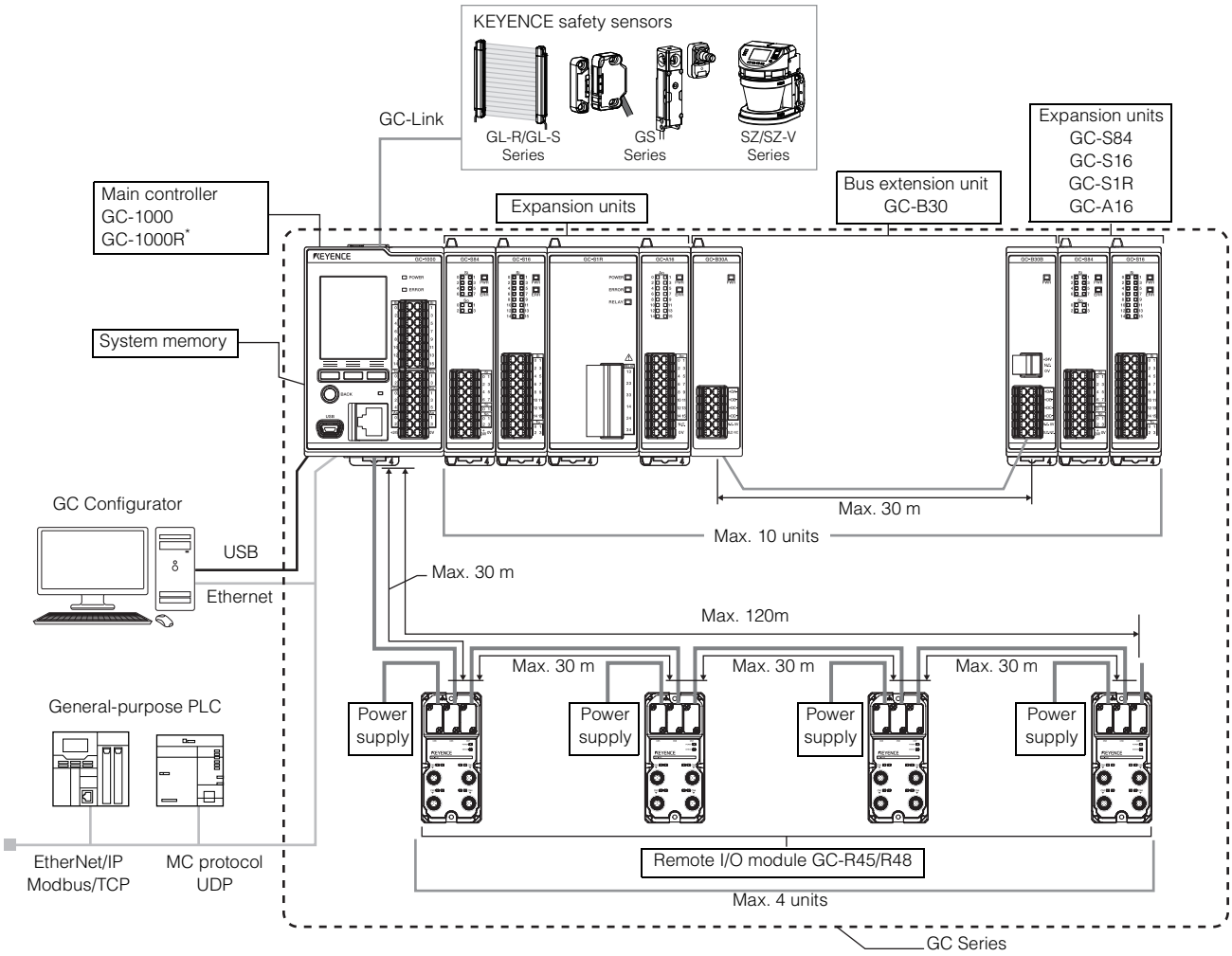
The GC Series allows users to construct safety control systems that fulfill the following requirements:

- Requirements of SIL (Safety Integrity Level) 3 of IEC 61508 and IEC/EN 62061 (Functional safety of electrical/electronic/programmable electronic safety-related systems)
- Requirements of EN ISO 13849-1 safety category 4, PL (Performance Level) e

The GC Series offers two main controllers: the GC-1000 which can be extended using the expansion units and remote I/O modules and also features Ethernet communication functionality, and the GC-1000R which is equipped with a built-in safety relay output. Since the GC-1000 allows for extension of up to 212 safety input points and 46 safety output points with a single main controller, you are able to flexibly construct the system configuration according to the scale of the machine. Also, the use of the dedicated GC Configurator software makes setting up and programming simple or complicated safety system controls a breeze.

Base System and Components

The following shows the base system configuration using the GC Series.



* The GC-1000R cannot connect expansion units or remote I/O modules and cannot use the Ethernet communication function.

2

Basic Usage Procedure

This chapter describes the basic usage procedure for the GC Series.

2-1 Basic Usage Procedure .....page 2-2

2-1 Basic Usage Procedure

The following describes the basic usage procedure for the GC Series.

- System design -

Perform a risk assessment to determine necessary safety measures

Before using the GC Series, be sure to perform a risk assessment on the target machine and determine the risks involved with machine operation and the corresponding safety measures that must be appropriately taken.

Select necessary safety devices and consider the system configuration

Select appropriate devices to be connected to the GC Series to fulfill the safety requirements. Using an inappropriate external device may degrade the overall machine safety. Make a selection while checking compatibility with the GC Series specifications.

Chapter 3 Specifications
Appendix: List of Input/Output Devices

Communication with PLC on the control side

The GC-1000 is equipped with an Ethernet port and can communicate with a general-purpose PLC that performs machine control via Ethernet. This allows you to monitor the operation status of the GC Series and any potential error information on the general-purpose PLC side. Also, you can use data transmitted from the general-purpose PLC to the GC Series in the control system program.

Chapter 15 Ethernet Communication Function
Chapter 16 EtherNet/IP™ Communication Function
Chapter 17 UDP Communication Function
Chapter 18 Modbus/TCP Communication Function
Chapter 19 MC Protocol Communication Function

- Hardware design -

Calculate and verify the response time.

The response time is the maximum time required for the GC Series to execute a program based on a signal from a safety input device and shut off the output sent to the safety output device. Safety distances are calculated using the response time.
When calculating the response time for the whole machine, add the response times of the input devices such as safety sensors (e.g. safety light curtain) and switches, and the time required for the machine to stop after the output from the GC Series turns OFF.

Chapter 4 Calculating Response Time

Install the GC Series.

Connect and install the GC Series main controller, expansion units, and remote I/O modules.

6-1 Installing Units
6-2 Wiring Units

Perform wiring of the input/output devices.

Install and wire the input/output devices to be connected to the GC Series.

6-3 Connecting Input Devices
6-4 Connecting Output Devices
6-5 Connecting KEYENCE Safety Sensors

- Software design - GC Configurator

Preparation and startup

Check the operating environment of the PC on which the GC Configurator will be used and then install the software. Review the flow of programming and the basic operations of the GC Configurator before use.

Chapter 7 Before Use of GC Configurator
Chapter 8 Basic Operations of GC Configurator

Set the system configuration.

Create a new project and select the appropriate unit configuration.

Chapter 9 Creating New Program

Register the input/output devices.

Register the input/output devices to be connected to the GC Series and assign them to the terminals.

Chapter 10 [Settings] - Configuration

Create a program.

Create a program for the GC Series.
There are two types of programming methods: "EASY mode" enables quick and easy programming by simply selecting an application and registering the input devices, and "Standard mode" enables unique customization opportunities to fit any application using function blocks.

Chapter 11 [Settings] - Programming
11-1 EASY Mode
11-2 Standard Mode

Verify the program.

Verify the created program works properly using the simulation function. In simulation mode, debugging can be performed without the need for the physical signals from the input devices.

11-3 Simulation

- Startup and debugging -

Transfer the program and manage the access privileges.

Transfer the created program to the GC Series main controller. Passwords can be placed on the GC Series program to prevent unauthorized access to the GC Series main controller.

Chapter 12 [Settings] - Transfer
12-1 Log-in Authentication
12-2 Transfer

Perform debugging.

Using the GC Configurator monitoring function, check the wiring status of the input/output devices and the overall program operation. When an abnormality occurs, investigate the cause using the GC Configurator monitoring and history functions and the LCD display of the GC Series main controller.

Chapter 13 [Monitoring]
Chapter 14 [History]
Appendix: Troubleshooting

Perform a safety confirmation test.

After debugging, confirm that all the safety functions operate properly. Make a backup of the project so as to be ready for potential future replacement of the GC Series. Using the report function, you can output and store a project report.

Maintenance and inspection

Troubleshooting

When an abnormality occurs, investigate the cause using the GC Configurator monitoring and history functions and the LCD display of the GC Series main controller.

Appendix: Troubleshooting

Inspection, maintenance, and replacement

Perform daily and periodic inspections appropriately to ensure the GC Series functions are in top condition.

Chapter 20 Inspection and Maintenance

MEMO

3 Specifications

This chapter describes the specifications for the GC Series main controllers, expansion units, and remote I/O modules.

3-1 Main Controllers ..... page 3-2
3-2 Expansion Units ..... page 3-9
3-3 Remote I/O Modules ..... page 3-20
3-4 Dimensions ..... page 3-24

3-1 Main Controllers

GC-1000

GC-1000 specifications

Item		GC-1000
Input/output points	Safety inputs	16
	Safety outputs	6
	Safety relay output	--
	AUX outputs	4
	Test outputs	4
Maximum number of connectable expansion units		10 *1
Maximum number of connectable remote I/O modules		4
GC-Link ports		2 ports
Safety input specifications	Input device	Contact output device or PNP output device
	Input type	Type3
	ON level (voltage/current)	Min. 11 V/2 mA
	OFF level (voltage/current)	Max. 5 V/1.5 mA
	Short-circuit current	Si 0 to 3: Approx. 5 mA
		Si 4 to 15: Approx. 3 mA
	Protection circuit	Surge protection circuit, wrong wiring protection circuit
	Maximum cable length	Max. 100 m
Safety output specifications	Output type	PNP transistor output (DC-13, Type 0.5, Protected outputs)*2
	Maximum load current	500mA
	Residual voltage (during ON)	Max. 2.0 V
	Leakage current (during OFF)	Max. 0.5mA
	Maximum capacitive load	0.5 µF
	Load wiring resistance	Max. 2.5 Ω
	Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
	Maximum cable length	Max. 30 m
Test output specifications	Output type	PNP transistor output *3
	Maximum load current	100 mA
	Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
	Maximum cable length	Max. 100 m*4
AUX output specifications	Output type	Transistor output (PNP/NPN selectable by wiring) PNP output (DC-13, Type 0.1, Protected outputs)*2 *3
	Maximum load current	PNP: 100 mA, NPN: 20 mA
	Residual voltage (during ON)	Max. 2.0 V
	Leakage current (during OFF)	Max. 0.5mA
	Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
	Maximum cable length	Max. 30 m

Item		GC-1000
Communication interface	USB	USB2.0
	Ethernet	100BASE-TX STP (shielded twisted pair) cable of Category 5 or higher
Network functionality		EtherNet/IP™, Modbus/TCP, MC protocol, UDP
Others	LCD display	1.77-inch color LCD
	Display buttons	4 points (3 operation keys + 1 BACK key)
Usage environment	Operating ambient temperature	-10 to +55 °C (No freezing)
	Relative humidity	5 to 85% (No condensation)
	Storage temperature	-25 to +70 °C (No freezing)
	Vibration resistance	Frequency: 5 to 9 Hz, Half amplitude: 3.5 mm Frequency: 9 to 150 Hz, Acceleration: 10 m/s^2 10 times each in X, Y, Z directions
	Shock resistance	Acceleration: 150 m/s^2, Operating time: 11 ms, 3 times each in X, Y, Z directions
	Overvoltage category	II III (relay output part of GC-1000R and GC-S1R)
	Pollution degree	2
	Operating altitude	Max. 2000 m
Applicable standards	EMC	EMS: IEC 61131-2/-6, EN61131-2/-6 EMI: IEC 61131-2, FCC Part15B Class A, ICES-003, Class A
	Safety	IEC 61508,EN61508 SIL3 IEC 62061,EN62061 SIL CL3 ISO/EN13849-1:2015 Cat. 4, PL e, UL1998
Power supply	Power voltage	24 VDC (-30 to +20%) *5 Class 2
	Current consumption	Max. 200 mA*6
Dimensions (W x D x H)		60 x 95 x 90 mm
Materials		Polycarbonate
Weight		Approx. 260 g

*1 The bus extension unit "GC-B30" is not included in this number, and only one set of "GC-B30" can be used.

*2 Paragraph 6.4.6 Temporary overload of IEC 61131-2 supports up to 1.2 times the maximum load current.

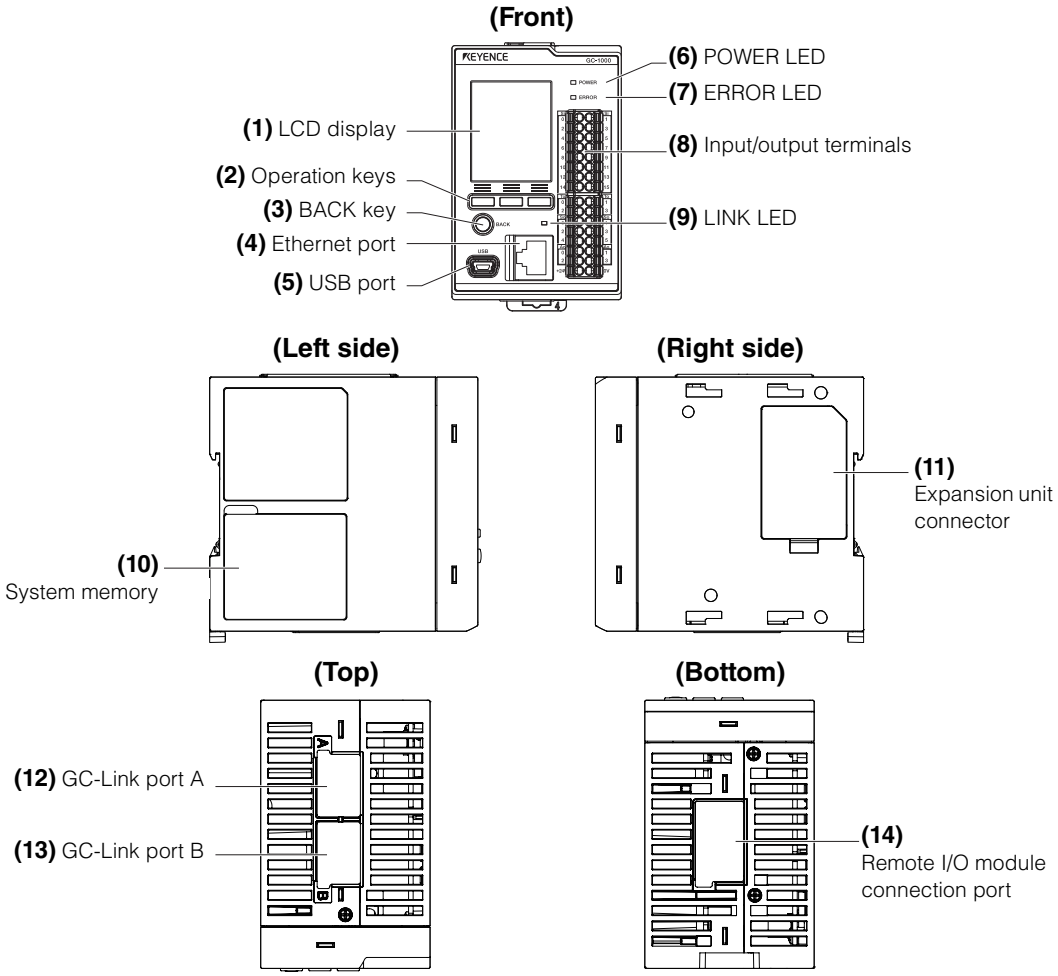
*3 AUX outputs (NPN output) and test outputs do not comply with paragraph 6.4.6 of IEC 61131-2.

*4 When the test output is branched and connected to multiple safety input devices, the total branched cable length must not exceed 400 m.

*5 When using GC-S1R, GC-A16, GC-B30, GC-R45 or GC-R48, it is "-20 to +20%".

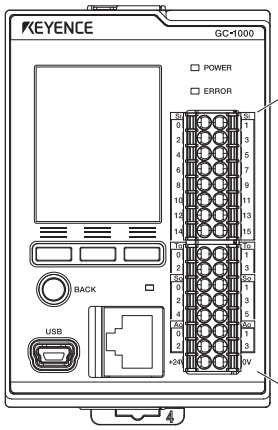
*6 Except for load current and sensors connected to GC-Link.

Part names



Number	Name	Function
(1)	LCD display	Used to monitor the GC Series operation status.
(2)	Operation keys	Used to operate the LCD display.
(3)	BACK key	Used to return to the previous screen.
(4)	Ethernet port	Used to connect a network cable (RJ-45).
(5)	USB port	Used to connect a USB cable (mini-B).
(6)	POWER LED	Turns ON (green) while power is supplied.
(7)	ERROR LED	Blinks (red) when an error occurs.
(8)	Input/output terminals	Terminals for inputs/outputs.
(9)	LINK LED	Shows the link status with the control device. Turns ON in green: Link established, Blinks in green: Transmitting data, OFF: Link not established
(10)	System memory	A slot for the system memory.
(11)	Expansion unit connector	Terminals for expansion units. A cover is attached prior to shipment. Remove the cover when connecting an expansion unit.
(12)	GC-Link port A	Ports dedicated for connecting KEYENCE safety sensors.
(13)	GC-Link port B	
(14)	Remote I/O module connection port	A port for connecting a remote I/O module.

Terminal arrangement



0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	Si14	Si15	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	So4	So5	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		

GC-1000R

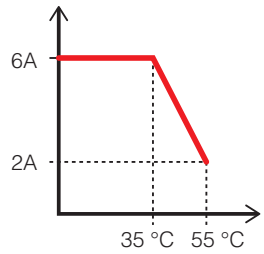
GC-1000R specifications

Item		GC-1000R
Input/output points	Safety inputs	14
	Safety outputs	4
	Safety relay output	1 (3a)
	AUX outputs	4
	Test outputs	4
GC-Link port		2 ports
Safety input specifications	Input device	Contact output device or PNP output device
	Input type	Type3
	ON level (voltage/current)	Min. 11 V/2 mA
	OFF level (voltage/current)	Max. 5 V/1.5 mA
	Short-circuit current	Si 0 to 3: Approx. 5 mA
		Si 4 to 13: Approx. 3 mA
	Protection circuit	Surge protection circuit, wrong wiring protection circuit
	Maximum cable length	Max. 100 m
Safety output specifications	Output type	PNP transistor output (DC-13, Type 0.5, Protected outputs)*1
	Maximum load current	500 mA
	Residual voltage (during ON)	Max. 2.0 V
	Leakage current (during OFF)	Max. 0.5 mA
	Maximum capacitive load	0.5 µF
	Load wiring resistance	Max. 2.5 Ω
	Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
	Maximum cable length	Max. 30 m
Safety relay output specifications	Output type	Relay (3a) (Externally-protected outputs, R300, B300)*2
	Rated load (resistance load)	250 VAC 6A / 30 VDC 6A*3 *4
	Rated load (inductive load)	240 VAC 2A (AC-15) / 24 VDC 1A (DC-13) (TÜV SÜD, CSA Certified) R300, B300 (UL Certified)
	Relay output mechanical life	Resistance load (250 VAC 6A/30 VDC 6A): Min. 100,000 times Resistance load (250 VAC 1A/30 VDC 1 A): Min. 500,000 times Inductive load (AC-15: 240 VAC 2 A): Min. 100,000 times (cosø = 0.3) Inductive load (DC-13: 24 VDC 1 A): Min. 100,000 times (L/R = 48 ms)
	Maximum cable length	Max. 100 m
	B10d	With rated load: 400,000 times With low load: 2,000,000 times
Test output specifications	Output type	PNP transistor output*5
	Maximum load current	100 mA
	Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
	Maximum cable length	Max. 100 m*6

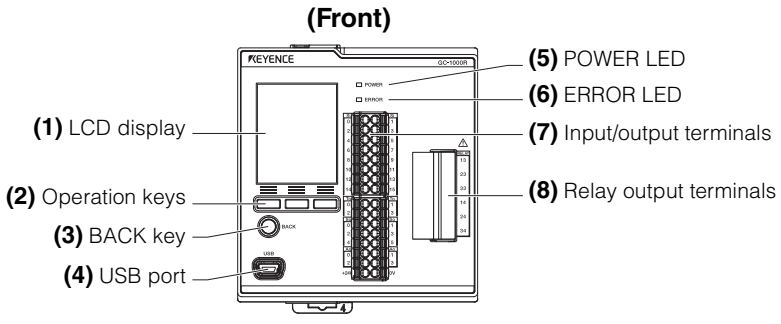
Item		GC-1000R
AUX output specifications	Output type	Transistor output (PNP/NPN selectable by wiring) PNP output (DC-13, Type 0.1, Protected outputs)*1 *5
	Maximum load current	PNP: 100 mA, NPN: 20 mA
	Residual voltage (during ON)	Max. 2.0 V
	Leakage current (during OFF)	Max. 0.5 mA
	Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
	Maximum cable length	Max. 30 m
Communication interface	USB	USB2.0
Others	LCD display	1.77-inch color LCD
	Display buttons	4 points (3 operation keys + 1 BACK key)
Usage environment	Operating ambient temperature	-10 to +55 °C (No freezing)
	Relative humidity	5 to 85% (No condensation)
	Storage temperature	-25 to +70 °C (No freezing)
	Vibration resistance	Frequency: 5 to 9 Hz, Half amplitude: 3.5 mm Frequency: 9 to 150 Hz, Acceleration: 10 m/s^2 10 times each in X, Y, Z directions
	Shock resistance	Acceleration: 150 m/s^2, Operating time: 11 ms, 3 times each in X, Y, Z directions
	Overvoltage category	II III (relay output part of GC-1000R and GC-S1R)
	Pollution degree	2
	Operating altitude	Max. 2000 m
Applicable standards	EMC	EMS: IEC 61131-2/-6, EN61131-2/-6 EMI: IEC 61131-2, FCC Part15B Class A, ICES-003, Class A
	Safety	IEC 61508,EN61508 SIL3 IEC 62061,EN62061 SIL CL3 ISO/EN13849-1:2015 Cat. 4, PL e, UL1998
Power supply	Power voltage	24 VDC (-20 to +20%) Class 2
	Current consumption	Max. 200 mA*7
Dimensions (W x D x H)		85 x 95 x 90 mm
Materials		Polycarbonate
Weight		Approx. 360 g

*1 Paragraph 6.4.6 Temporary overload of IEC 61131-2 supports up to 1.2 times the maximum load current.
*2 To comply with the requirements of IEC61131-2, connect 10A fast blow fuse (IEC 60127) in series to each contact.
*3 Check the derating characteristics described later.
*4 Use this product with load current of max. 5 A at temperature of 40 C° or lower when using this product as a product certified by UL.
*5 AUX outputs (NPN output) and test outputs do not comply with paragraph 6.4.6 of IEC 61131-2.
*6 When the test output is branched and connected to multiple safety input devices, the total branched cable length must not exceed 400 m.
*7 Except for load current and sensors connected to GC-Link.

Derating characteristics

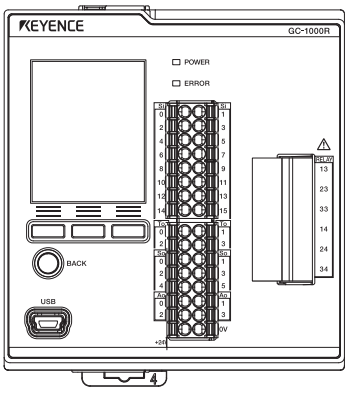


Part names



Number	Name	Function
(1)	LCD display	Used to monitor the GC Series operation status.
(2)	Operation keys	Used to operate the LCD display.
(3)	BACK key	Used to return to the previous screen.
(4)	USB port	A port for USB connection (mini-B).
(5)	POWER LED	Turns ON (green) while power is supplied.
(6)	ERROR LED	Blinks (red) when an error occurs.
(7)	Input/output terminals	Terminals for input/output.
(8)	Relay output terminals	Terminals for relay output.
(9)	GC-Link port A	Ports dedicated for connecting KEYENCE safety sensors.
(10)	GC-Link port B	

Terminal arrangement

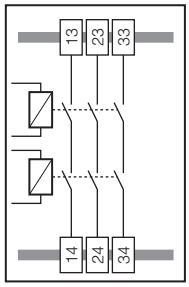


Inputs/outputs

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	N.C.	N.C.	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	N.C.	N.C.	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		

Relay output terminals

13	SRo	Relay output SRo
23	SRo	
33	SRo	
14	SRo	
24	SRo	
34	SRo	



3-2 Expansion Units

GC-S84

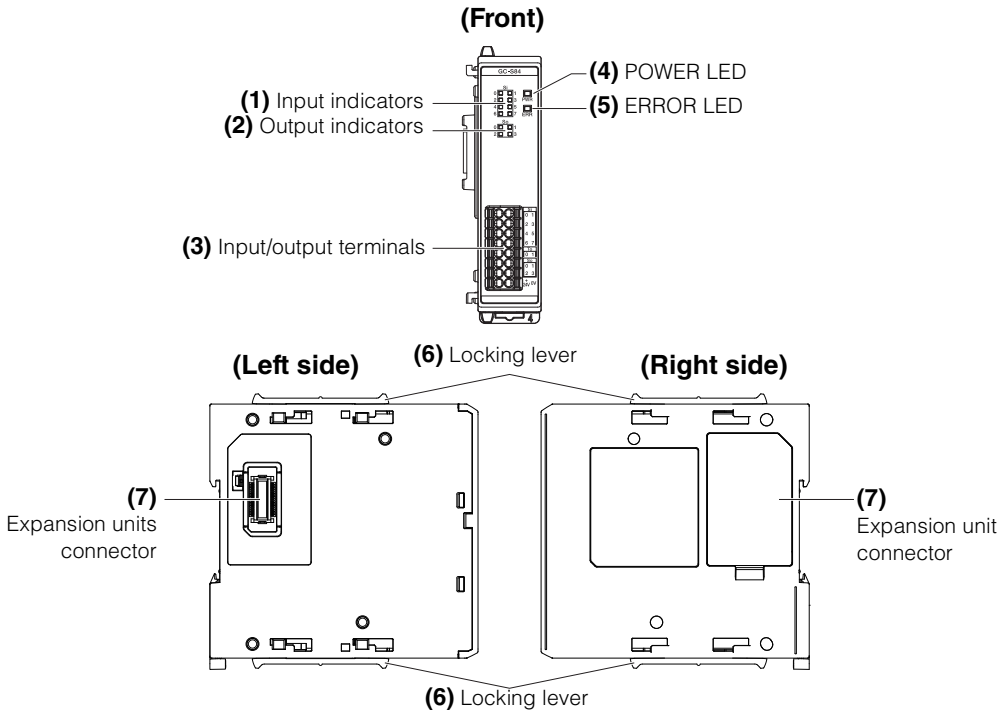
GC-S84 specifications

Item		Specification
Input/output points	Safety inputs	8
	Safety outputs (transistor output)	4
	Test outputs	2
Safety input specifications	Input device	Contact output device or PNP output device
	Input type	Type3
	ON level (voltage/current)	Min. 11 V/2 mA
	OFF level (voltage/current)	Max. 5 V/1.5 mA
	Short-circuit current	Approx. 3 mA
	Protection circuit	Surge protection circuit, wrong wiring protection circuit
	Maximum cable length	Max. 100 m
Safety output specifications	Output type	PNP transistor output (DC-13, Type 0.5, Protected outputs)*1
	Maximum load current	500 mA
	Residual voltage (during ON)	Max. 2.0 V
	Leakage current (during OFF)	Max. 0.5 mA
	Maximum capacitive load	0.5 µF
	Load wiring resistance	Max. 2.5 Ω
	Maximum cable length	Max. 30 m
	Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
Test output specifications*2	Output type	PNP transistor output
	Maximum load current	100 mA
	Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
	Maximum cable length	Max. 100 m*3
Usage environment	Operating ambient temperature	-10 to +55 °C (No freezing)
	Relative humidity	5 to 85% (No condensation)
	Storage temperature	-25 to +70 °C (No freezing)
	Vibration resistance	Frequency: 5 to 9 Hz, Half amplitude: 3.5 mm Frequency: 9 to 150 Hz, Acceleration: 10 m/s^2 10 times each in X, Y, Z directions
	Shock resistance	Acceleration: 150 m/s^2, Operating time: 11 ms, 3 times each in X, Y, Z directions
	Overvoltage category	II
	Pollution degree	2
	Operating altitude	Max. 2000 m
Applicable standards	EMC	EMS: IEC 61131-2/-6, EN61131-2/-6,EMI: IEC 61131-2, FCC Part15B Class A, ICES-003, Class A
	Safety	IEC 61508, EN 61508 SIL3, IEC 62061, EN 62061 SIL CL3, ISO/EN 13849-1:2015 Cat. 4, PL e, UL1998

Item		Specification
Power supply	Power voltage	24 VDC (-20 to +20%) Class 2
	Current consumption	Max. 60 mA*4
Dimensions (W x D x H)		22.2 x 95 x 90 mm
Materials		Polycarbonate
Weight		Approx. 130 g

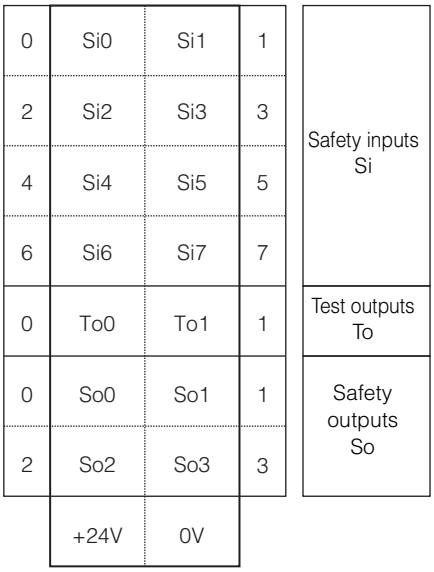
*1 Paragraph 6.4.6 Temporary overload of IEC 61131-2 supports up to 1.2 times the maximum load current.
*2 Test outputs do not comply with paragraph 6.4 of IEC 61131-2.
*3 When the test output is branched and connected to multiple safety input devices, the total branched cable length must not exceed 400 m.
*4 Except for load current.

Part names



Number	Name	Function
(1)	Input indicators	Individual input indicators for Si0 to Si7. Input ON: Turns ON in green. Input OFF: Turns OFF.
(2)	Output indicators	Individual output indicators for So0 to So3. Output ON: Turns ON in green. Output OFF/Not used: Turns OFF.
(3)	Input/output terminals	Terminals for input/output.
(4)	POWER LED	Turns ON (green) while power is supplied.
(5)	ERROR LED	Blinks (red) when an error occurs.
(6)	Locking lever	Used to lock the connection between units.
(7)	Expansion unit connector	Terminals for expansion units. A cover is attached to the connector on the right side prior to shipment. Remove the cover when connecting an expansion unit.

Terminal arrangement



GC-S16

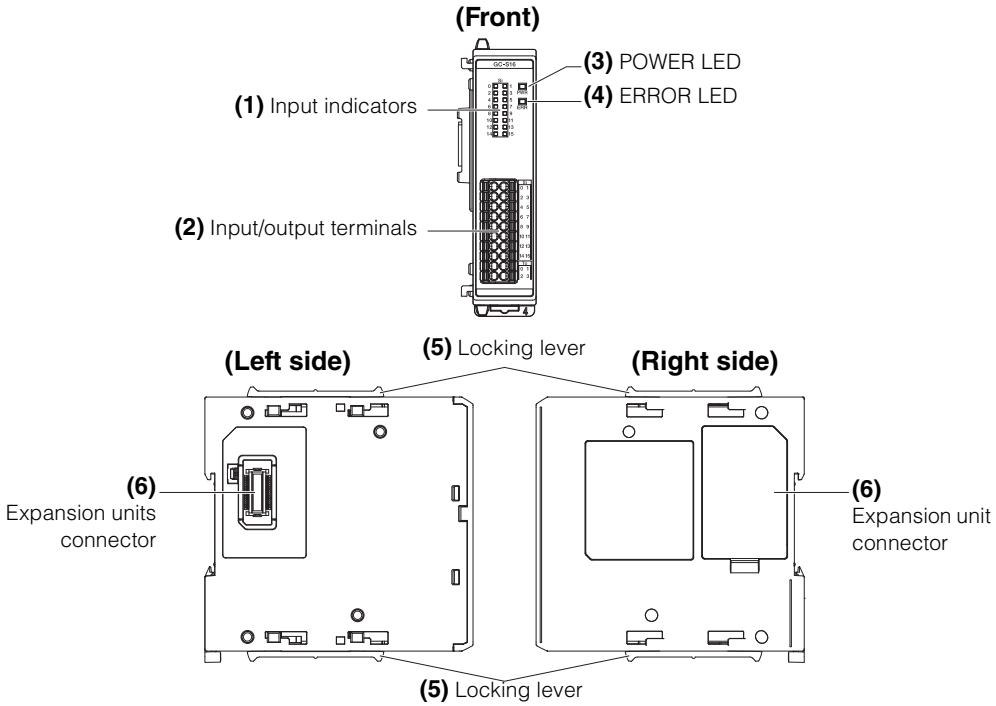
GC-S16 specifications

Item		GC-S16
Input/output points	Safety inputs	16
	Test outputs	4
Safety input specifications	Input device	Contact output device or PNP output device
	Input type	Type3
	ON level (voltage/current)	Min. 11 V/2 mA
	OFF level (voltage/current)	Max. 5 V/1.5 mA
	Short-circuit current	Approx. 5 mA
	Protection circuit	Surge protection circuit, wrong wiring protection circuit
	Maximum cable length	Max. 100 m
Test output specifications*1	Output type	PNP transistor output
	Maximum load current	100 mA
	Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
	Maximum cable length	Max. 100 m*2
Usage environment	Operating ambient temperature	-10 to +55 °C (No freezing)
	Relative humidity	5 to 85% (No condensation)
	Storage temperature	-25 to +70 °C (No freezing)
	Vibration resistance	Frequency: 5 to 9 Hz, Half amplitude: 3.5 mm Frequency: 9 to 150 Hz, Acceleration: 10 m/s^2 10 times each in X, Y, Z directions
	Shock resistance	Acceleration: 150 m/s^2, Operating time: 11 ms, 3 times each in X, Y, Z directions
	Overvoltage category	II
	Pollution degree	2
	Operating altitude	Max. 2000 m
Applicable standards	EMC	EMS: IEC 61131-2/-6, EN61131-2/-6,EMI: IEC 61131-2, FCC Part15B Class A,ICES-003, Class A
	Safety	IEC 61508, EN 61508 SIL3, IEC 62061, EN 62061 SIL CL3, ISO/EN 13849-1:2015 Cat. 4, PL e, UL1998
Current consumption		Max. 50 mA
Dimensions (W x D x H)		22.2 x 95 x 90 mm
Materials		Polycarbonate
Weight		Approx. 130 g

*1 Test outputs do not comply with paragraph 6.4 of IEC 61131-2.

*2 When the test output is branched and connected to multiple safety input devices, the total branched cable length must not exceed 400 m.

Part names



Number	Name	Function
(1)	Input indicators	Individual input indicators for Si0 to Si15. Input ON: Turns ON in green. Input OFF: Turns OFF.
(2)	Input/output terminals	Terminals for input/output.
(3)	POWER LED	Turns ON (green) while power is supplied.
(4)	ERROR LED	Blinks (red) when an error occurs.
(5)	Locking lever	Used to lock the connection between units.
(6)	Expansion unit connector	Terminals for expansion units. A cover is attached to the connector on the right side prior to shipment. Remove the cover when connecting an expansion unit.

Terminal arrangement

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	Si14	Si15	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	

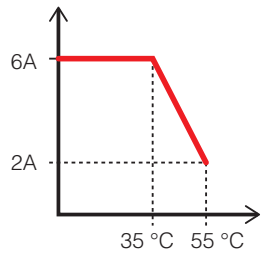
GC-S1R

GC-S1R specifications

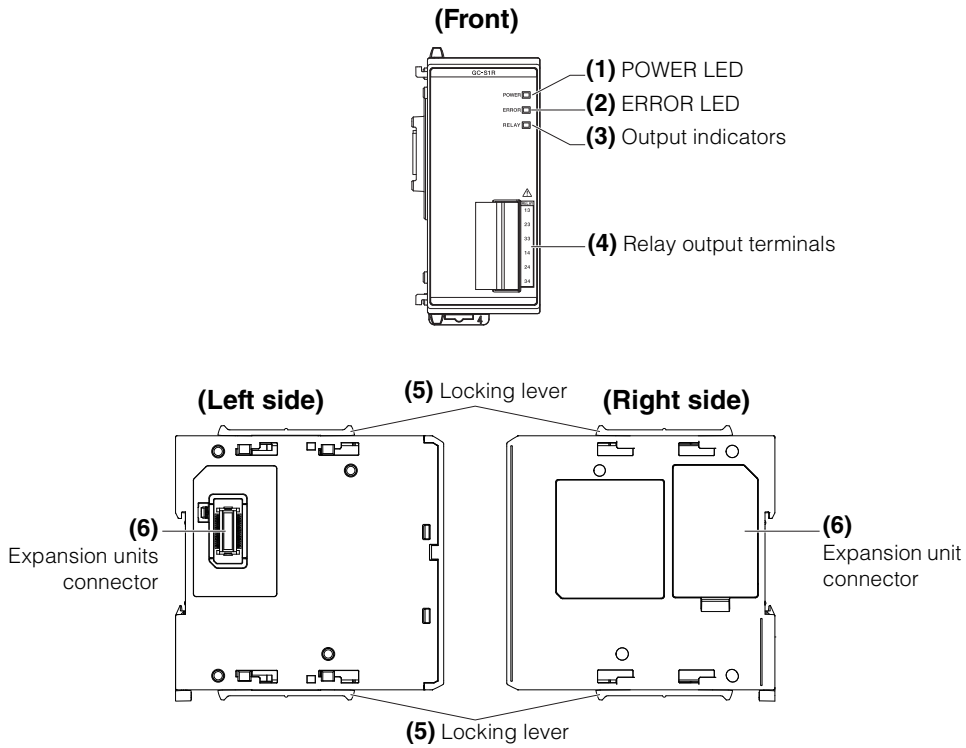
Item		GC-S1R
Output points	Safety relay output	1 (3a)
Safety relay output specifications	Output type	Relay (3a) (Externally-protected outputs, R300, B300)*1
	Rated load (resistance load)	250 VAC 6A / 30 VDC 6A*2 *3
	Rated load (inductive load)	240 VAC 2A (AC-15) / 24 VDC 1A (DC-13) (TÜV SÜD, CSA Certified) R300, B300 (UL Certified)
	Relay output mechanical life	Resistance load (250 VAC 6A/30 VDC 6A): Min. 100,000 times Resistance load (250 VAC 1A/30 VDC 1 A): Min. 500,000 times Inductive load (AC-15: 240 VAC 2 A): Min. 100,000 times (cosø = 0.3) Inductive load (DC-13: 24 VDC 1 A): Min. 100,000 times (L/R = 48 ms)
	Maximum cable length	Max. 100 m
	B10d	With rated load: 400,000 With low load: 2,000,000
Usage environment	Operating ambient temperature	-10 to +55 °C (No freezing)
	Relative humidity	5 to 85% (No condensation)
	Storage temperature	-25 to +70 °C (No freezing)
	Vibration resistance	Frequency: 5 to 9 Hz, Half amplitude: 3.5 mm Frequency: 9 to 150 Hz, Acceleration: 10 m/s^2 10 times each in X, Y, Z directions
	Shock resistance	Acceleration: 150 m/s^2, Operating time: 11 ms, 3 times each in X, Y, Z directions
	Overvoltage category	II (III for relay output part)
	Pollution degree	2
	Operating altitude	Max. 2000 m
Applicable standards	EMC	EMS: IEC 61131-2/-6, EN61131-2/-6,EMI: IEC 61131-2, FCC Part15B Class A, ICES-003, Class A
	Safety	IEC 61508, EN 61508 SIL3, IEC 62061, EN 62061 SIL CL3, ISO/EN 13849-1:2015 Cat. 4, PL e, UL1998
Current consumption		Max. 80 mA
Dimensions (W x D x H)		39.6 x 95 x 90 mm
Materials		Polycarbonate
Weight		Approx. 180 g

*1 To comply with the requirements of IEC61131-2, connect 10A fast blow fuse (IEC 60127) in series to each contact.
*2 Check the derating characteristics described later.
*3 Use this product with load current of max. 5 A at temperature of 40 °C or lower when using this product as a product certified by UL.

Derating characteristics

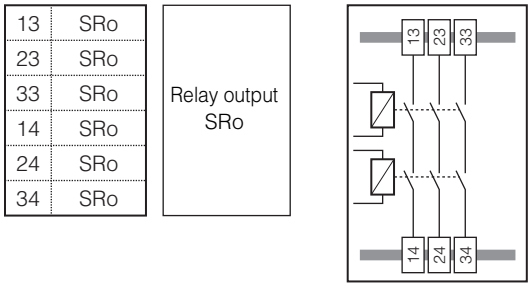


Part names



Number	Name	Function
(1)	POWER LED	Turns ON (green) while power is supplied.
(2)	ERROR LED	Blinks (red) when an error occurs.
(3)	Output indicators	An indicator for the relay output. Relay ON: Turns ON in green. Relay OFF/Not used: Turns OFF.
(4)	Relay output terminals	Terminals for relay output.
(5)	Locking lever	Used to lock the connection between units.
(6)	Expansion unit connector	Terminals for expansion units. A cover is attached to the connector on the right side prior to shipment. Remove the cover when connecting an expansion unit.

Terminal arrangement



GC-A16

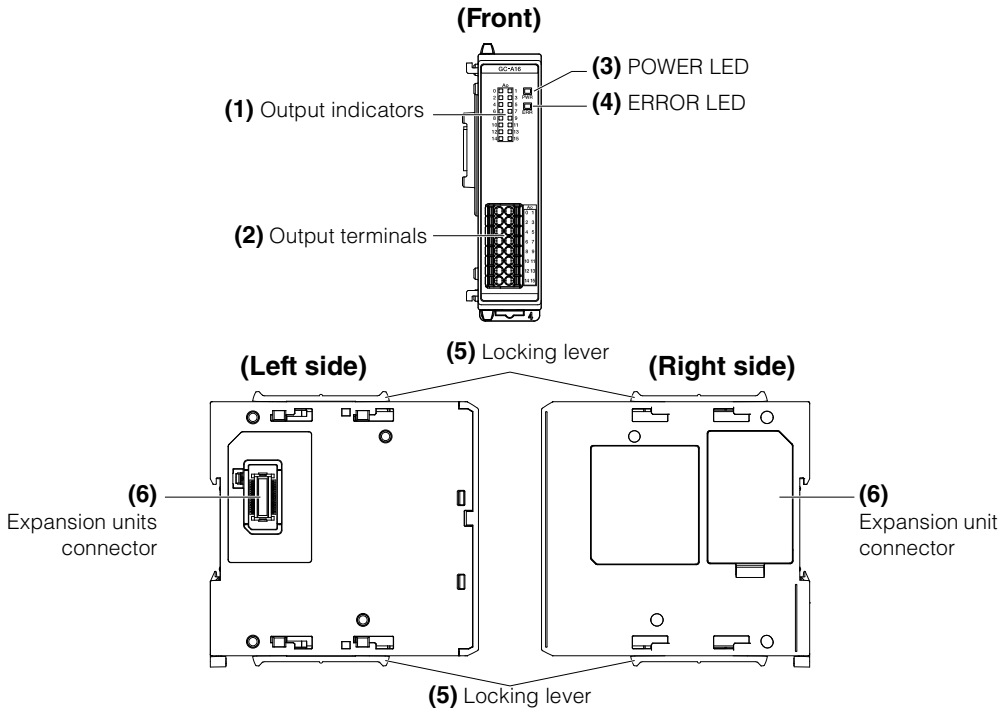
GC-A16 specifications

Item		GC-A16
Output points	AUX outputs	16
AUX output specifications	Output type	PNP transistor output (DC-13, Type 0.1, Protected outputs)*1
	Maximum load current	100 mA
	Residual voltage (during ON)	Max. 2.0 V
	Leakage current (during OFF)	Max. 0.5 mA
	Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
	Maximum cable length	Max. 30 m
Usage environment	Operating ambient temperature	-10 to +55 °C (No freezing)
	Relative humidity	5 to 85% (No condensation)
	Storage temperature	-25 to +70 °C (No freezing)
	Vibration resistance	Frequency: 5 to 9 Hz, Half amplitude: 3.5 mm Frequency: 9 to 150 Hz, Acceleration: 10 m/s^2 10 times each in X, Y, Z directions
	Shock resistance	Acceleration: 150 m/s^2, Operating time: 11 ms, 3 times each in X, Y, Z directions
	Overvoltage category	II
	Pollution degree	2
	Operating altitude	Max. 2000 m
Applicable standards	EMC	EMS: IEC 61131-2/-6, EN61131-2/-6, EMI: IEC 61131-2, FCC Part15B Class A, ICES-003, Class A
	Safety	IEC 61508, EN 61508 SIL3, IEC 62061, EN 62061 SIL CL3, ISO/EN 13849-1:2015 Cat. 4, PL e, UL1998
Current consumption		Max. 70 mA*2
Dimensions (W x D x H)		22.2 x 95 x 90 mm
Materials		Polycarbonate
Weight		Approx. 130 g

*1 Paragraph 6.4.6 Temporary overload of IEC 61131-2 supports up to 1.2 times the maximum load current.

*2 Except for load current.

Part names



Number	Name	Function
(1)	Output indicators	Individual output indicators for Ao0 to Ao15. Output ON: Turns ON in green. Output OFF/Not used: Turns OFF.
(2)	Output terminals	Terminals for the outputs.
(3)	POWER LED	Turns ON (green) while power is supplied.
(4)	ERROR LED	Blinks (red) when an error occurs.
(5)	Locking lever	Used to lock the connection between units.
(6)	Expansion unit connector	Terminals for expansion units. A cover is attached to the connector on the right side prior to shipment. Remove the cover when connecting an expansion unit.

Terminal arrangement

0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
4	Ao4	Ao5	5	
6	Ao6	Ao7	7	
8	Ao8	Ao9	9	
10	Ao10	Ao11	11	
12	Ao12	Ao13	13	
14	Ao14	Ao15	15	

GC-B30

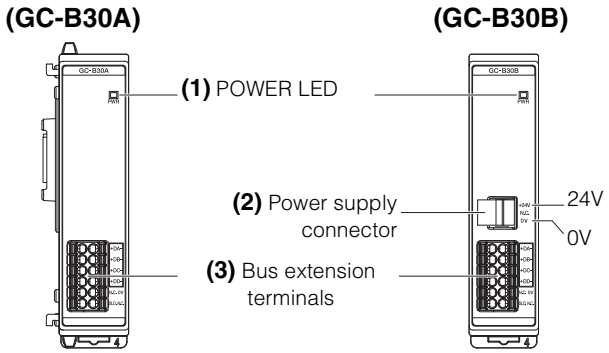
GC-B30 specifications

Item		GC-B30	
		GC-B30A	GC-B30B
Cable length between GC-B30A and GC-B30B		Max. 30 m	
Usage environment	Operating ambient temperature	-10 to +55 °C (No freezing)	
	Relative humidity	5 to 85% (No condensation)	
	Storage temperature	-25 to +70 °C (No freezing)	
	Vibration resistance	Frequency: 5 to 9 Hz, Half amplitude: 3.5 mm Frequency: 9 to 150 Hz, Acceleration: 10 m/s^2 10 times each in X, Y, Z directions	
	Shock resistance	Acceleration: 150 m/s^2, Operating time: 11 ms, 3 times each in X, Y, Z directions	
	Overvoltage category	II	
	Pollution degree	2	
	Operating altitude	Max. 2000 m	
Applicable standards	EMC	EMS: IEC 61131-2/-6, EN61131-2/-6, EMI: IEC 61131-2, FCC Part15B Class A, ICES-003, Class A	
	Safety	IEC 61508, EN61508 SIL3, IEC 62061, EN62061 SIL CL3, ISO/EN13849-1:2015 Cat. 4, PL e, UL1998	
Power supply	Power voltage	--	24 VDC (-20 to +20%) Class 2
	Current consumption	Max. 35 mA	Max. 35 mA
Dimensions (W x D x H)		22.2 x 95 x 90 mm	22.2 x 95 x 90 mm
Materials		Polycarbonate	
Weight		Approx. 110 g	Approx. 110 g

Point

Only one set of the GC-B30 can be used for a single system (unit configuration).

Part names



Number	Name	Function
(1)	POWER LED	Turns ON (green) while power is supplied.
(2)	Power supply connector	A connector for power.
(3)	Bus extension terminals	Used to connect bus extension units.

Terminal arrangement

Signal	Signal
DA+	DA-
DB+	DB-
DC+	DC-
DD+	DD-
N.C.	0V
Shield	N.C.

Signal	Cable (twisted pair 5P + shield)	Signal
DA+		DA+
DA-		DA-
DB+		DB+
DB-		DB-
DC+		DC+
DC-		DC-
DD+		DD+
DD-		DD-
N.C.		N.C.
0V		0V
Shield		Shield
N.C.		N.C.

■ Usable cables

When connecting GC-B30A with GC-B30B, use a cable meeting the Specifications 1 or 2 below.

	Item	Specification
1	UL Style No.	2464
	Shape	Shielded multicore cable
	Rating	80 °C/300 V
	Core thickness	AWG 16 to 26
	Number of cores	Twisted pair 5P + shield
2	UL Style No.	20276
	Shape	Shielded multicore cable
	Rating	80 °C/30 V
	Core thickness	AWG 16 to 24
	Number of cores	Twisted pair 5P + shield

3-3 Remote I/O Modules

GC-R45

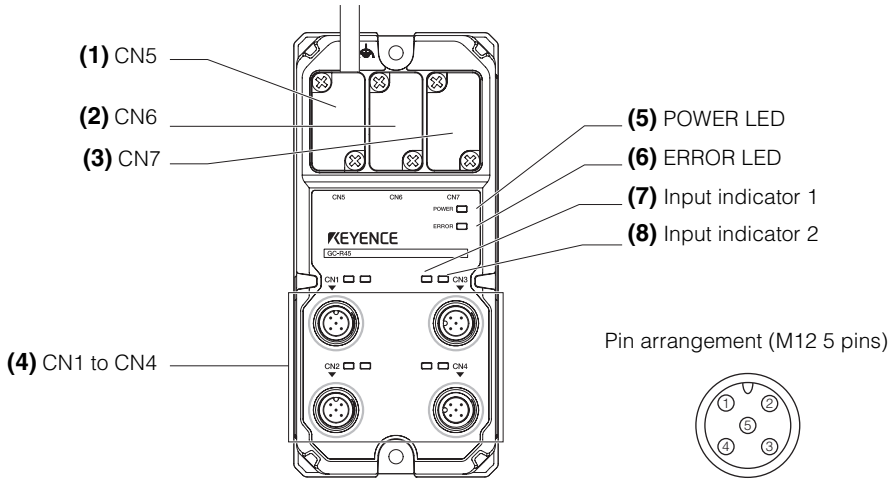
GC-R45 specifications

Item		GC-R45
Maximum number of connected units		4 *1 (GC-R45 and GC-R48 can be connected together)
Safety input specifications	Input device	Contact output device or PNP output device
	Input type	Type3
	ON level (voltage/current)	Min. 11 V/2 mA
	OFF level (voltage/current)	Max. 5 V/1.5 mA
	Short-circuit current	Approx. 3 mA
	Protection circuit	Surge protection circuit, wrong wiring protection circuit
	Maximum cable length	Max. 100 m
Test output specifications*2	Output type	PNP transistor output
	Maximum load current	100 mA
	Protection circuit	Overcurrent protection circuit
	Maximum cable length	Max. 100 m*3
AUX output specifications	Output type	PNP transistor output (DC-13, Type 0.1, protected outputs)*4
	Maximum load current	100 mA
	Residual voltage (during ON)	Max. 2.0 V
	Leakage current (during OFF)	Max. 0.5 mA
	Protection circuit	Overcurrent protection circuit
	Maximum cable length	Max. 30 m
Power supply output*2	Supported pin	Pin 1
	Power supply capability	Max. 0.5 A
	Protection circuit	Overcurrent protection circuit
Usage environment	Operating ambient temperature	-10 to +55 °C (No freezing)
	Relative humidity	5 to 85 % (No condensation)
	Storage temperature	-25 to +70 °C (No freezing)
	Vibration resistance	Frequency: 5 to 9 Hz, Half amplitude: 3.5 mm Frequency: 9 to 150 Hz, Acceleration: 10 m/s^2 10 times each in X, Y, Z directions
	Shock resistance	Acceleration: 150 m/s^2, Operating time: 11 ms, 3 times each in X, Y, Z directions
	Overvoltage category	II
	Pollution degree	2
	Operating altitude	Max. 2000 m
Applicable standards	EMC	EMS: IEC 61131-2/-6, EN61131-2/-6, EMI: IEC 61131-2, FCC Part15B Class A, ICES-003, Class A
	Safety	IEC 61508, EN61508 SIL3, IEC 62061, EN62061 SIL CL3, ISO/EN13849-1:2015 Cat. 4, PL e, UL1998

Item		GC-R45
Power supply	Power voltage	24 VDC (-20 to +20 %) Class 2
	Current consumption	Max. 90 mA*5
Enclosure ratings		IP65/67 (IEC 60529) (TÜV SÜD certified)
Dimensions (W x D x H)		64.8 x 141.5 x 34.5 mm
Materials		PBT (GF 30 %), SUS304
Weight		Approx. 420 g

*1 When connecting multiple remote I/O modules, power needs to be supplied to each remote I/O module.
"Installing Remote I/O Modules" (page 6-5)
*2 Power supply outputs and test outputs do not comply with paragraph 6.4.6 of IEC 61131-2.
*3 When the test output is branched and connected to multiple safety input devices, the total branched cable length must not exceed 400 m.
*4 Paragraph 6.4.6 Temporary overload of IEC 61131-2 supports up to 1.2 times the maximum load current.
*5 Except for input devices.

Part names



Number	Name	Function
(1)	CN5*	A connector used for communication between the main controller and the remote I/O module, or connection to an external power supply.
(2)	CN6*	A connector used for communication between the main controller and the remote I/O module, or between remote I/O modules.
(3)	CN7	A connector used to cascade with another remote I/O module.
(4)	CN1 to CN4	Terminals for input/output device.
(5)	POWER LED	Turns ON (green) while power is supplied.
(6)	ERROR LED	Blinks (red) when an error occurs.
(7)	Input indicator 1	An input indicator for M12 connector Pin 4. Input ON: Turns ON in green. Input OFF: Turns OFF.
(8)	Input indicator 2	An input indicator for M12 connector Pin 2. Input ON: Turns ON in green. Input OFF: Turns OFF.

* The necessary connector, cable, and wiring method varies depending on the number of remote I/O modules to be connected.
For connection with the main controller, refer to the following page.
"Installing Remote I/O Modules" (page 6-5)

GC-R48

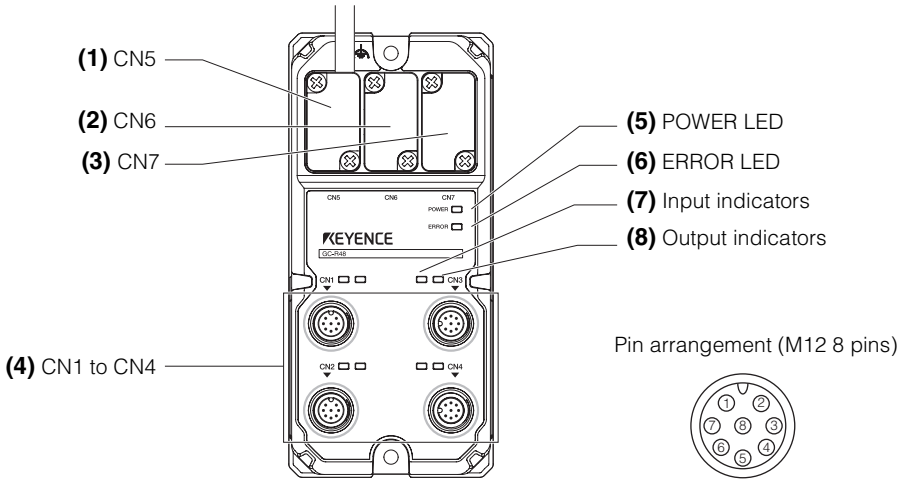
GC-R48 specifications

Item		GC-R48
Maximum number of connected units*1		4 (GC-R45 and GC-R48 can be connected together)
Safety input specifications	Input device	Contact output device or PNP output device
	Input type	Type3
	ON level (voltage/current)	Min. 11 V/2 mA
	OFF level (voltage/current)	Max. 5 V/1.5 mA
	Short-circuit current	Approx. 3 mA
	Protection circuit	Surge protection circuit, wrong wiring protection circuit
	Maximum cable length	Max. 100 m
Safety output specifications (GC-R48 Pin 3: Lock control output)	Output type	PNP transistor output (DC-13, Type 0.5, Protected outputs)*2
	Maximum load current	500 mA
	Residual voltage (during ON)	Max. 2.0 V
	Leakage current (during OFF)	Max. 0.5 mA
	Maximum capacitive load	0.5 μF
	Protection circuit	Overcurrent protection circuit
	Maximum cable length	Max. 30 m
Test output specifications*3	Output type	PNP transistor output
	Maximum load current	100 mA
	Protection circuit	Overcurrent protection circuit
	Maximum cable length	Max. 100 m*4
Power supply output*3	Supported pin	Pin 2
	Power supply capability	Max. 0.5 A
	Protection circuit	Overcurrent protection circuit
Usage environment	Operating ambient temperature	-10 to +55 °C (No freezing)
	Relative humidity	5 to 85 % (No condensation)
	Storage temperature	-25 to +70 °C (No freezing)
	Vibration resistance	Frequency: 5 to 9 Hz, Half amplitude: 3.5 mm Frequency: 9 to 150 Hz, Acceleration: 10 m/s^2 10 times each in X, Y, Z directions
	Shock resistance	Acceleration: 150 m/s^2, Operating time: 11 ms, 3 times each in X, Y, Z directions
	Overvoltage category	II
	Pollution degree	2
	Operating altitude	Max. 2000 m
Applicable standards	EMC	EMS: IEC 61131-2/-6, EN61131-2/-6, EMI: IEC 61131-2, FCC Part15B Class A, ICES-003, Class A
	Safety	IEC 61508, EN61508 SIL3, IEC 62061, EN62061 SIL CL3, ISO/EN13849-1:2015 Cat. 4, PL e, UL1998

Item		GC-R48
Power supply	Power voltage	24 VDC (-20 to +20 %) Class 2
	Current consumption	Max. 90 mA*5
Enclosure ratings		IP65/67 (IEC 60529) (TÜV SÜD certified)
Dimensions (W x D x H)		64.8 x 141.5 x 34.5 mm
Materials		PBT (GF 30 %), SUS304
Weight		Approx. 420 g

*1 When connecting multiple remote I/O modules, power needs to be supplied to each remote I/O module.
"Installing Remote I/O Modules" (page 6-5)
*2 Paragraph 6.4.6 Temporary overload of IEC 61131-2 supports up to 1.2 times the maximum load current.
*3 Power supply outputs and test outputs do not comply with paragraph 6.4.6 of IEC 61131-2.
*4 When the test output is branched and connected to multiple safety input devices, the total branched cable length must not exceed 400 m.
*5 Except for load current and input devices.

Part names



Number	Name	Function
(1)	CN5*	A connector used for communication between the main controller and the remote I/O module, or connection to an external power supply.
(2)	CN6*	A connector used for communication between the main controller and the remote I/O module, or between remote I/O modules.
(3)	CN7	A connector used to cascade with another remote I/O module.
(4)	CN1 to CN4	Terminals for input/output device.
(5)	POWER LED	Turns ON (green) while power is supplied.
(6)	ERROR LED	Blinks (red) when an error occurs.
(7)	Input indicators	An input indicator for M12 connector Pin 5. Input ON: Turns ON in green. Input OFF: Turns OFF.
(8)	Output indicators	An output indicator for M12 connector Pin 3. Output ON: Turns ON in green. Output OFF/Not used: Turns OFF.

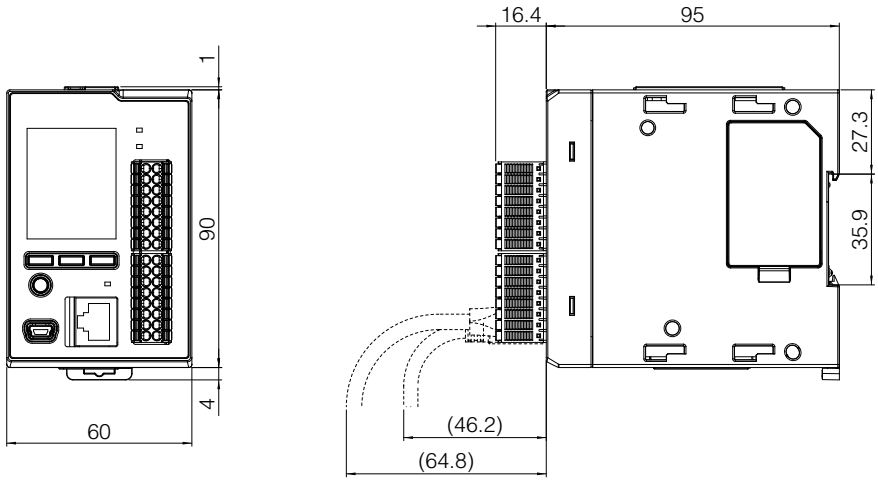
* The necessary connector, cable and wiring method varies depending on the number of remote I/O modules to be connected.
For connection with the main controller, refer to the following page.
"Installing Remote I/O Modules" (page 6-5)

3-4 Dimensions

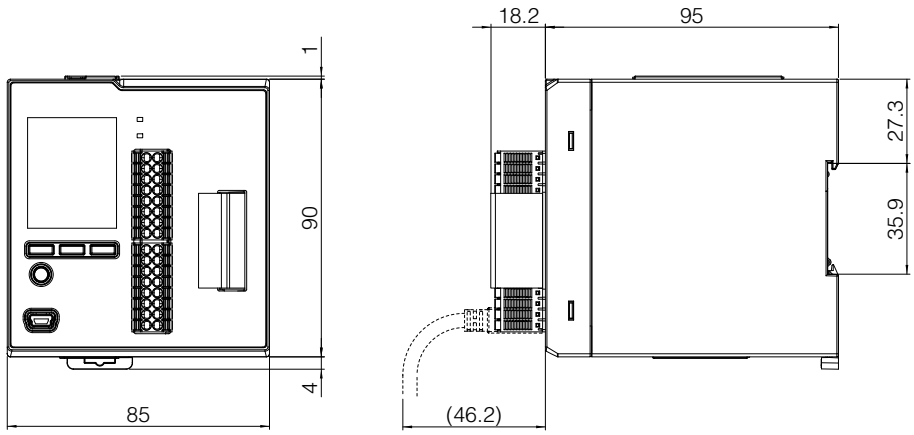
Unit: mm

Main Controllers

GC-1000

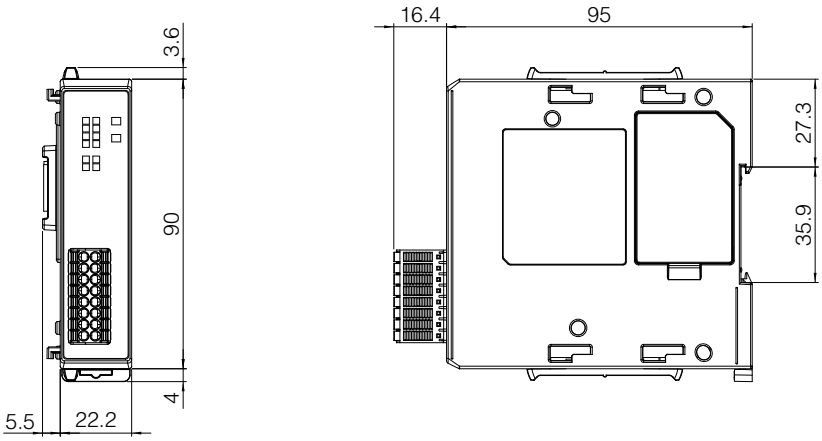


GC-1000R

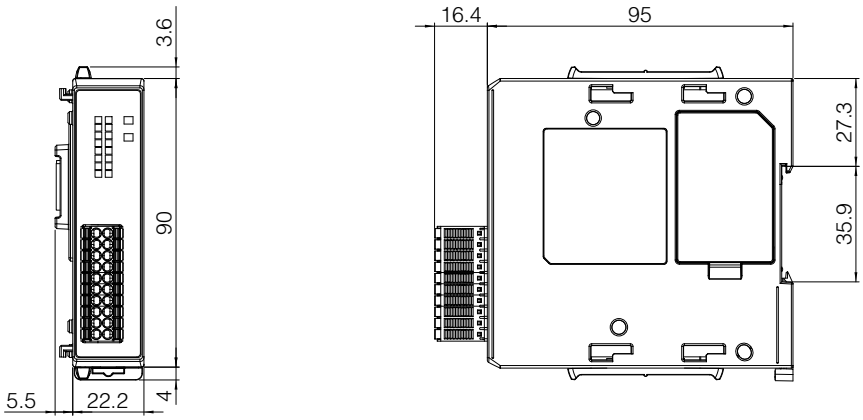


Expansion Units

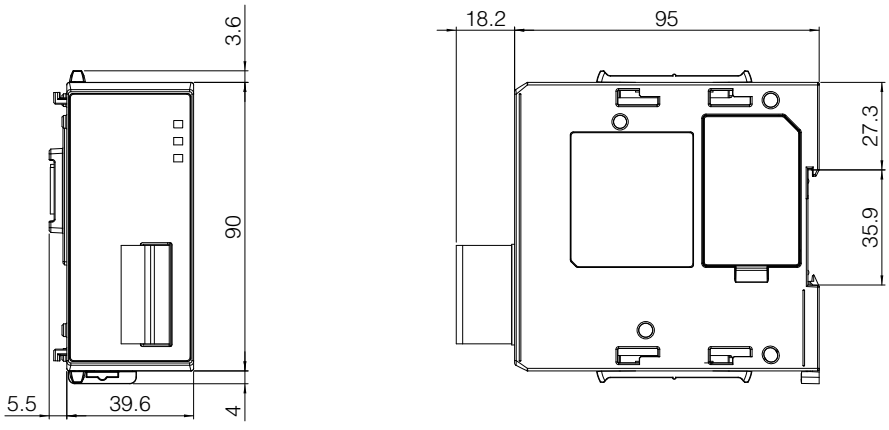
GC-S84



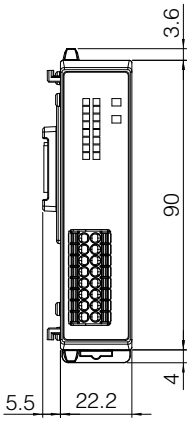
GC-S16



GC-S1R



GC-A16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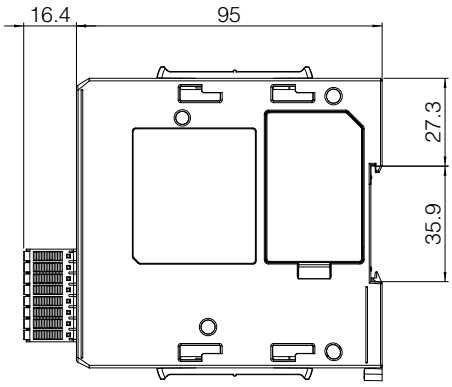
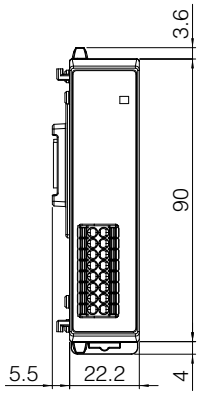
90
4
5.5
22.2


16.4
95
27.3
35.9

GC-B30


3.6
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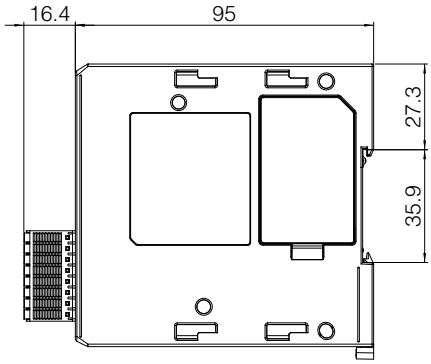
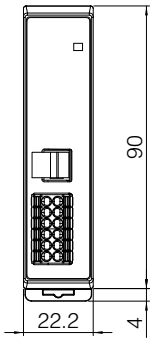
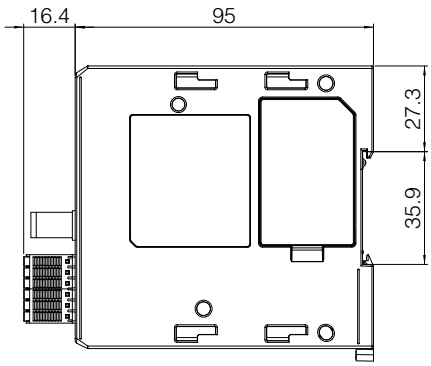
22.2
4

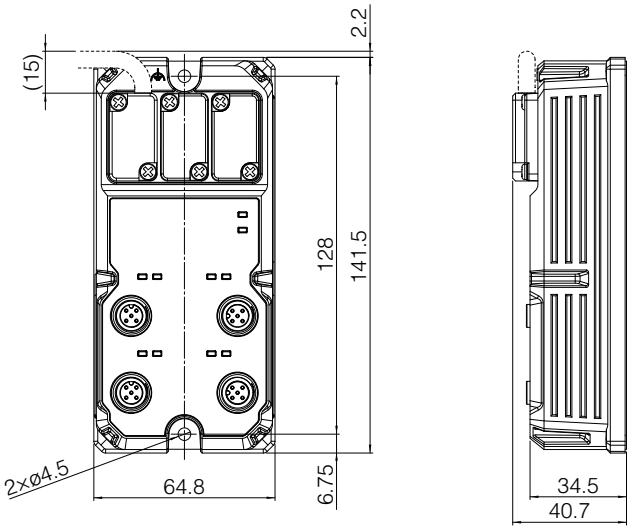

16.4
95
27.3
35.9


90
22.2
4

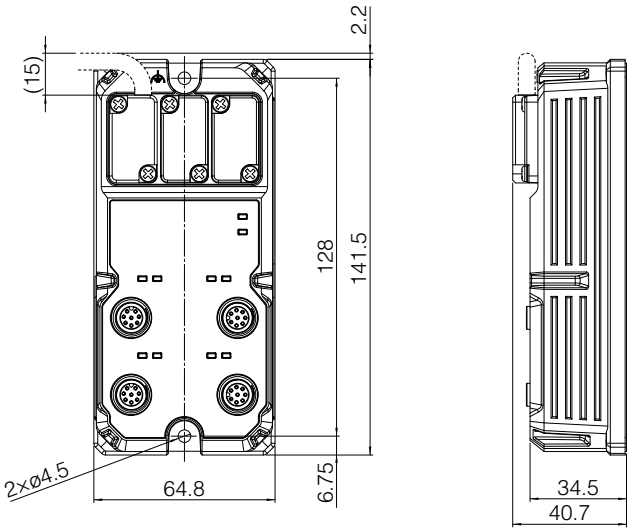

16.4
95
27.3
35.9

Remote I/O Modules

GC-R45

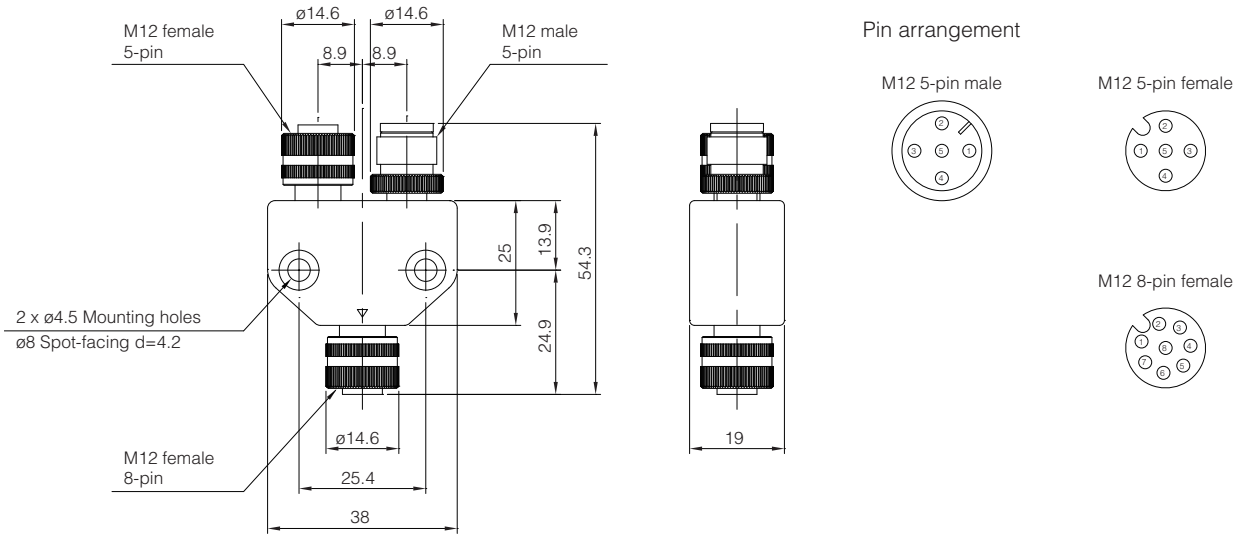


GC-R48

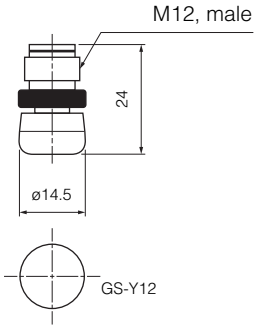


Others

GS-Y11 (Y-shaped connector for GC-Link)



GS-Y12 (end connector for GC-Link)



4

Calculating Response Time

This chapter describes how to calculate the response time.

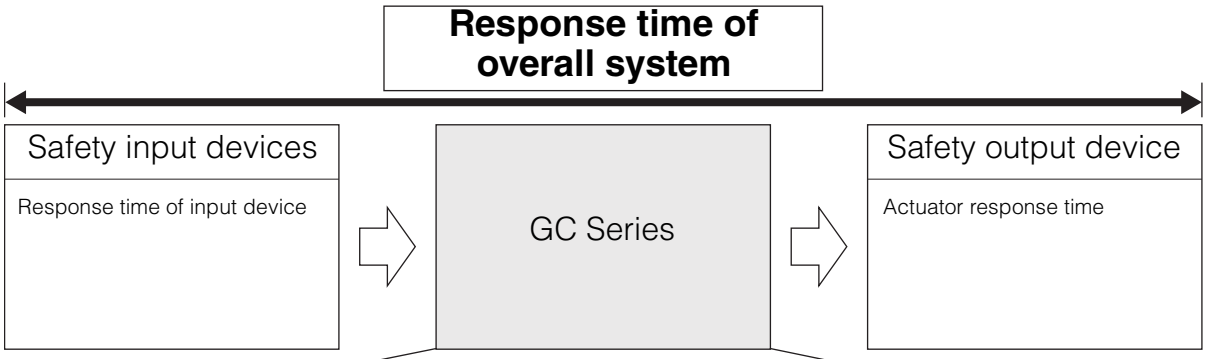
4-1 Calculating Response Time.....page 4-2

4-1 Calculating Response Time

The following describes how to calculate the response time.

Response Time

The GC response time is the maximum time required for the GC Series to execute a program based on a signal from a safety input device and shut off the output sent to the safety output device. Safety distances (minimum distances) are calculated using the response time.



GC Series response time (ms) = Base response time	4.8 ms
+ Added time for input device connection point	(1)
+ Added time for input blocks	(2)
+ Added time for program	(3)
+ Added time for output device connection point	(4)
+ Added time for output blocks	(5)

Calculating the GC Series response time

Base response time	4.8ms

+

(1) Added time for input device connection point	ON -> OFF	OFF -> ON
When connecting to the main controller (GC-Link, terminal block)	0 (No addition)	
When connecting to an expansion unit or remote I/O module	+1.7ms	

+

(2) Added time for input blocks	ON -> OFF	OFF -> ON
Filtering time setting: 0.5 ms	+0.7ms	+1.2ms
Filtering time setting: 1 ms or more	+Filtering time*1	+Filtering time*1 +0.5ms
When using the test output	+4.5ms	+34ms

+

(3) Added time for program	
When using a timer function, such as OFF-delay and ON-delay	Add delay time by timer*2
When using a register	+2.0 ms *3

+

(4) Added time for output device connection point	ON -> OFF	OFF -> ON
When connecting to the main controller	0 (No addition)	
When connecting to an expansion unit or remote I/O module	+2.4ms	

+

(5) Added time for output blocks*4	ON -> OFF	OFF -> ON
S-OUT (transistor output)	0 (No addition)	
S-OUT (Relay output)	+10ms	+32 ms *5

*1 For details on filtering time, "Safety Input Functions" (page 6-15).

*2 OFF-delay and ON-delay timers are set by the function blocks.
For details, refer to "Function Block Reference Manual".

*3 When arranging multiple registers in series, add 2 ms per register pair (store and load).
For example, when two register pairs are arranged in series, add 4 ms.

*4 For AUX outputs, add 0.5 ms.

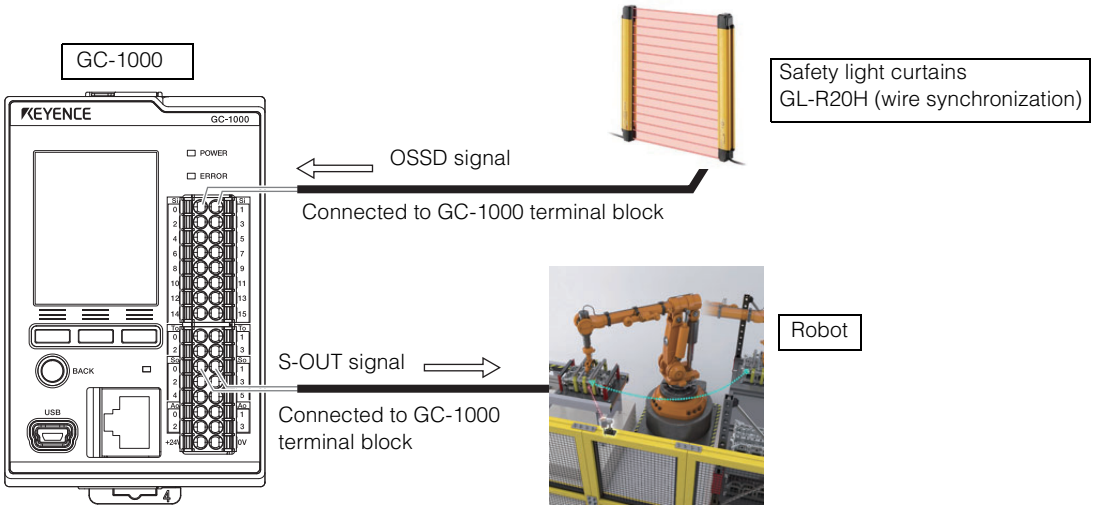
*5 The minimum OFF time of relay output is 300 ms.

Reference

For the response times of KEYENCE safety sensors, refer to the manual for each sensor.

- "GL-R Series User's Manual"
- "GL-S Series User's Manual"
- "GS Series (Non-contact) User's Manual"
- "GS Series (Lock) User's Manual"
- "GS-M Series User's Manual"
- "SZ-V Series User's Manual"
- "SZ Series User's Manual"

■ Response time calculation example 1



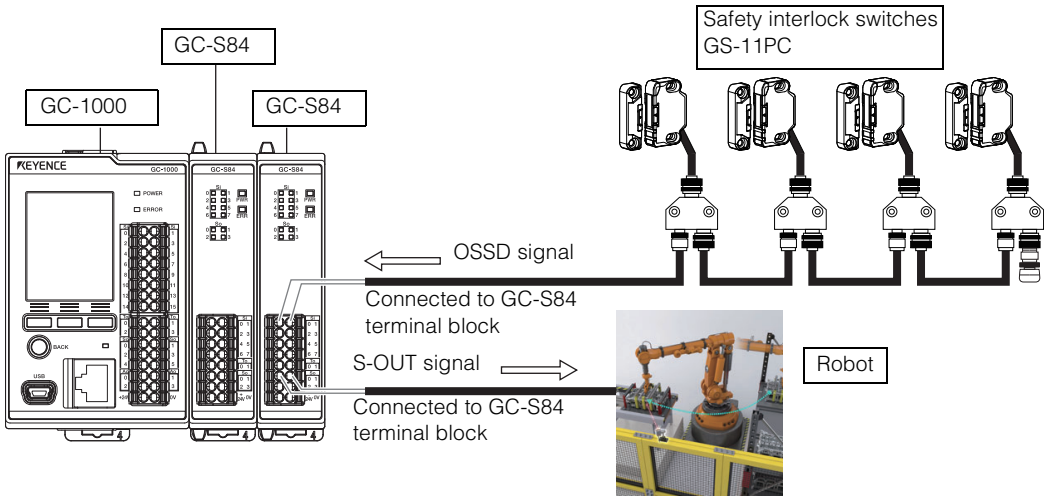
Input device	Safety light curtain GL-R20H Wiring system: Wire synchronization used	Response time: 6.6 ms*1
GC Series	Input device connection point	GC-1000 terminal block
	Input filtering time	0.5ms
	Output device connection point	GC-1000 terminal block
	Output block	S-OUT (transistor output)
Output device	Robot	Response time: 40 ms

*1 The response time of the GL-R Series varies based on the wiring system and model. For details, refer to "GL-R Series User's Manual".

<Calculation example>

Input device	Sensor response time		**6.6ms**
GC Series	Base response time	4.8ms	**5.5ms**
	+ Added time for input device connection point	0ms	
	+ Added time for input blocks	0.7ms	
	+ Added time for output device connection point	0ms	
	+ Added time for output blocks	0ms	
Output device	Robot response time		**40ms**
	Response time of overall system		**52.1ms**

■ Response time calculation example 2



Input device	Safety Interlock Switches GS-11PC 4 units cascaded	Response time: 26ms*1
GC Series	Input device connection point	GC-S84 terminal block
	Input filtering time	2.0ms
	Output device connection point	GC-S84 terminal block
	Output block	S-OUT (transistor output)
Output device	Robot	Response time: 40 ms

*1 When cascading the GS Series, use the following formula to calculate the response time.
Response time = 20 ms + 2 ms × (number of cascaded units - 1)

<Calculation example>

Input device	Sensor response time		**26ms**
GC Series	Base response time	4.8ms	**10.9ms**
	+ Added time for input device connection point	1.7ms	
	+ Added time for input blocks	2.0ms	
	+ Added time for output device connection point	2.4ms	
	+ Added time for output blocks	0ms	
Output device	Robot response time		**40ms**
	Response time of overall system		**76.9ms**

MEMO

5

Operating Main Controller

This chapter describes how to operate the GC Series main controller.

5-1 Screen Configuration ..... page 5-2
5-2 Screen Details ..... page 5-4

5-1 Screen Configuration

The GC Series displays five types of screens in addition to the TOP screen.

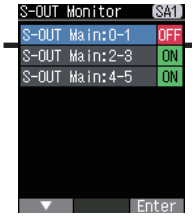
TOP

You can monitor the GC Series operation status and main controller input/output status.
When an alert or error occurs, the screen changes to display the error description.
"TOP Screen" (page 5-4)

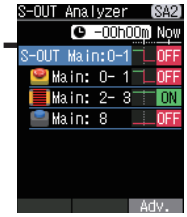
Alert/Error Occurrence

[S-OUT]

1. S-OUT Monitor



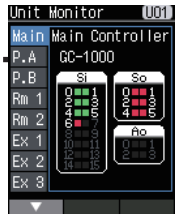
S-OUT Analyzer

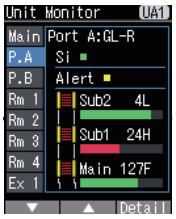


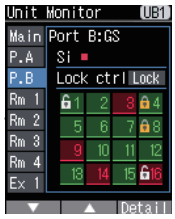
Displays the S-OUT status. The time at which the S-OUT signal last turned OFF is also displayed. The S-OUT related input block status is also displayed, which helps you to promptly identify the cause of the S-OUT OFF.
"S-OUT Monitor" (page 5-7)

[Unit]

2. Unit Monitor



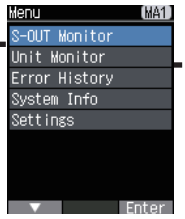




The display varies depending on the connected unit. You can monitor the KEYENCE safety sensors connected to an expansion unit or GC-Link port.
"Unit Monitor" (page 5-11)

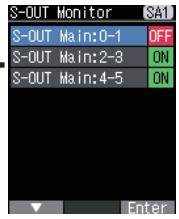
[Menu]

Menu



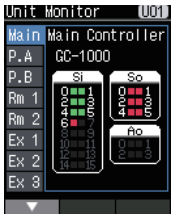
[Enter]

1. S-OUT Monitor



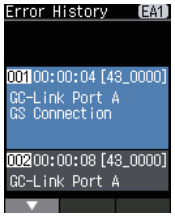
This screen can also be displayed by pressing [S-OUT] on the TOP screen.

2. Unit Monitor



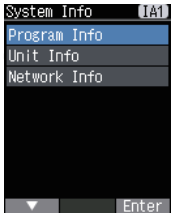
This screen can also be displayed by pressing [Unit] on the TOP screen.

3. Error History



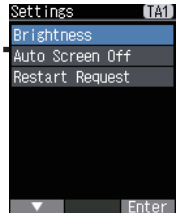
You can review the error history.
"Error History" (page 5-16)

4. System Info



You can review the project or unit information and network settings.
"System Information" (page 5-17)

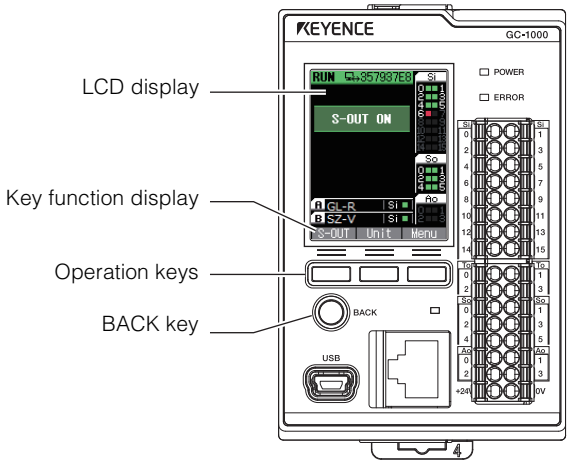
5. Settings



You can adjust the brightness of the LCD display, configure the automatic screen off function, or restart the main controller.
"Settings" (page 5-19)

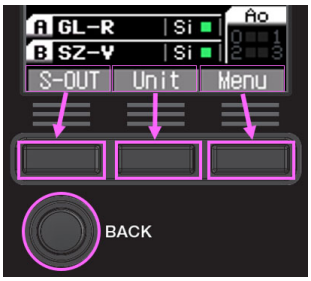
Basic Operations

Use the operation keys and BACK key to switch to each screen. The functions of the operation keys vary depending on the screen. For details, refer to the operation method for each screen.



Relationship between the functions on the display and the operation buttons/keys

The functions shown at the bottom of the LCD display correspond with the associated display buttons/keys.



(Example)

Left key: Pressing this button transitions the display to the [S-OUT Monitor] screen.

Center key: Pressing this button transitions the display to the [Unit Monitor] screen.

Right key: Pressing this button transitions the display to the [Menu] screen.

BACK key: Returns to the previous screen.

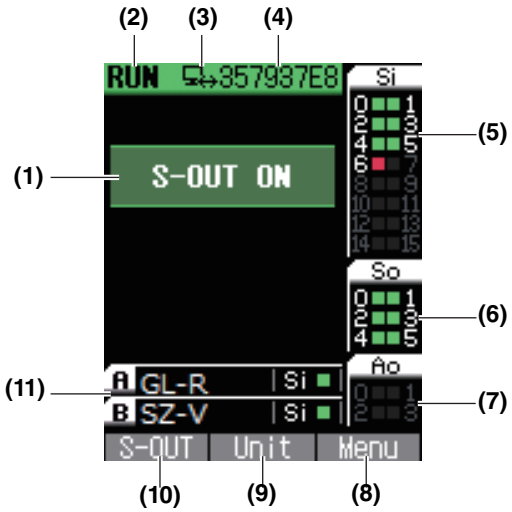
5-2 Screen Details

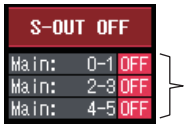
TOP Screen

The TOP screen shows the S-OUT (safety output) status, the GC Series operation status, the main controller input/output status, etc.

Display item

■ Normal operation



	Item	Details
(1)	S-OUT status	Displays the S-OUT status. All S-OUTs are ON: [S-OUT ON] (green) Any S-OUT is OFF: [S-OUT OFF] (red) For the case of [S-OUT OFF], the S-OUT list appears as a sub display.  Sub display Shows a list of S-OUTs in the OFF state.
(2)	Program execution status	Program execution in progress: [RUN] (green) Program execution stopped: [STOP] (red)
(3)	Log in status	The icon appears when connecting to the GC Configurator and logging in.
(4)	Configuration code (CRC)	Displays an eight digit code to identify the settings information.
(5)	Input terminal status	Displays the input terminal "Si" statuses of the main controller. ON: (green), OFF: (red), Not used: (off)
(6)	S-OUT terminal status	Displays the output terminal "So" statuses of the main controller. ON: (green), OFF: (red), Not used: (off)
(7)	AUX output terminal status	Displays the output terminal "Ao" statuses of the main controller. ON: (green), OFF: (red), Not used: (off)
(8)	Key function display: [Menu]	Pressing the operation key (right) transitions the display to the [Menu] screen.
(9)	Key function display: [Unit]	Pressing the operation key (center) transitions the display to the [Unit Monitor] screen.
(10)	Key function display: [S-OUT]	Pressing the operation key (left) transitions the display to the [S-OUT Monitor] screen.
(11)	GC-Link status	Displays the series name connected to the GC-Link port and the safety input status. ON: (green), OFF: (red), Not used: (off)

■ Alert/Error Occurrence

When an alert or error occurs, the alert or error information is displayed on the TOP screen.

Press the operation key (left) to display the detail screen.

	Item	Details
(1)	Error type	Displays the error type. (Alert, Error, Info)
(2)	Page number	Displays the selected page number and the total page number when multiple alerts/errors have occurred.
(3)	Error title	Displays the error title (two lines).
(4)	Error detail	Displays the error detail. The displayed content varies by the error type.
(5)	Error code	Displays the error code.
(6)	Error message	Displays the detailed message for the error.
(7)	Page change	Used to change the page when multiple alerts/errors have occurred.

Reference The screen that appears at the occurrence of an alert or error is cleared by pressing the [BACK] key. Pressing the left operation key [Alert], [Error] or [Info] displays the detail screen.

■ When using PROFINET

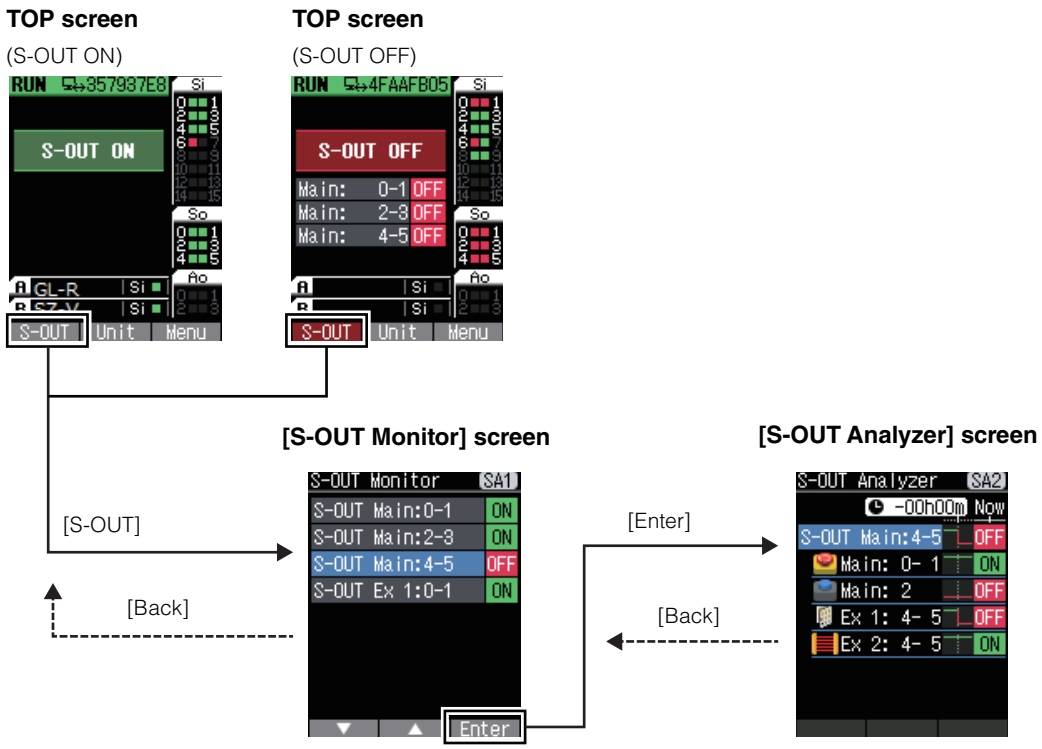
The PROFINET communication information is displayed on the top of the TOP screen only when configuring the PROFINET settings and the main controller is the GC-1000.

	Item	Details
(1)	SF	Displays the GC Error status. Error status: (red), Normal operation: (off)
(2)	BF	Displays the Ethernet communication status. Ethernet communication error status: (red), Normal operation: (off)
(3)	LNK	Displays the Ethernet communication status. Connected: (green), Received the FLASH signal: (blinks in green), Not connected: (off)
(4)	ACT	Displays the communication status of the Ethernet port. Communicating: (blinks in orange), Not communicating: (off)

S-OUT Monitor

The [S-OUT Monitor] screen allows you to monitor the status of each S-OUT (safety output). You are able to review the input/output status at the time of the S-OUT OFF on the [S-OUT Analyzer] screen.

Screen transition

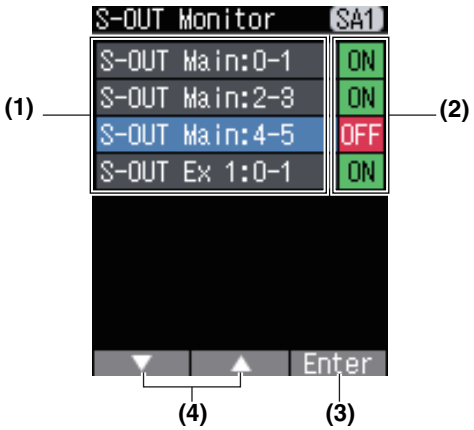


Reference

When only one S-OUT is used by a program, the [S-OUT Monitor] screen is not displayed. Instead, the [S-OUT Analyzer] screen is displayed.

When [S-OUT Monitor] is displayed

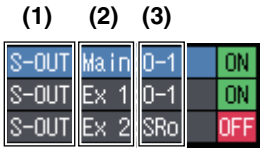
■ Display item



	Item	Details
(1)	List of safety outputs	Displays a list of the safety outputs used by a program. For details of the display, refer to the following items.
(2)	Safety output status	Displays the safety output status. ON: (green), OFF: (red)
(3)	Key function display: [Enter]	Press the operation key (right) to transition to the [S-OUT Analyzer] screen for the active safety output.
(4)	Key function display: [▼], [▲]	Press the operation key (left or center) to select an active safety output.

● List of safety outputs

	Item	Details
(1)	Safety output type	[S-OUT]
(2)	Unit number	• Main: Main controller GC-1000 or GC-1000R • Ex*: Expansion units (* indicates a unit number)
(3)	Terminal number	The terminal number assigned to S OUT on each unit.



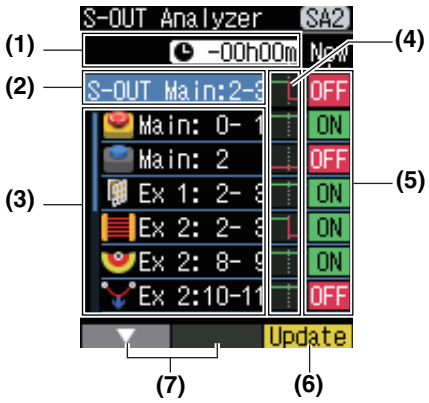
Reference

When the reset block related to the selected safety output block or the reset function is requesting a reset, the character string [Reset Required] is displayed.

When [S-OUT Analyzer] is displayed

The [S-OUT Analyzer] screen displays the most recent S-OUT OFF event with the status change of the related input blocks. You can easily review the cause of the S-OUT OFF by checking the input block status at the time of the S-OUT OFF. Select the S-OUT you want to review on the [S-OUT Monitor] screen and press the [Enter] button. The events of the selected S-OUT are read from the GC main controller and displayed.

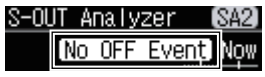
■ Display item



	Item	Details
(1)	S-OUT OFF event occurrence time	Displays the relative time for the occurrence of the S-OUT OFF event. The relative time indicates the time difference between the current time and the time at which an S-OUT OFF event occurred.
(2)	Safety output information	Displays the type, unit number and terminal number of the selected safety output.
(3)	Input block information	Displays the type, unit number and terminal number of the input block related to the selected safety output.
(4)	Status change information	Displays the icon that indicates the status change of the related input block at the occurrence of the S-OUT OFF event. For details of the display, refer to "Status change" (page 5-10).
(5)	Current value monitor	Displays the current values of safety output and input block. ON: (green), OFF: (red)
(6)	Key function display: [Update]	Displayed when a new S-OUT OFF event occurred and the displayed information was no longer the most recent event. Press the operation key (right) to update the event information.
	Key function display: [Adv.]	When the GS Series or GL-R Series is connected to the GC-Link port, you can review the interlock switch open/close state at the occurrence of the S-OUT OFF event or blocked optical axis of safety light curtain. For details of the display, refer to "GC-Link operation log" (page 5-10).
(7)	Key function display: [▼], [▲]	When there are multiple related input blocks and they cannot be displayed on a single screen, press the operation key (left or center) to change the screen to display the input blocks.

Reference

When you enter the [S-OUT Analyzer] screen when a S-OUT OFF event does not exist, [No OFF Event] will be displayed.

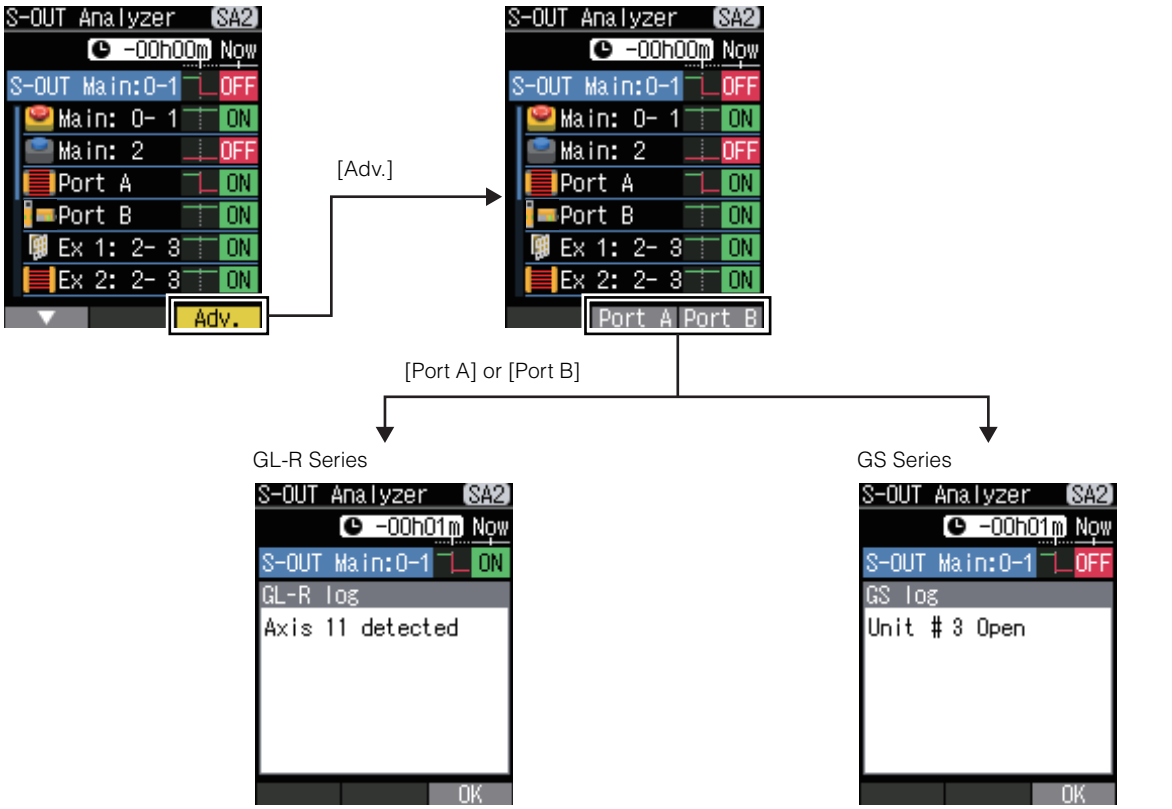


● Status change

	Input status: ON -> OFF
	Input status: OFF -> ON
	Input status: ON -> ON, no change
	Input status: OFF -> OFF, no change
	Mode selecting switch status: M1 -> M2 (M2 -> M1)
	Mode selecting switch status: M1 (M2) -> Undefined state

● GC-Link operation log

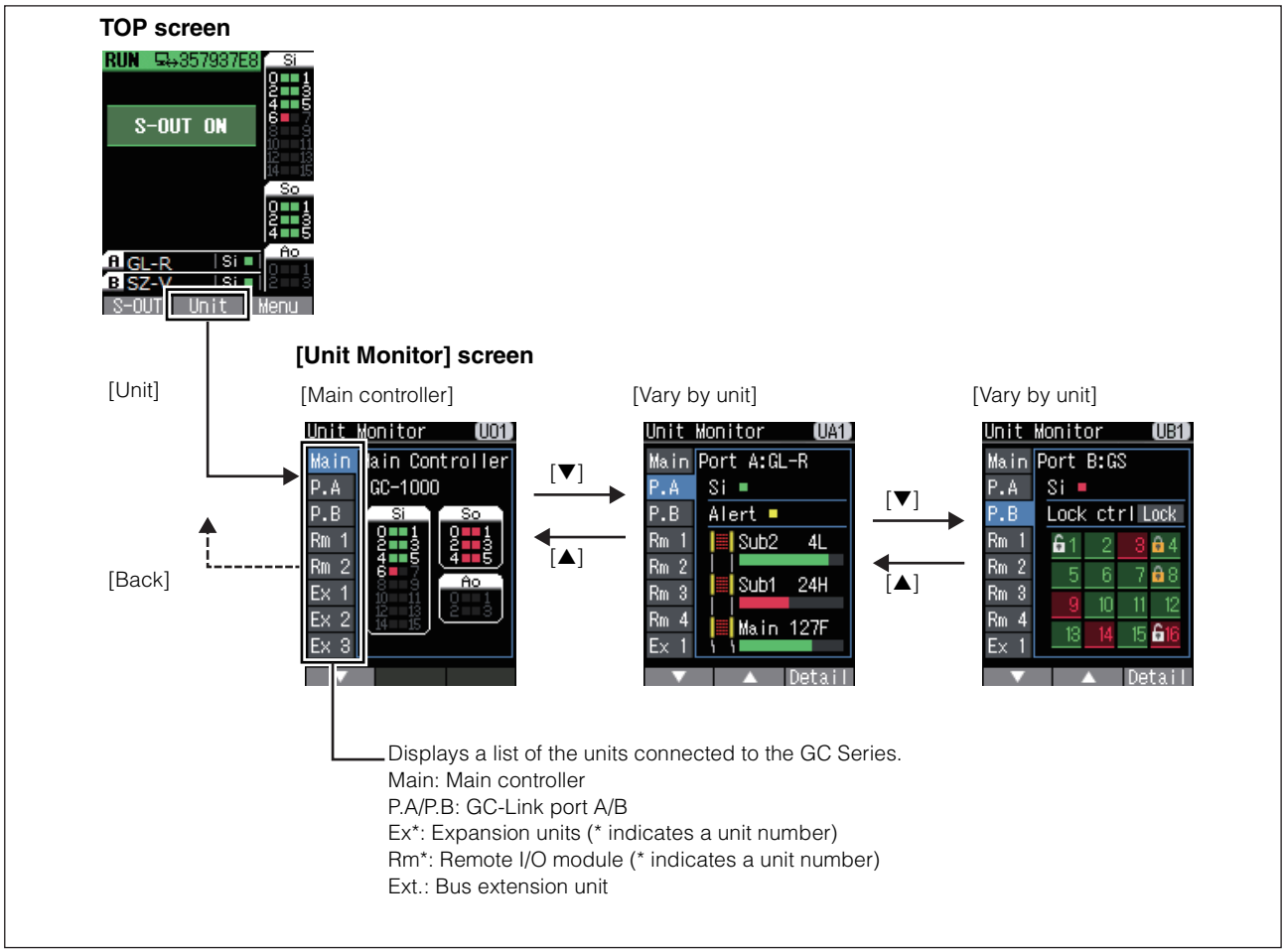
When the GS Series or GL-R Series is connected to the GC-Link port, you can press the [Adv.] key to check the door sensor open/close state or blocked optical axis of safety light curtain at the occurrence of the event.



Unit Monitor

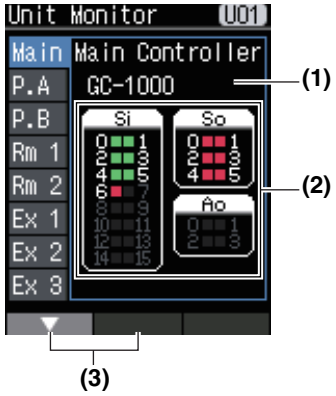
The [Unit Monitor] screen allows you to monitor the input/output status of the main controller, expansion unit and remote I/O module. You can also monitor the status of the KEYENCE safety sensor connected to the GC-Link port.

Screen transition



When selecting Main (main controller), Ex (expansion unit) or Rm (remote I/O module)

■ Display item

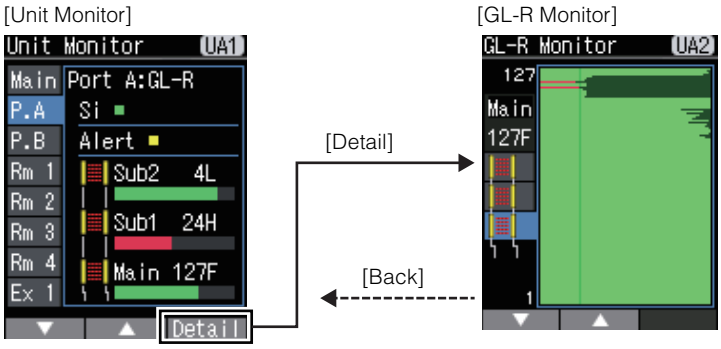


	Item	Details
(1)	Unit name and model	Displays the selected unit name and model.
(2)	Input/output status	Displays the input/output status. ON: (green), OFF: (red) Si: Safety input So: Safety output SRo: Safety output (relay) Ao: AUX outputs Ai: AUX input
(3)	Key function display: [▼], [▲]	Press the operation key (left or center) to change the selected unit.

When selecting P.A/P.B (GC-Link device)

The status of the KEYENCE safety sensor connected via GC-Link is displayed. The displayed content varies by the connected safety sensor.

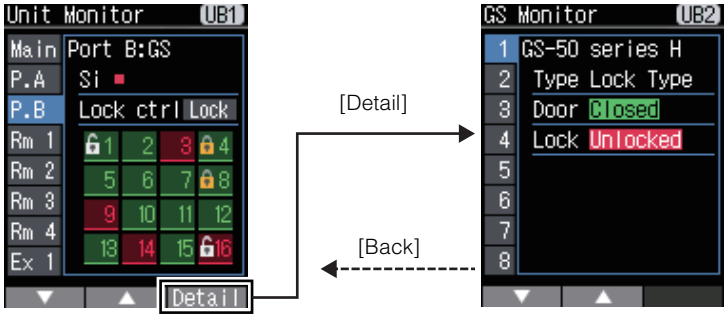
■ GL-R Series



Reference For [Unit Monitor] and [GL-R Monitor] dedicated for the GL-R Series, refer to "GL-R received-light-amount monitoring function" (page 6-68)

■ GS Series

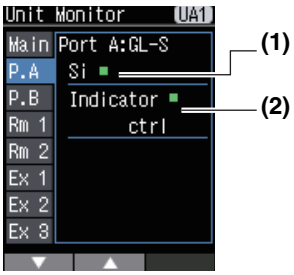
[Unit Monitor] [GS Monitor]



Reference For [Unit Monitor] and [GS Monitor] dedicated for the GS Series, refer to "GS monitoring function" (page 6-90)

■ GL-S Series

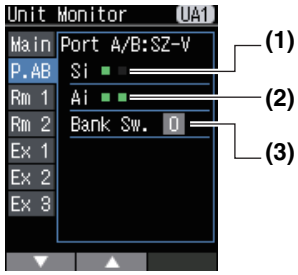
[Unit Monitor]



	Item	Details
(1)	Safety input status	Displays the safety input status. ON: (green), OFF: (red)
(2)	Indicator control output status	Displayed when the GL-S indicator control output is used. Shows the display color of the indicator control output block (green/red/orange/off).

■ SZ-V Series, SZ Series

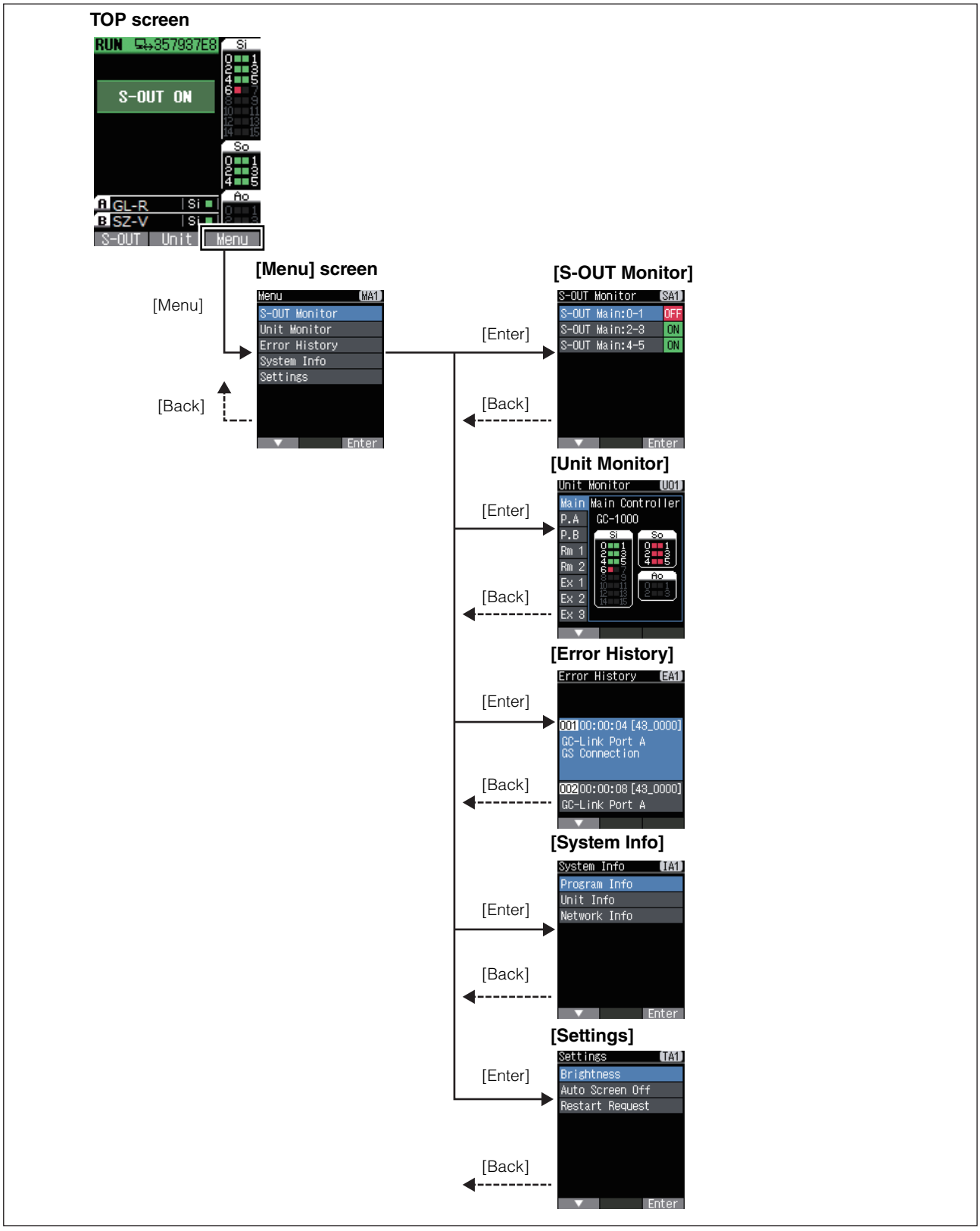
[Unit Monitor]



	Item	Details
(1)	Safety input status	Displays the safety input status. ON: (green), OFF: (red)
(2)	AUX input status	Displays the AUX input status. ON: (green), OFF: (red)
(3)	Bank switching output status	Displayed when the bank switching function is used. Shows the bank number specified by the bank output block.

Menu

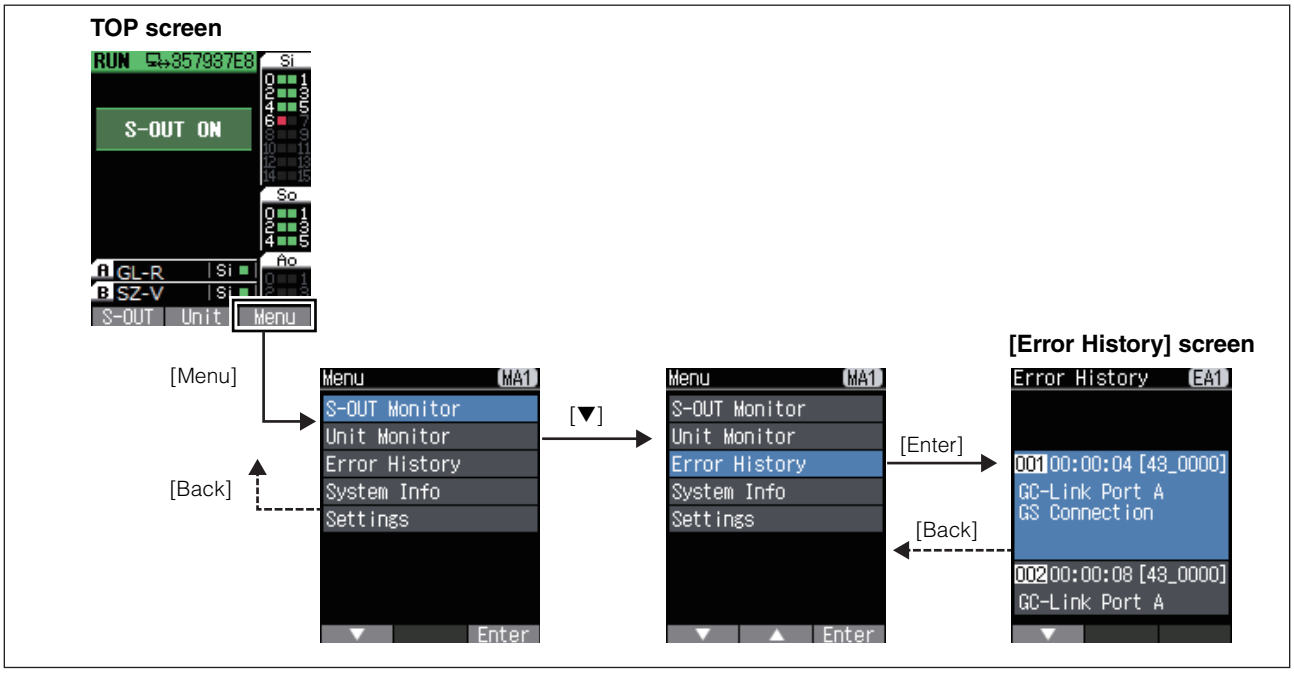
Screen transition



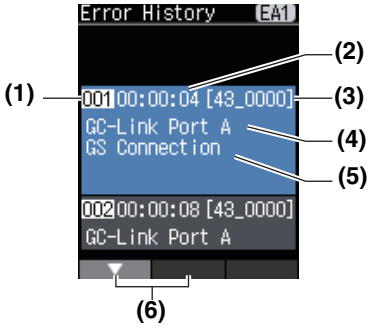
Error History

The [Error History] screen allows you to review the error history.

Screen transition



■ Display item



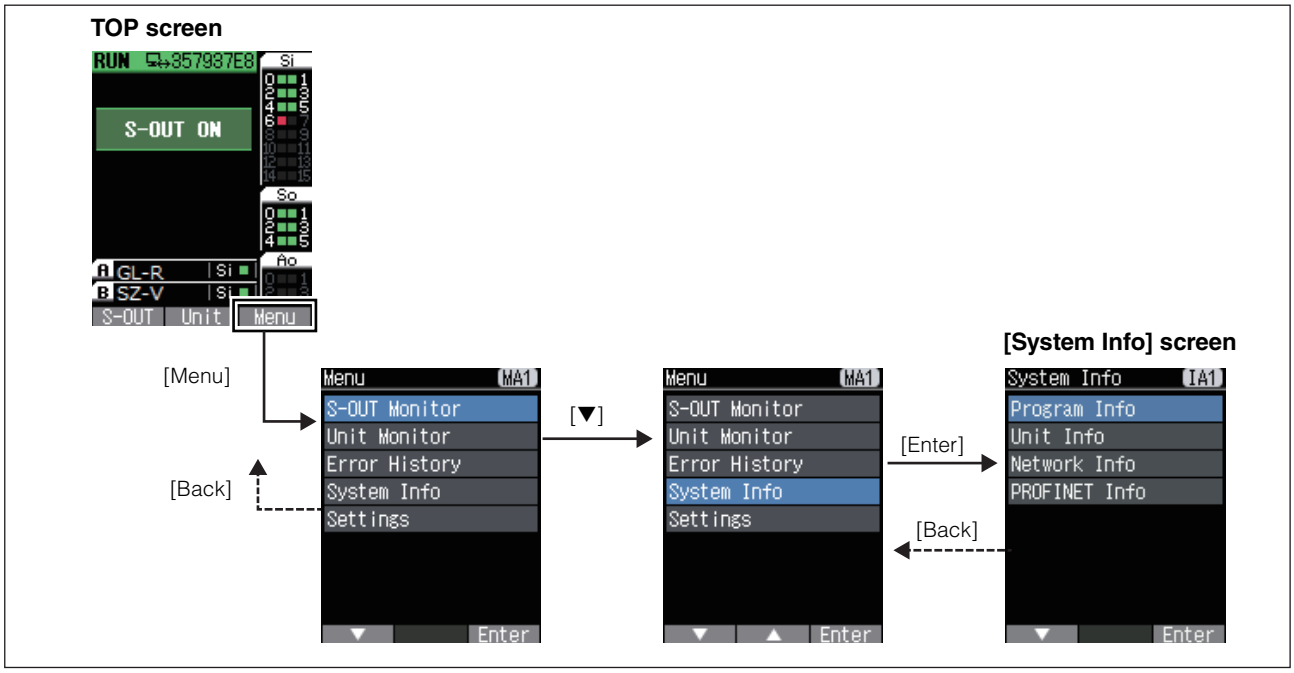
	Item	Details
(1)	Error sequence number	Displays the error sequence number in order from the most recent error.
(2)	Operation time	Displays the time at which the error occurred. This value is specified as the amount of time that has expired since the GC series was powered on.
(3)	Error code	Displays the error code.
(4)	Error title	Displays the error title using two lines.
(5)	Error detail	Displays detailed information such as a port name or terminal generating an error.
(6)	Key function display: [▼], [▲]	Press the operation key (left or center) to select an error.

Reference The error history will display up to 100 errors, beginning from the most recent occurrence.

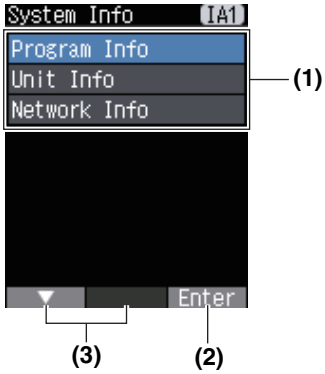
System Information

The [System Info] screen displays the information related to a project, unit and network communication function.

Screen transition

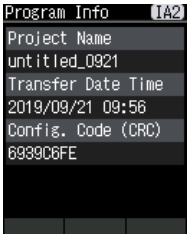


■ Display item



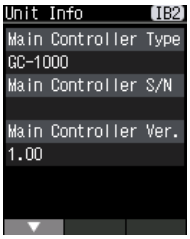
	Item	Details
(1)	System information list	Displays the available items to select.
(2)	Key function display: [Enter]	Press the operation key (right) to transition the display to the selected item.
(3)	Key function display: [▼], [▲]	Press the operation key (left or center) to select an item.

●Program Info



Project Name	Displays the project name transferred to the GC main controller.
Transfer Date Time	Displays the date and time on which the project was transferred to the GC main controller.
Config. Code(CRC)	Displays the configuration code (CRC) of the project transferred to the GC main controller.

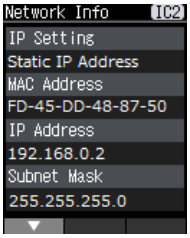
●Unit Info



Main Controller Type	Displays the model of the main controller.
Main Controller S/N	Displays the serial number of the main controller.
Main Controller Ver.	Displays the software version of the main controller.

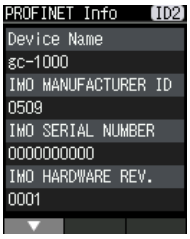
* When an expansion unit or remote I/O module is connected, the information of each unit is displayed.

●Network Info



IP Setting	Displays the IP address setting method ([Static IP Address] or [BOOTP/DHCP]).
MAC Address	Displays the MAC address.
IP Address	Displays the IP address.
Subnet Mask	Displays the subnet mask.
Default Gateway	Displays the default gateway.

●PROFINET Info



Device Name	Displays the device name.
IM0 MANUFACTURER ID	Displays the manufacturer number. The manufacturer number of KEYENCE is 0509.
IM0 SERIAL NUMBER	Displays the serial number of the main controller.
IM0 HARDWARE REV.	Displays the hardware version of the main controller.
IM0 SOFTWARE REV.	Displays the firmware version of the main controller.
IM1 TAG FUNCTION*1	Displays the tag information of the functions.
IM1 TAG LOCATION*1	Displays the tag information of the locations.
IM2 INSTALL. DATE*1	Displays the tag information of the installation date.
IM3 DESCRIPTOR*1	Displays the comments.
IM4 SIGNATURE	Displays the configuration code (CRC) of the project transferred to the GC main controller.

*1 These information can be set by the user. These information can be set by GC Configurator or the configuration software of the PROFINET IO controller.
"Communication" (page 8-12)

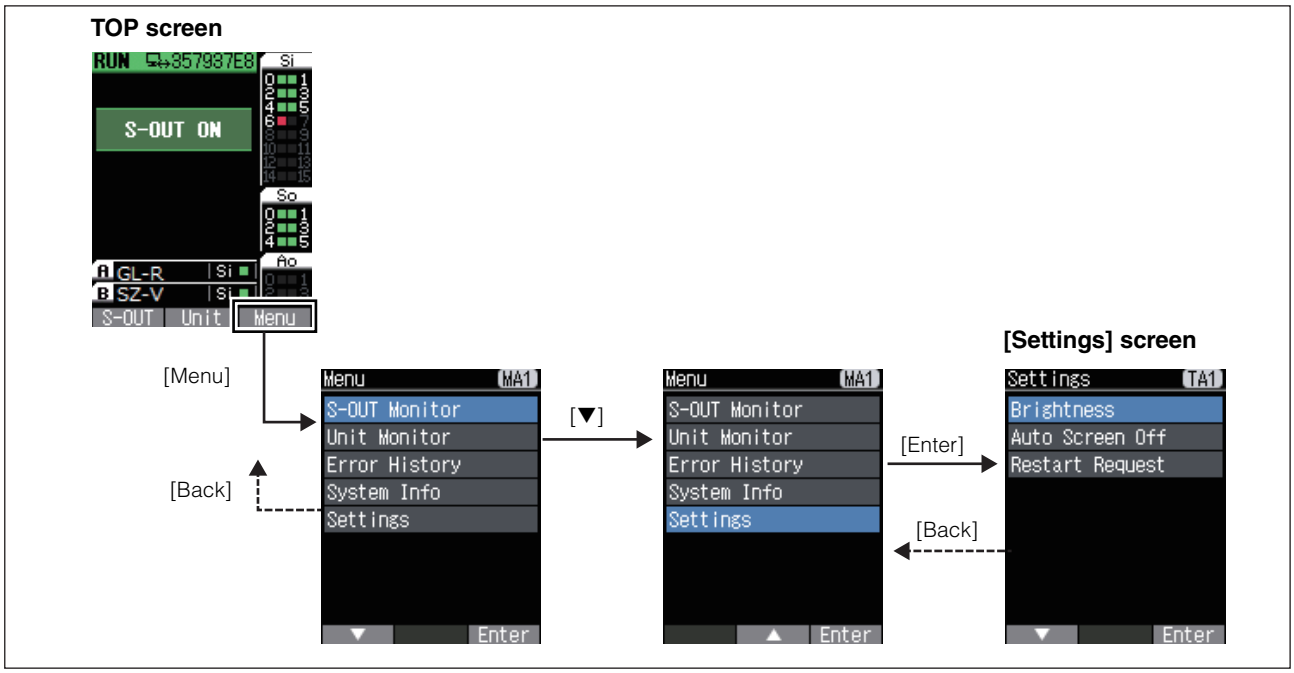
Point

- **The network information is displayed only when the main controller is the GC-1000.**
- **The network information items cannot be changed on the GC-1000 main controller. Configure them using the GC Configurator, etc. "10-7 Setting Options" (page 10-22)**
- **The PROFINET information is displayed only when configuring the PROFINET settings and the main controller is the GC-1000. " PROFINET Communication Settings" (page 17-4)**

Settings

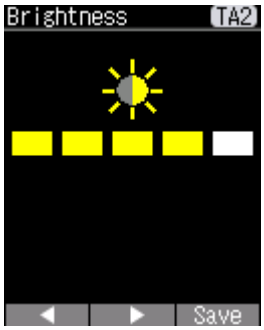
The [Settings] screen allows you to adjust the brightness of the LCD display, configure the automatic screen turn-off function, or restart the GC main controller.

Screen transition



● Brightness

Adjust the brightness of the main controller LCD display.



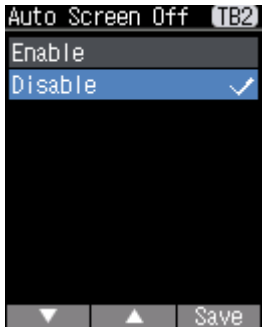
Item	Details
Key function display: [◀], [▶]	Press the operation key (left or center) to adjust the screen brightness.
Key function display: [Save]	Press the operation key (right) to save the brightness setting.

● Auto Screen Off

With [Enable] set, the screen will automatically turn OFF when the buttons on the GC main controller are not engaged for five minutes or longer. (Default: Disable)

The screen will turn ON again when either of the following conditions is met.

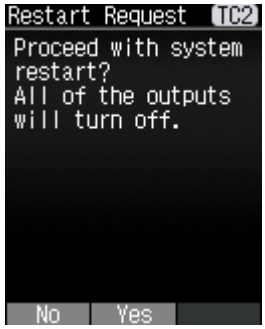
- An error/alert occurs.
- A button is engaged.



Item	Details
Automatic screen turn-off function	Select [Enable]/[Disable] for the automatic screen turn-off function.
Key function display: [▼], [▲]	Press the operation key (left or center) to select [Enable] or [Disable].
Key function display: [Save]	Press the operation key (right) to save the setting.

● Restart Request

You can restart the GC main controller.



Item	Details
Key function display: [Yes]	Press the operation key (center) to restart the GC main controller.
Key function display: [No]	Press the operation key (left) to cancel and return to the [Settings] screen.

6

Installation and Wiring

This chapter describes how to install and wire the GC Series.

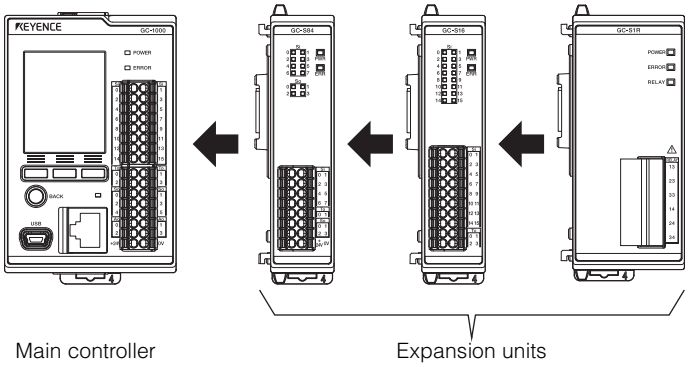
6-1 Installing Units ..... page 6-2
6-2 Wiring Units ..... page 6-10
6-3 Connecting Input Devices ..... page 6-23
6-4 Connecting Output Devices ..... page 6-39
6-5 Connecting KEYENCE Safety Sensors ..... page 6-47

6-1 Installing Units

Cautions for Installing Units

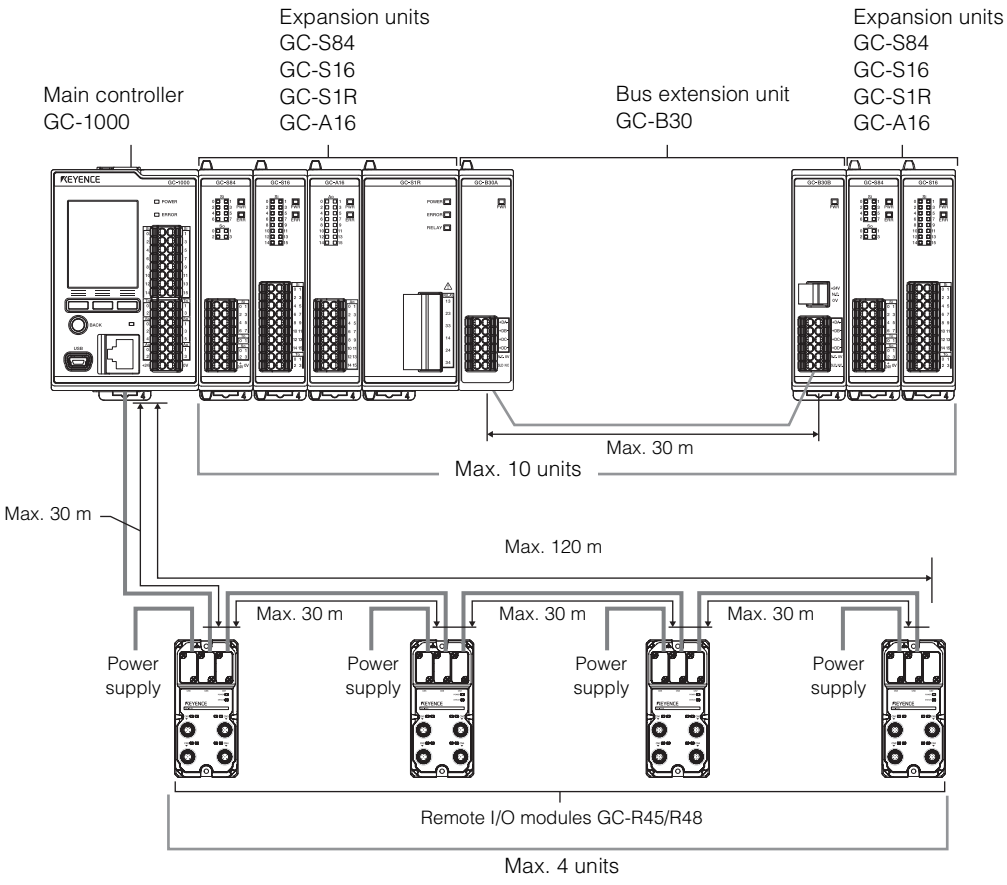
Be sure to connect each unit while the power is OFF.

Point **The GC-1000R cannot be connected to expansion units or remote I/O modules.**



Maximum number of units

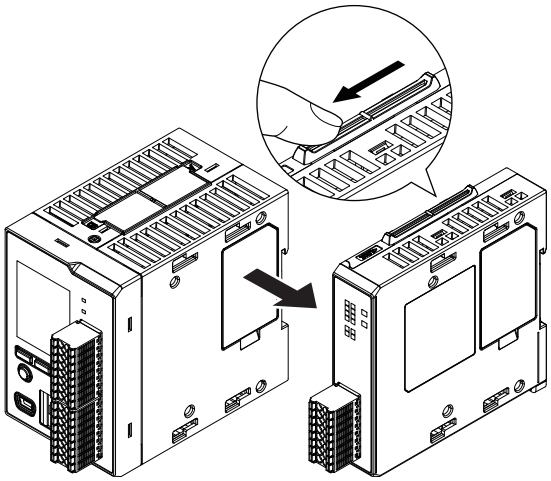
Up to ten expansion units and four remote I/O modules can be connected to a single main controller "GC-1000". (The bus extension unit "GC-B30" is not included in this number, and only one set of "GC-B30" can be used.)



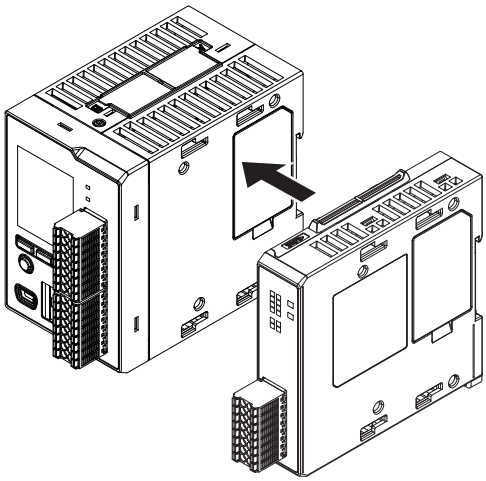
Point **Only the GC-S1R or GC-B30 can be installed on the right side of the GC-S1R.**

Arranging Units

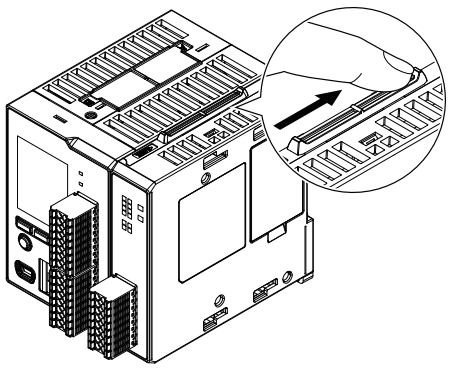
1 **Slide the upper and lower lock levers of the right unit to release the lock. Remove the expansion connector cover on the right side of the left unit.**



2 **Insert the lock levers of the right unit into the lock lever slots of the left unit.**
Check that no gap is produced between the units.



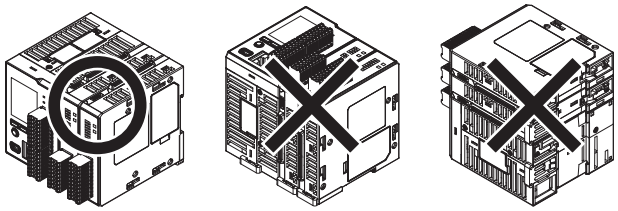
3 **Slide the upper and lower lock levers of the right unit to apply the lock.**



Installing Main Controller and Expansion Units

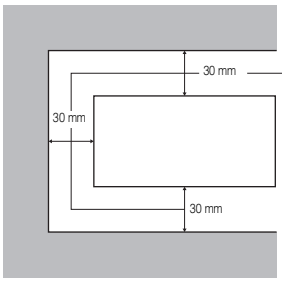
Installation orientation

When installing inside a panel, be sure to arrange the display side of the GC Series main controller so that it faces forward.



Clearance from surroundings

Ensure that there is a clearance of at least 30 mm from the surrounding wall or device.



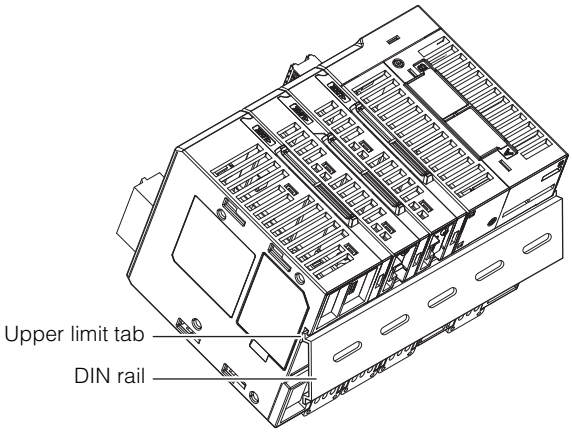
Top, left, bottom
Ensure that there is a clearance of 30 mm for heat radiation.

Point

If the temperature inside the panel (temperature at the center of the bottom of the unit) exceeds the ambient temperature for use, it is necessary to either introduce forced air cooling, or to increase the GC unit's clearance from its surroundings in order to decrease the ambient temperature.

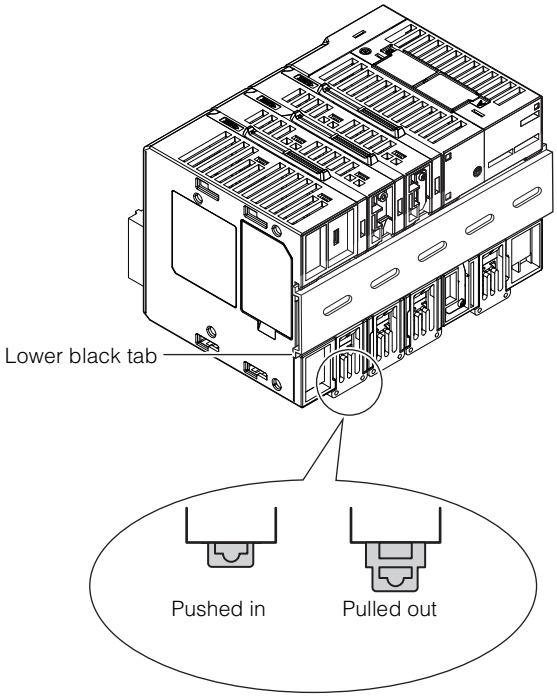
Attaching DIN rail

1 Hook the upper groove of the DIN rail on the upper DIN rail mounting tab of each unit.



2 Fit the bottom side of the DIN rail into the lower DIN rail mounting tab of each unit.

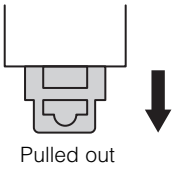
- The lower black tab is moved by a spring. Push against the black tab until a clicking sound is heard.
- If it is difficult to secure the unit to the DIN rail, it is recommended to pull out all the DIN rail mounting tabs and then attach the DIN rail. Once the DIN rail is attached, push in the DIN rail mounting tabs to lock.



3 Check that the lower DIN rail mounting tab is pushed in (locked).

Removing DIN rail

1 Pull out the lower DIN rail mounting tab.



2 Remove the DIN rail from the unit by following the attachment procedure in the opposite manner.

Installing Remote I/O Modules

Installation orientation

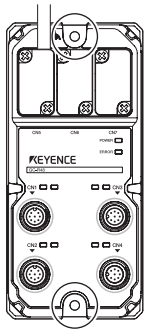
There is not a specific restriction.

Clearance from surroundings

There is not a specific restriction.

Securing method

Secure the unit using the two mounting holes (upper and lower sides) and M4 screws.



Tightening torque: 1.5 N·m

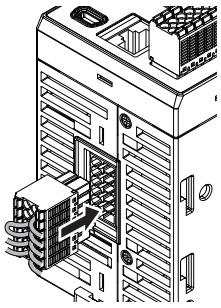
Point

- **Install a remote I/O module on a flat surface. If the mounting surface has an irregular shape, any excessive force applied to the remote I/O module may cause damage to the unit.**
- **If the two parts are not secured properly, vibration may interfere with the device's operation.**

Connecting to the main controller

■ Connection cables

A remote I/O module and the main controller "GC-1000" are connected by the dedicated cable.
The cable used and connection method vary by the number of remote I/O modules to be connected.



Point

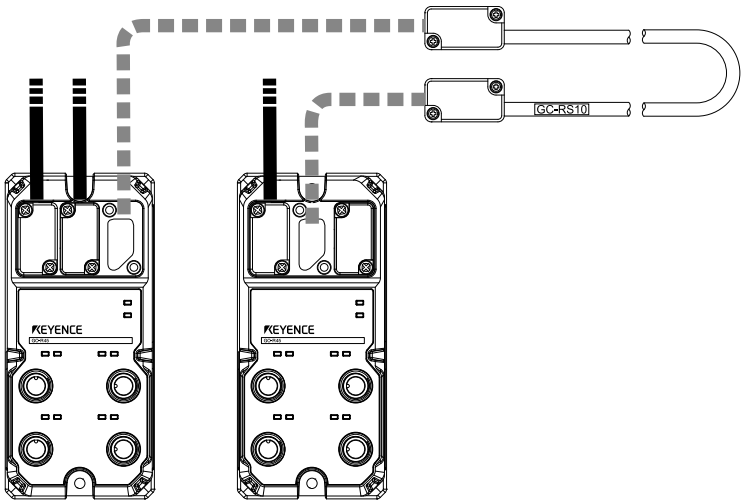
The main controller "GC-1000R" cannot be connected to remote I/O modules.
The remote I/O modules "GC-R45" and "GC-R48" can coexist.

Connecting between the Remote I/O Modules

When using two or more remote I/O modules, connecting between the remote I/O modules is required.

■ Connection cables

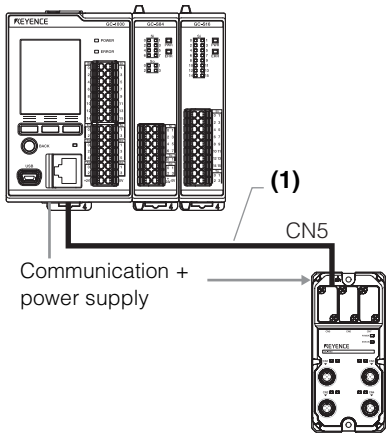
The remote I/O modules are connected with a remote I/O module extension cable.



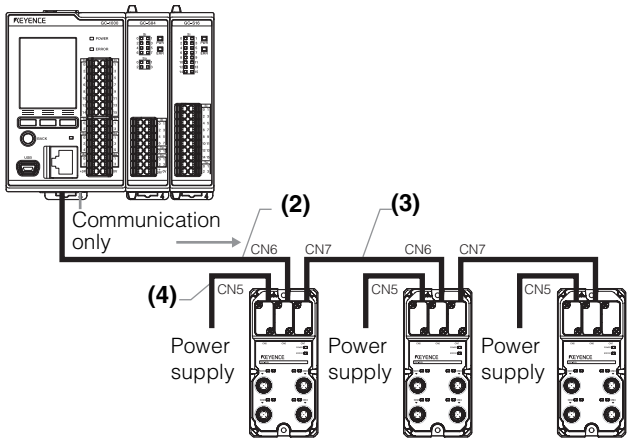
Point

- **The remote I/O module extension cable has a direction to connect.**
  Use the model label of the remote I/O module extension cable as a mark and connect the connectors as follows:
  - Connect the connector which is further from the model label to the CN7 of the first remote I/O module
  - Connect the connector which is closer to the model label to the CN6 of the second remote I/O module
- **When using three or more remote I/O modules, connect them in the same way as the second and third modules and third and fourth modules.**
- **If the remote I/O module extension cable is connected in the wrong direction, the "Remote I/O Module Config. Mismatch" error occurs.**

[Using a single remote I/O module]



[Using two or more remote I/O modules]

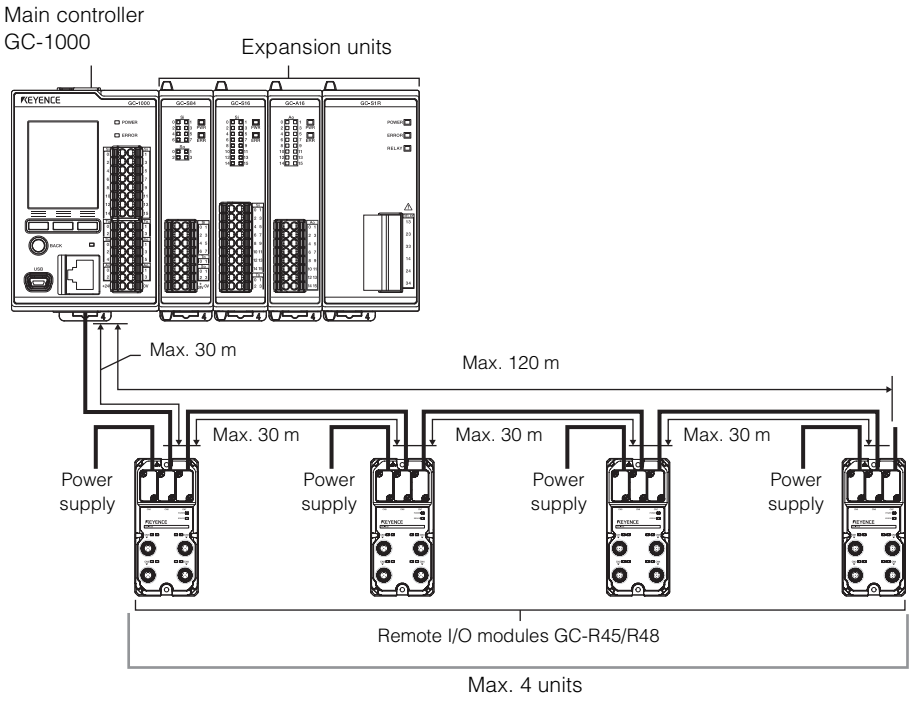


Number	Product name	Model	Length
(1), (2)	Remote I/O module power cable	GC-RP10	10 m
		GC-RP30	30 m
(3)	Remote I/O module extension cable	GC-RS10	10 m
		GC-RS30	30 m
(4)	Remote I/O module external power cable	GC-RE10	10 m

▶ Important

When using a single remote I/O module, if the current consumption of the connected input device exceeds 2.0 A, use the remote I/O module external power cable.

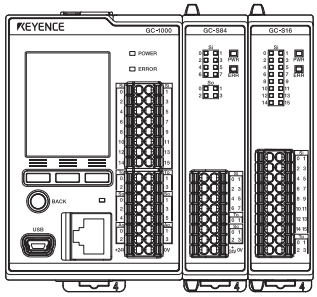
Maximum cable lengths



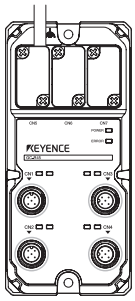
■ Reducing Cable Lengths

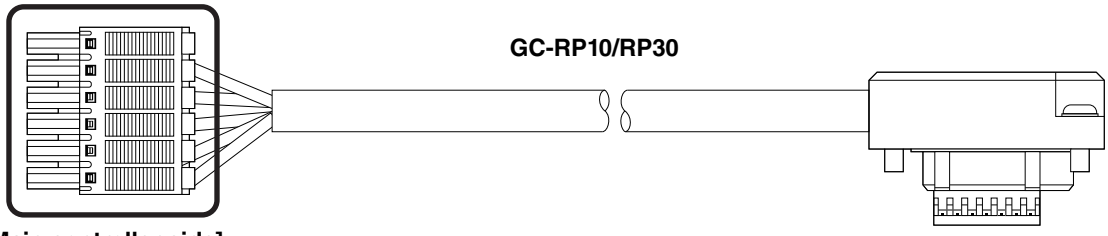
When you cut the remote I/O module power cable "GC-RP10/RP30" to shorten the length, it is necessary to re-connect the shortened cable to the connector on the main controller by connecting the individual wires to the appropriate pin numbers as shown below.

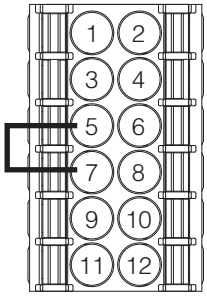
[GC-1000]



[GC-R45/R48]







Pin number	Wiring color	Wiring color	Pin number
1	--	--	2
3	--	Brown	4
5	Short wire	Shield	6
7		Blue	8
9	Black	White	10
11	Red	Yellow	12

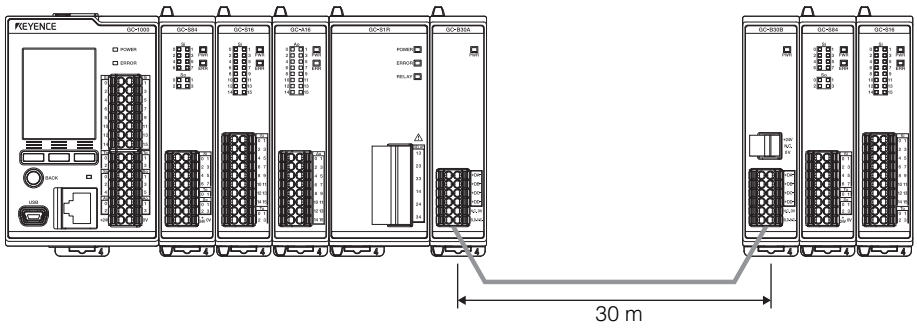
Item	Details
Cable sheath stripping length	10 mm
Usable bar terminal wire diameter	Bar terminal: 0.25 mm^2 to 1.5 mm^2 Ferrule terminal: 0.25 mm^2 to 0.75 mm^2

Point

- **For the wiring treatment in using the bar/ferrule terminal, comply with the specifications of the terminal used.**
- **Do not perform preliminary soldering at the end of the cable.**
- **To prevent unintended short failure between the cables next to each other, using bar terminals or Ferrule terminals is recommended.**
- **The pitch between terminals is 3.5 mm. Pay attention to the insulation sleeve outer diameter of the bar terminal, etc.**

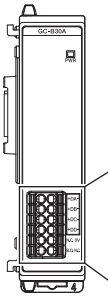
Installing Bus Extension Units

Maximum cable length

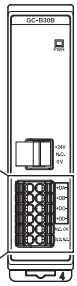


Terminal arrangement and wiring

GC-B30A



GC-B30B



Terminal arrangement

Signal	Signal
DA+	DA-
DB+	DB-
DC+	DC-
DD+	DD-
N.C.	0V
Shield	N.C.

Wiring diagram

Signal	Cable (twisted pair 5P + shield)	Signal
DA+		DA+
DA-		DA-
DB+		DB+
DB-		DB-
DC+		DC+
DC-		DC-
DD+		DD+
DD-		DD-
N.C.		N.C.
0V		0V
Shield		Shield
N.C.		N.C.

Cable connected between the bus extension units

When connecting the GC-B30A with the GC-B30B, use a cable that meets one of the specifications listed below.

	Item	Specification
1	UL Style No.	2464
	Shape	Shielded multicore cable
	Rating	80 °C/300 V
	Core thickness	AWG 16 to 26
	Number of cores	Twisted pair 5P + shield
2	UL Style No.	20276
	Shape	Shielded multicore cable
	Rating	80 °C/30 V
	Core thickness	AWG 16 to 26
	Number of cores	Twisted pair 5P + shield

6-2 Wiring Units

This section describes the power supply connection method and wiring for the GC Series.

NOTICE	**Be sure to perform wiring while the power is OFF.**

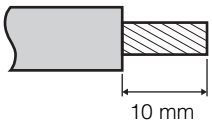
Connecting to Terminal Blocks

The main controller, GC1000/1000R, and expansion unit, GC-S84/S16/A16, are equipped with an European style terminal block.

Compatible cable/bar terminal

Use the cable and bar terminal meeting the following specifications.

Item	Details
Compatible cable size	AWG16 to 26 (copper wire, stranded wire) (Nominal cross-section area: 0.2 mm^2 to 1.5 mm^2)
Cable sheath stripping length	10.0 mm
Usable bar terminal wire diameter	Bar terminal: 0.25 mm^2 to 1.5 mm^2 Ferrule terminal: 0.25 mm^2 to 0.75 mm^2

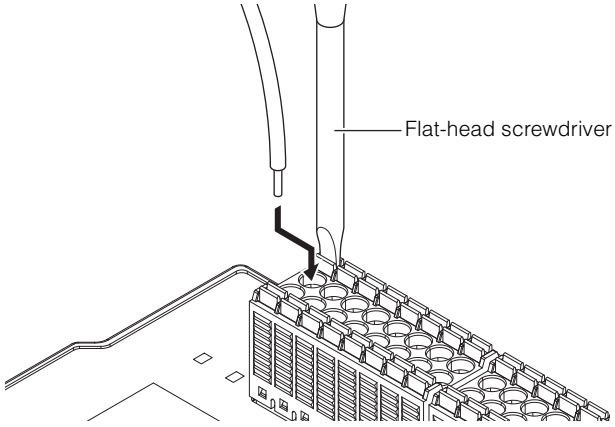


Point

- **For the wiring treatment in using the bar/ferrule terminal, comply with the specifications of the terminal used.**
- **Do not perform preliminary soldering at the end of the cable.**
- **To prevent unintended short failure between the cables next to each other, using bar terminals or Ferrule terminals is recommended.**
- **The pitch between terminals is 3.5 mm. Pay attention to the insulation sleeve outer diameter of the bar terminal, etc.**

Connection method

Insert the cable while pushing in the orange protrusion with a flat-head screwdriver or similar tool.



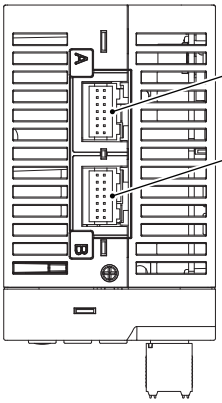
Assigning Input/Output Terminals

The following describes the assignment of the inputs/outputs for each unit. For details of each signal, refer to the following page.

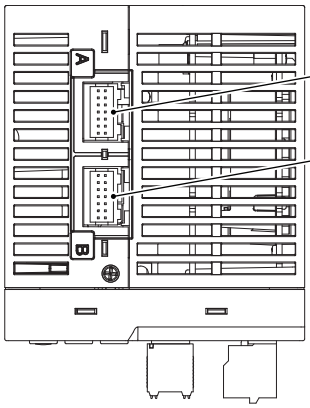
"Connecting Power Supplies" (page 6-13)
"6-3 Connecting Input Devices" (page 6-23)
"6-4 Connecting Output Devices" (page 6-39)
"GC-Link" (page 6-30)

Main controller

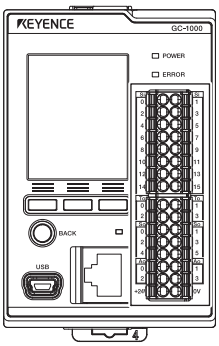
GC-1000



GC-1000R

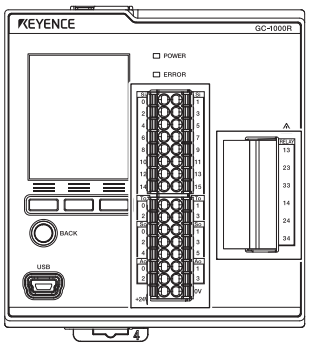


Terminal blocks



0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	Si14	Si15	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	So4	So5	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		Power supply terminal

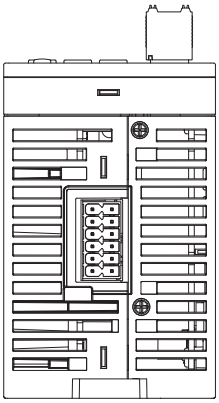
Terminal blocks



0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	N.C.	N.C.	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	N.C.	N.C.	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		Power supply terminal

Relay terminal block

13	SRo
23	SRo
33	SRo
14	SRo
24	SRo
34	SRo

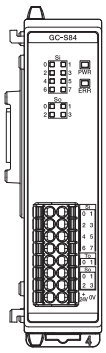


Remote I/O Modules Connector

Yellow		Red
White		Black
Blue		Short wire
Shield		
Brown		N.C.
N.C.		N.C.

Expansion units

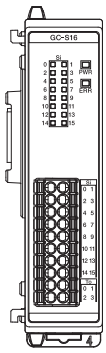
GC-S84



Signal

0	Si0	Si1	1	Safety inputs
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
0	To0	To1	1	Test outputs
0	So0	So1	1	Safety outputs
2	So2	So3	3	
	+24V	0V		

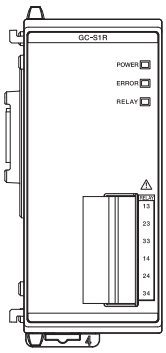
GC-S16

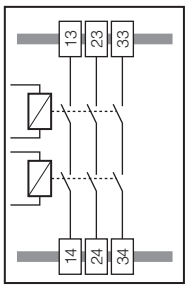


Signal

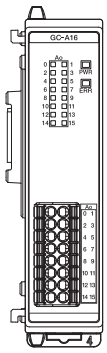
0	Si0	Si1	1	Safety inputs
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	Si14	Si15	15	
0	To0	To1	1	Test outputs
2	To2	To3	3	

GC-S1R





GC-A16

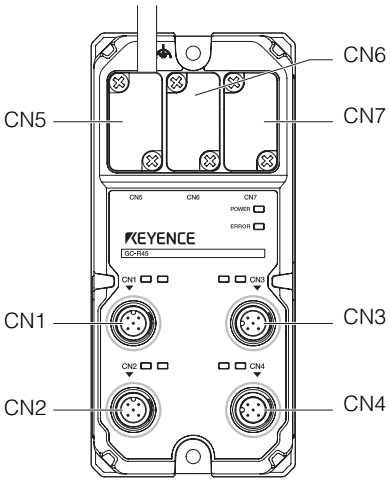


Signal

0	Ao0	Ao1	1	AUX outputs
2	Ao2	Ao3	3	
4	Ao4	Ao5	5	
6	Ao6	Ao7	7	
8	Ao8	Ao9	9	
10	Ao10	Ao11	11	
12	Ao12	Ao13	13	
14	Ao14	Ao15	15	

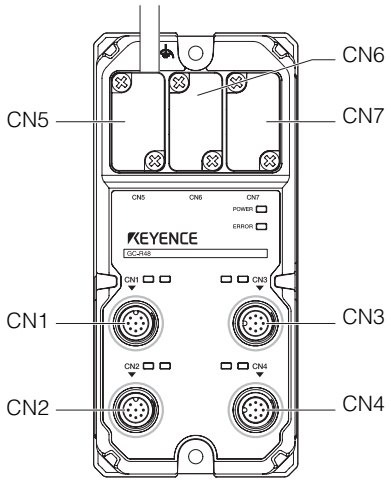
Remote I/O modules

GC-R45



Pin number	Function
Pin 1	+24 V/To1
Pin 2	Si1/Ao
Pin 3	0 V
Pin 4	Si0
Pin 5	+24 V/Ai/To0

GC-R48



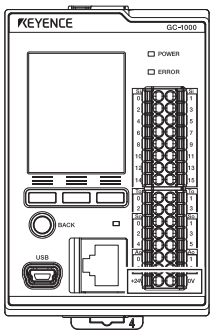
Pin number	Function
Pin 1	Ai
Pin 2	+24 V
Pin 3	So (lock control output)
Pin 4	+24 V/To0
Pin 5	Si0
Pin 6	Si1
Pin 7	0 V
Pin 8	+24 V/To1

Connecting Power Supplies

Connect the power supply for the GC Series to the terminal block of the main controller (GC-1000/1000R).
The power supplied to the expansion units and remote I/O modules originates from the main controller.

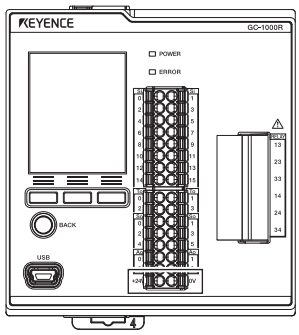
Point

- **Provide power separately to power supply terminal of GC-S84 and GC-B30B. Power is not provided from the GC-1000 main controller.**
- **When using two or more remote I/O modules, connect the dedicated power cable to each remote I/O module. For details, refer to "Connecting to the main controller" (page 6-5).**



Signal

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	Si14	Si15	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	So4	So5	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		Power supply terminal



Signal

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	N.C.	N.C.	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	N.C.	N.C.	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		Power supply terminal

Precautions for Wiring Input/Output Devices

Observe the following points when wiring input/output devices.

- Connect the input/output signal cable separately from the 100/200 VAC cable.
- When using a tube for wiring, check that the tube is properly grounded.
- Be sure to turn OFF all of the power supplies before wiring to avoid any potential risk of electrical shock or product damage.

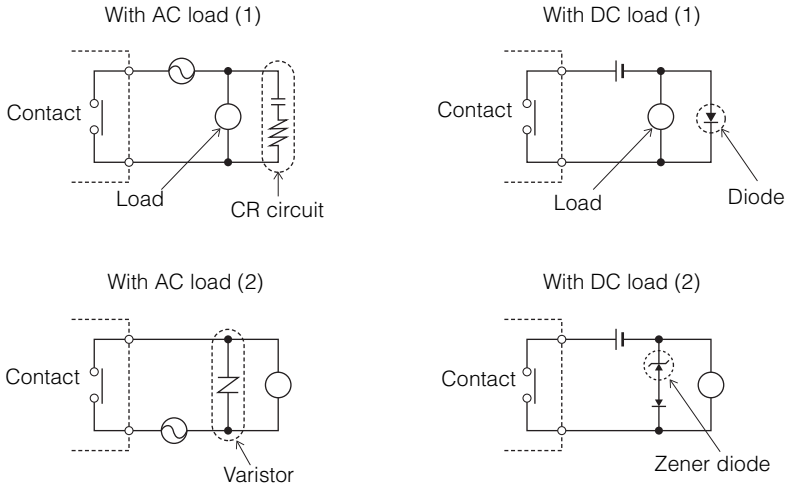
Precautions for installation

- Be sure to perform functional grounding for the DIN rail.
- The grounding resistance must be 100 Ω or less.

Contact protection

When using an inductive load, a rush current may flow at the input of the load's power supply, or a counter-electromotive voltage may be generated at the shut-off of the load's power supply. A rush current or counter-electromotive voltage can be particularly damaging to the contacts and may shorten their lifespan. To prevent the occurrence of this phenomenon, include a contact protection circuit.

■ Examples of a contact protection circuit



- Use the load coil rating that does not exceed the contact capacity.
- Use the diode with a peak inverse voltage that is at least ten times the circuit voltage and with a forward current that is equal to or larger than the load current.
- Attach the diode, varistor and CR circuit directly to the relay coil terminal.

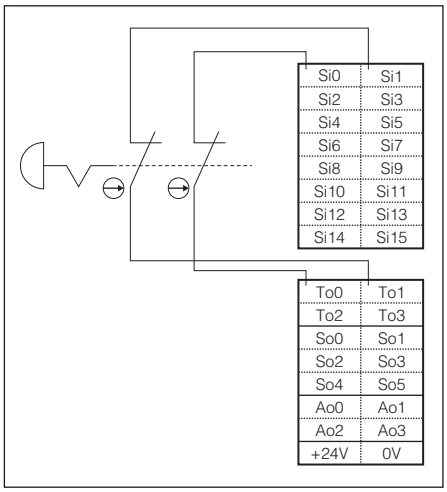
Safety Input Functions

The safety inputs of the main controller "GC-1000/1000R", expansion unit "GC-S84/S16" and remote I/O module "GC-R45/R48" provide the following functions.

Test output function

This function produces a 24 V output with a test pulse from the test output terminal to detect a failure or wiring error of the connected safety input device.

[Wiring example]
Connection type: 2 inputs 2 test outputs



■ Test output specifications

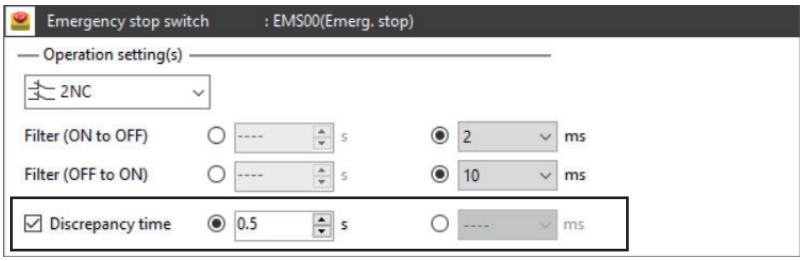
Item	Specification
Output type	PNP transistor output
Maximum load current	100 mA
Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
Maximum cable length	Max. 100 m

Select the "connection type" of each input device to set the test output function. "Connection Types" (page 6-24)

Discrepancy detection

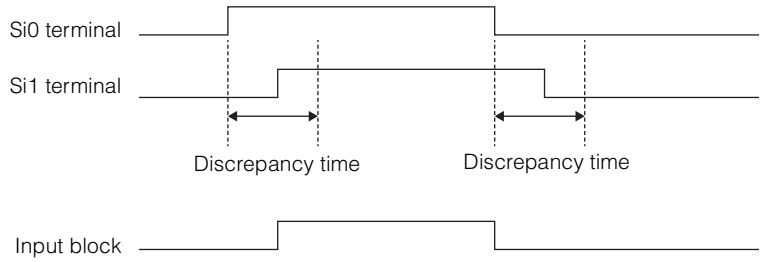
A duplicate signal can be connected to the GC Series. This function detects a discrepancy between the two input signals. It monitors the time that has elapsed from a change in the value of one input signal to a change in the value of the other input signal. If the value of the other input signal does not change within the predetermined time, it will be judged as an error.

The discrepancy detection time can be changed via "detailed settings" of each input device. "Input Device Detailed Settings" (page 10-8)

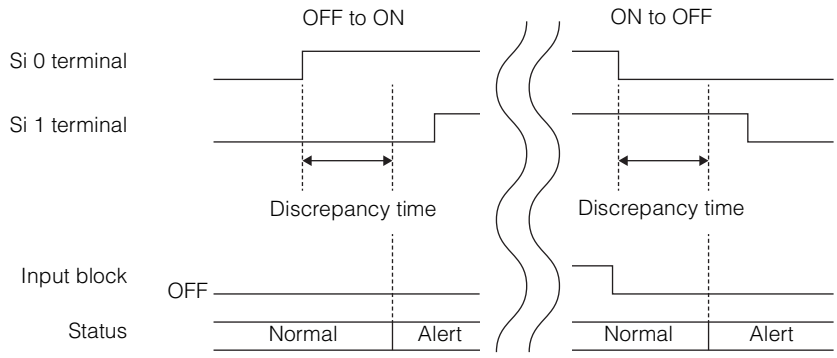


Item	Details/Setting range	Default
Discrepancy time	With the check box checked, the discrepancy detection function is enabled. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	Enabled: 0.5 seconds

■ Operation with discrepancy detection enabled (normal situation)

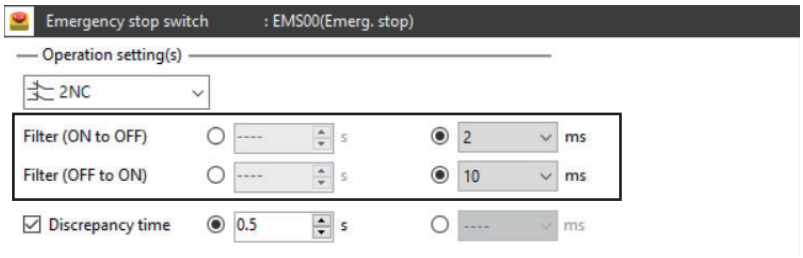


■ Operation with discrepancy detection enabled (abnormal situation)



ON-OFF filter and OFF-ON filter

You can set the filters to prevent chattering of the input device to the safety input terminal or any malfunctions caused by electromagnetic noise.
The filtering time can be changed via detailed settings of each input device. "Input Device Detailed Settings" (page 10-8)



Item	Details/Setting range	Default
ON-OFF filter	A filter used to apply an OFF-delay. Select either seconds (s) or milliseconds (ms) as the unit of filtering time and check the corresponding radio button. • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2 ms
OFF-ON filter	A filter used to apply an ON-delay. Set the filtering time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10 ms

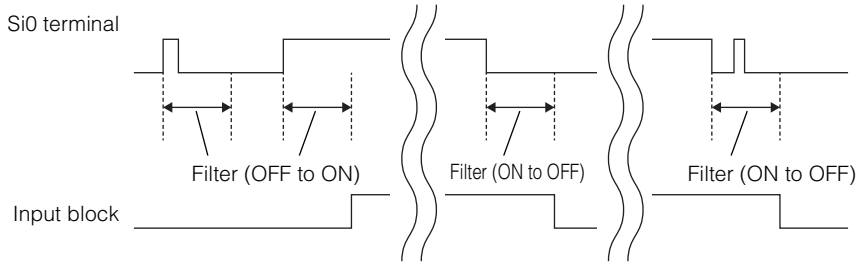
Point

- **A larger filtering time value increases the resistance to chattering or electromagnetic noise, but a response to an input signal becomes slower. A slower response increases the required safety distance. When calculating the response time, add the ON-OFF filtering time. "4 Calculating Response Time" (page 4-1)**
- **When the ON-OFF filter and OFF-ON filter are set to "0.5 ms" or "1 ms", connect a resistor of 2.2 kΩ between the input terminal and 0 V.**

Reference

When you select "NCNO" or "NONC" in the input logic setting, the ON-OFF filter and OFF-ON filter become the same value, and as a result, it is only necessary to configure the ON-OFF filter.

■ Operation with filter setting



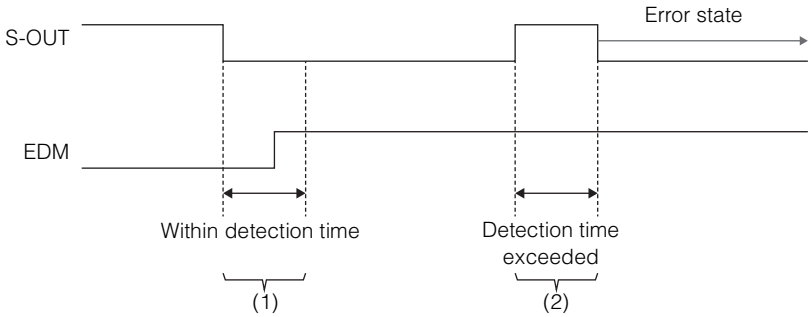
Safety Output Functions

The safety outputs of the main controller "GC-1000/1000R", expansion units "GC-S84/S1R" and remote I/O module "GC-/R48" provide the following functions.

EDM function

When the safety output of the GC Series is connected to an external device such as force guided relay or contactor, the GC Series can detect a failure of the external device (contact welding, etc.). This monitoring function is called EDM (External Device Monitoring) function.

■ Timing chart



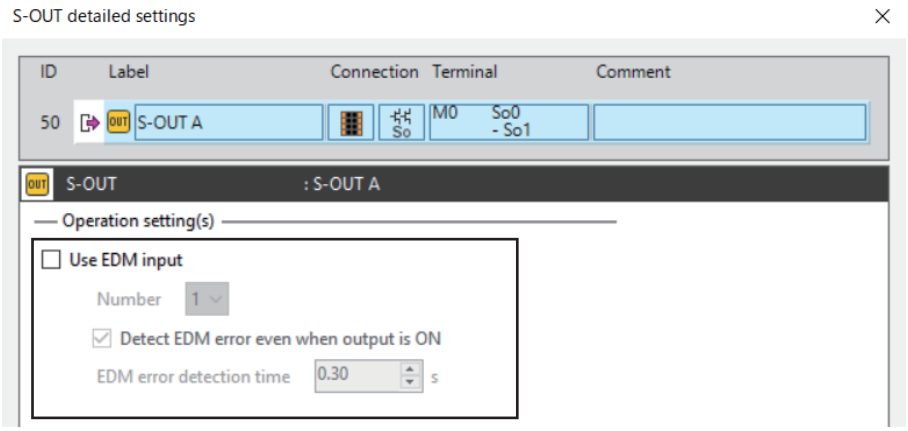
(1) The GC Series continues normal operation because it detects the operation of an external device in tandem with the S-OUT operation within the detection time.

(2) The GC Series detects a failure of the external device as an "EDM error" and enters the error state because it does not detect the operation of the external device within the detection time.

The EDM function can be enabled/disabled via the detailed settings of the output block "S-OUT" or "S-OUT (Relay output)".

"Output Device Detailed Settings" (page 10-15)

[S-OUT detailed settings]



Item	Details
Use EDM input	Check this check box to enable the EDM function.
Number	Set the signal cable used for the EDM input. (Setting range: 1 or 2)

Item	Details
Detect EDM error even when output is ON	Check this check box to detect an EDM error even when the S-OUT output is ON.
EDM error detection time	Set the EDM error detection time. (Default: 0.30 seconds) (Setting range: 0.15 to 3.00 seconds, in increments of 0.05 seconds)

Point

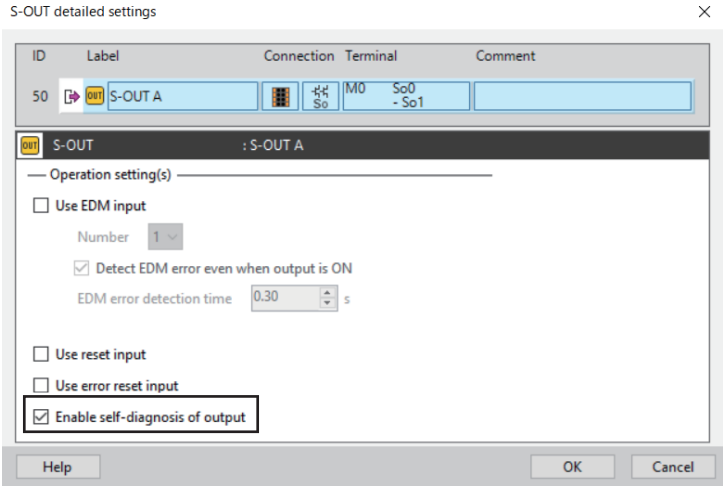
To use the EDM function of each "S-OUT", the "EDM input" block needs to be configured as well. For details, refer to "10-4 Registering Input Devices" (page 10-5) and "EDM input" (page A-76).

Self-diagnostic function

The safety output of the GC Series generates self-diagnostic signals to check the output circuit operation. These signals periodically force the safety output into a temporary OFF state when the safety output is in the ON state.
When the internal control circuit receives feedback from the self-diagnostic signal (OFF signal), the GC Series determines that the output circuit is operating normally. If the OFF signal is not returned to the internal control circuit, the GC Series determines that there is a problem in the output circuit or wiring and then enters the error state.

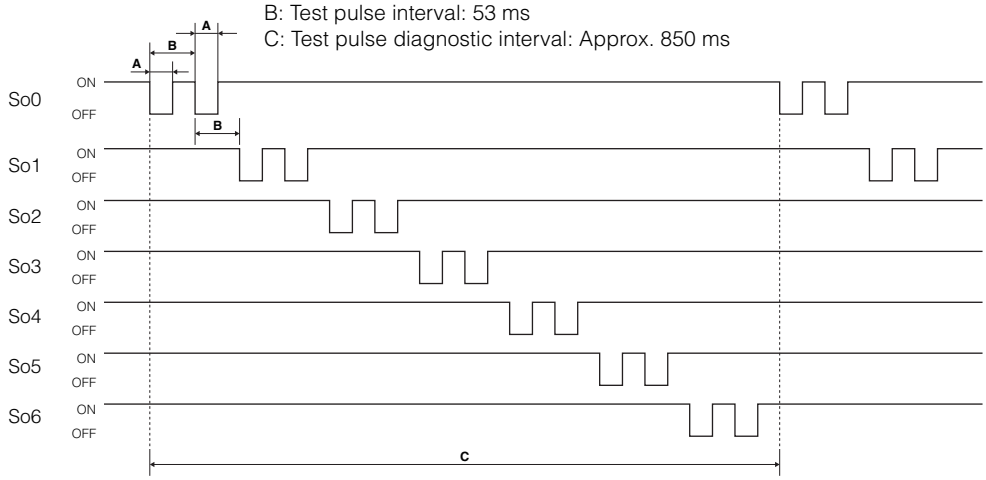
The safety output self-diagnostic function can be enabled/disabled via the detailed settings of the output block "S-OUT" or "S-OUT EDM enabled". "Output Device Detailed Settings" (page 10-15) (Default: ON)

[S-OUT detailed settings]



<Timing chart>

A: Test pulse width 50 to 250 µs
B: Test pulse interval: 53 ms
C: Test pulse diagnostic interval: Approx. 850 ms



Maximum SIL/PL/Category Achieved by GC Series

Safety input

Input device	Connection type	PNP1 input	PNP 2 inputs		1 input	1 input + 1 test output	2 inputs		2 inputs + 1 test output		2 inputs + 2 test outputs	
	Input logic	NC/NO	2NC/2NO	NC/NO	NC/NO	NC/NO	2NC/2NO	NCNO/ NONC	2NC/2NO	NCNO/ NONC	2NC/2NO	NCNO/ NONC
GL-R Series			SIL3/PLe									
GL-S Series			SIL3/PLe									
GS Series			SIL3/PLe									
SZ-V Series			SIL2/PLd									
SZ Series			SIL2/PLd									
Emergency stop switch					Cat.2*2	Cat.2*2	Cat.3		Cat.3		Cat.4	
Limit switch		Cat.2*2	SIL3/PLe*3	SIL3/PLe	Cat.2*2	Cat.2*2	Cat.3	Cat.4	Cat.3	Cat.4	Cat.4	Cat.4
Interlock switch		Cat.2*2	SIL3/PLe*3	SIL3/PLe	Cat.2*2	Cat.2*2	Cat.3	Cat.4	Cat.3	Cat.4	Cat.4	Cat.4
Guard locking switch		Cat.2*2	SIL3/PLe*3	SIL3/PLe	Cat.2*2	Cat.2*2	Cat.3	Cat.4	Cat.3	Cat.4	Cat.4	Cat.4
Light curtain		Cat.2*2	SIL3/PLe*3	SIL3/PLe								
Laser scanner		Cat.2*2	SIL2/PLd*3	SIL2/PLd								
Rope pull switch		Cat.2*2	Cat.4*3	Cat.4	Cat.2*2	Cat.2*2	Cat.3	Cat.4	Cat.3	Cat.4	Cat.4	Cat.4
Safety mat		Cat.2*2	Cat.3*3	Cat.3	Cat.2*2	Cat.2*2	Cat.3	Cat.3	Cat.3	Cat.3	Cat.3	Cat.3
Two hand control device				Type III c Cat.4				Type III c Cat.4		Type III c Cat.4		Type III c Cat.4
Enabling device							Cat.3	Cat.4	Cat.3	Cat.4	Cat.4	Cat.4
Other safety switches							Cat.3	Cat.4	Cat.3	Cat.4	Cat.4	Cat.4
Other safety inputs			Cat.4*3	Cat.4			Cat.3	Cat.4	Cat.3	Cat.4	Cat.4	Cat.4

*1 To achieve the above levels, you need to use the appropriate input device that complies with the requirements of SIL (IEC 61508) and PL/Cat. (ISO 13849-1:2015).

*2 Exclusion of failure needs to be applied according to the required standards such as Table D.4 of ISO 13849-2:2012.
*3 When a cable short-circuit between two safety inputs or a short-circuit between a safety input and power line occurs, the input device is required to detect the trouble and turn OFF the two safety inputs.
*4 A switch that complies with ISO 13851 needs to be used.

WARNING	• **The above table shows the maximum safety levels which can be achieved by the GC Series. However, the safety performance of a control system needs to be determined by overall system including input devices and the wiring methods as well as the GC Series. Since the above safety levels may not be achieved by the actual system combining multiple devices, carefully select the devices to use and the wiring methods.** • **A mechanical interlock switch which is defined as Type1/2 Interlocking Device in ISO 14119 may not be able to detect the state that the guard is not at the close position due to an actuator trouble. Therefore, for the system requiring SIL3/PLe/Cat.4, use two interlock switches (Type1/2) for one movable guard or use a Type3/4 device that satisfies SIL3/PLe/Cat.4 alone like the GS Series.** • **When the test output is branched and connected to multiple input devices (e.g. 2 inputs 1 test output), a short-circuit between the cables connecting the same test output cannot be detected. When compliance with Cat.4/PLe/SIL3 is necessary, apply exclusion of failure according to Table D4 of ISO 13849-2:2012 to prevent a short-circuit between multiple cables.**

Safety output

When the safety output of the GC Series is connected to an external device such as force guided relay or contactor, the GC Series can detect a failure of the external device (contact welding, etc.). This monitoring function is called EDM (External Device Monitoring) function.

Safety output type	Connection type	EDM function	Self-diagnostic function	Achievable safety level
PNP	Safety output x 1	Enabled	Enabled	SIL3/PLe/Cat.4 *1
			Disabled	SIL2/PLd/Cat.3 *1
		Disabled	Enabled	SIL3/PLe/Cat.4 *1*2
			Disabled	SIL2/PLd/Cat.3 *1*2
	Safety output x 2	Enabled	Enabled	SIL3/PLe/Cat.4
			Disabled	SIL2/PLd/Cat.3
		Disabled	Enabled	SIL3/PLe/Cat.4 *2
			Disabled	SIL2/PLd/Cat.3 *2
Relay	-	Enabled	-	SIL3/PLe/Cat.4 *1
		Disabled	-	SIL3/PLe/Cat.4 *1*2

*1 Exclusion of failure of cable between the safety output and external device (output device) needs to be applied according to Table D.4 of ISO 13849-2:2012.
Example: Install the GC and external device in the enclosure (e.g. control panel) that complies with IEC 60204-1 and use the cable complying with the standard.
*2 An external device (output device) alone needs to achieve the above safety level.

WARNING	**The above table shows the maximum safety levels which can be achieved by the GC Series. However, the safety performance of a control system needs to be determined by overall system including external devices (output devices) and the wiring methods as well as the GC Series. Since the above safety levels may not be achieved by the actual system combining multiple devices, carefully select the devices to use and the wiring methods.**

Reference The safety output is duplicated internally, and the self-diagnostic function is used to detect a failure. Depending on the operating condition, the requirements of SIL3/PLe/Cat.4 can be satisfied with a single safety output.

6-3 Connecting Input Devices

This section describes how to connect an input device to the GC Series. The connection method of the input device is determined by a combination of the following items.

1. Input device type(page 6-23)

Example: Safety light curtain, emergency stop switch, etc.

2. Connection type(page 6-24)

- Output type of the input device (contact output device or PNP output device)
- Output form of the input device (single or dual output)
- Use of the test output (contact output device only)

3. Connection destinations(page 6-27)

- GC-Link
- Terminal blocks
- Remote I/O modules (M12 5 pins)
- Remote I/O modules (M12 8 pins)

Input Device Types

The following shows the devices that can be connected to the GC Series.

KEYENCE safety sensors

Product name	Series	
Safety light curtains		GL-R Series
		GL-S Series
Safety interlock switches		GS/GS-M Series
Safety laser scanners		SZ-V Series
		SZ Series

Safety input devices

	Emergency stop switch		Rope pull switch
	Limit switch		Safety mat
	Interlock switch		Two hand control device
	Guard locking switch		Enabling device
	Light curtain		Other safety switches
	Laser scanner		Other safety inputs

Other input devices

	Reset switch		Safety plug
	Mode selecting switch		Hold-to-run switch
EDM	EDM input		Other switches
	Muting input*	IN	Other inputs

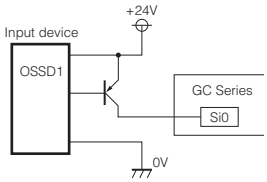
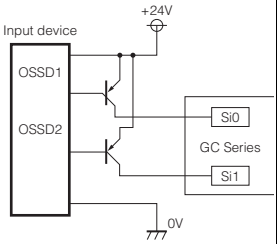
* This cannot be used in the EASY mode. "11-1 EASY Mode" (page 11-2)

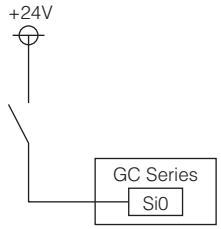
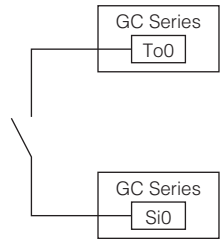
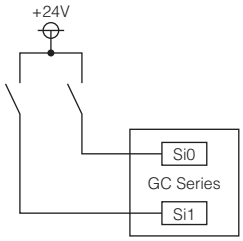
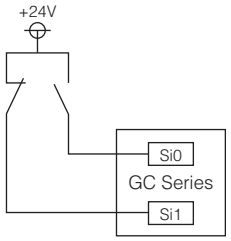
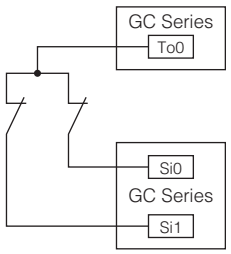
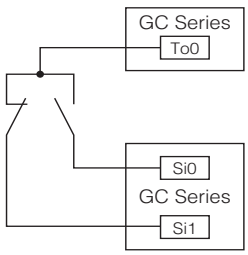
Connection Types

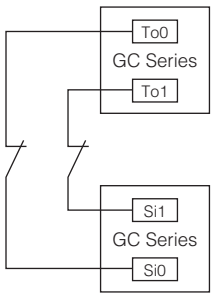
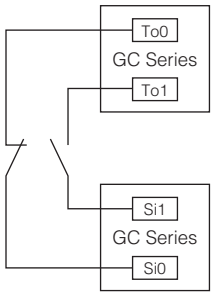
When connecting an input device to the GC Series, select a connection type from the following options. The connection type is determined by a combination of the following items.

- Output type of the input device (contact output device or PNP output device)
- Output form of the input device (single or dual output)
- Use of the test output (contact output device only)

Note that the selectable connection type varies by the input device type and connection destination (e.g. terminal block, remote I/O module). For details, refer to "A-2 List of input devices" (page A-10).

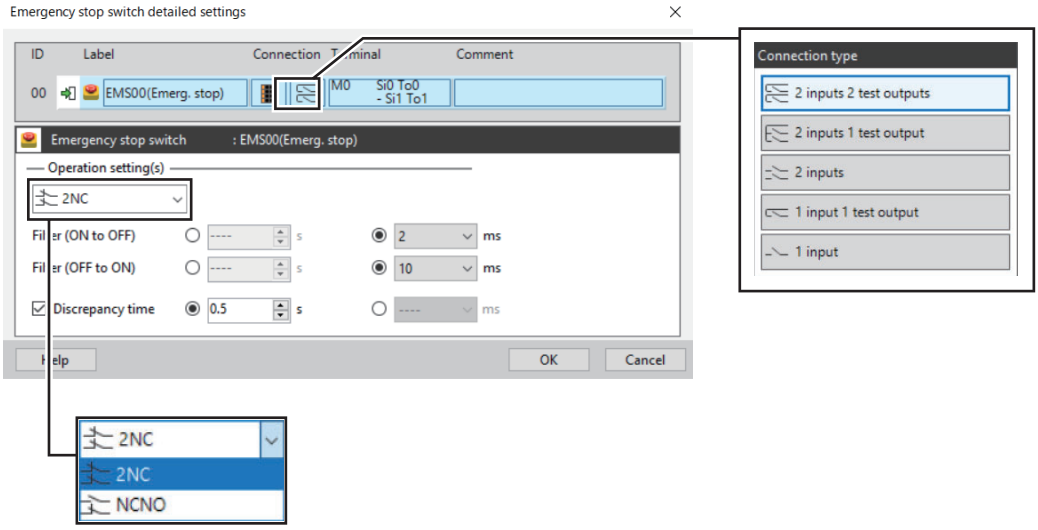
Connection type		Details	Input logic	Wiring diagram	Test output	Short-circuit detection	Discrepancy detection	Remarks
PNP output device	PNP 1 input	Connect a PNP output sensor	1NC 1NO		-	None	-	Used when connecting a non-safety sensor such as muting sensor.
	PNP 2 inputs	Connect a duplicate PNP output devices	2NC 2NO NC/NO NO/NC		-	None	Available	A short-circuit detection cannot be performed on the GC Series. It is performed on the sensor side.

Connection type		Details	Input logic	Wiring diagram	Test output	Short-circuit detection	Discrepancy detection	Remarks
Contact output device	1 input	Connect a single contact output device	1NC 1NO		Not used	None	-	
	1 input + 1 test output	Connect a single contact output device Use 1 test output	1NC 1NO		Used	Available	-	
	2 inputs	Connect a duplicate contact output device	2NC 2NO		Not used	None	Available	
		Connect a single channel NC contact and a single channel NO contact output device	NC/NO NO/NC		Not used	None	Available	The NO/NC (NC/NO) connection enables shortcircuit detection equivalent of Cat4 without a test signal.
	2 inputs + 1 test output	Connect a duplicate contact output device Use 1 test output	2NC 2NO		Used	Available	Available	Only To0 or To2 can be selected for the test output.
		Connect a single channel NC contact and a single channel NO contact output device Use 1 test output	NC/NO NO/NC		Used	Available	Available	

Connection type		Details	Input logic	Wiring diagram	Test output	Short-circuit detection	Discrepancy detection	Remarks
Contact output device	2 inputs + 2 test outputs	Connect a duplicate contact output device Use 2 test outputs	2NC 2NO		Used	Available	Available	The test output enables detection of an inter-system short-circuit between inputs. Test outputs and safety inputs can only be selected in even or odd combinations.
		Connect a single channel NC contact and a single channel NO contact output device Use 2 test outputs	NC/NO NO/NC		Used	Available	Available	

Reference

Select a connection type or input terminal when registering an input device with the GC Configurator.
For details, refer to "10-4 Registering Input Devices" (page 10-5).



Connection destinations

Select a connection destination from the following options.

- GC-Link

The GC-Link is a connection destination dedicated for KEYENCE safety sensors. Connect to the GC-Link port located on the top of the main controller "GC-1000" or "GC-1000R". The use of the dedicated cable enables connection of a KEYENCE safety sensor with less wiring work required.

- Terminal blocks

Connection to the connector terminal block of the main controller "GC-1000"/"GC-1000R" and expansion unit "GC-S84"/"GC-S16".

- Remote I/O modules (M12 5 pins)

- Remote I/O modules (M12 8 pins)

The remote I/O module is an IP65/IP67 rated unit which can be installed outside of the panel. There are two models: the "GCR45" which can be connected using a M12 5-pin connector and the "GC-R48" which can be connected using the M12 8-pin connector. The "GC-R48" is used to perform the lock control for the KEYENCE Safety Interlock Switches, "GS Series" (lock type), or safety guard locking switch.

Note that there are restrictions on the input device or connection type used when connecting to a remote I/O module. Refer to the following table for the devices that can be connected to a remote I/O module.

■ Input devices compatible with the GC-R45 (M12 5 pins)

Input device	Connection type	2 inputs + 2 test outputs	2 inputs	1 input + 1 test output	1 input	PNP 2 inputs	PNP 1 input
Safety input devices	KEYENCE safety sensors						
	- GL-R Series	-	-	-	-	●	-
	- GL-S Series	-	-	-	-	●	-
	- GS Series*1	-	-	-	-	●*2	-
	- SZ-V Series	-	-	-	-	●*2	-
	- SZ Series	-	-	-	-	●*2	-
	Emergency stop switch	●	●	●	●	-	-
	Limit switch	●	●	●	●	●	●
	Interlock switch	●	●	●	●	●	●
	Guard locking switch	-	-	-	-	-	-
	Light curtain	-	-	-	-	●	●
	Laser scanner	-	-	-	-	●	●
	Rope pull switch	●	●	●	●	●	●
	Safety mat	●	●	●	●	●	●
	Two hand control device*3	●	●	-	-	●	-
	Enabling device	●	●	-	-	-	-
	Other safety switches	●	●	-	-	-	-
	Other safety inputs	●	●	-	-	●*2	-
Other input devices	Reset switch	-	-	●*4	●*4	-	-
	Mode selecting switch	●*4	●*4	-	-	-	-
	EDM input	-	-	●	●	-	-
	Muting input	-	-	●	●	-	●
	Safety plug	-	-	●	●	-	-
	Hold-to-run switch	-	-	●	●	-	-
	Other switches	-	-	●*4	●*4	-	-
	Other inputs	-	-	●*2	●*2	-	●*2
	Power supply only	-	-	-	-	-	-

*1 Only the GS Series non-contact type (GS-10PC) can be connected. Cascade connection using a Y-shaped connector is not supported.

*2 The advanced input can be used depending on the setting.

*3 Two M12 5-pin connectors are used.

*4 The advanced output can be used depending on the setting.

■ Input devices compatible with the GC-R48 (M12 8 pins)

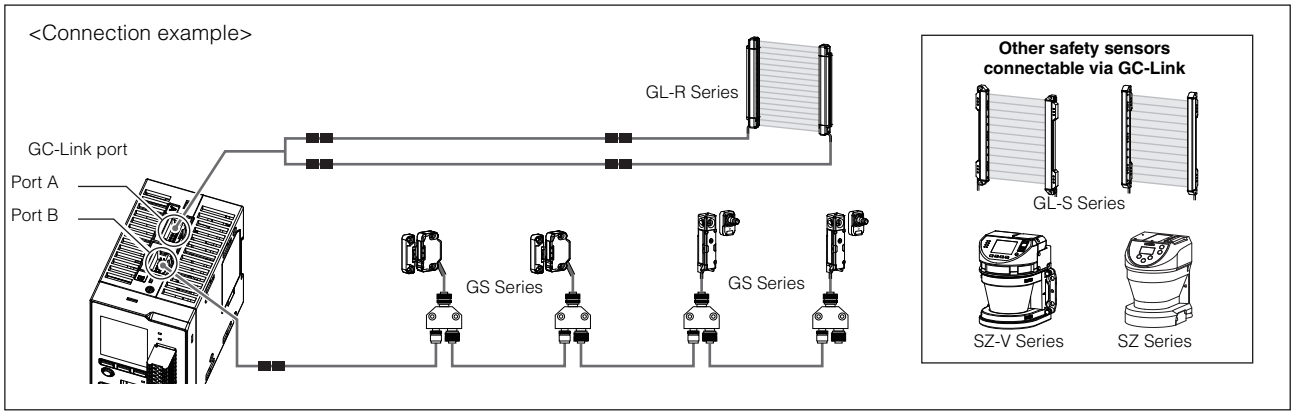
Input device	Connection type	2 inputs + 2 test outputs	2 inputs	1 input + 1 test output	1 input	PNP 2 inputs	PNP 1 input
Safety input devices	KEYENCE safety sensors						
	- GL-R Series	-	-	-	-	-	-
	- GL-S Series	-	-	-	-	-	-
	- GS/GS-M Series*1	-	-	-	-	●*2	-
	- SZ-V Series	-	-	-	-	-	-
	- SZ Series	-	-	-	-	-	-
	Emergency stop switch	-	-	-	-	-	-
	Limit switch	-	-	-	-	-	-
	Interlock switch	-	-	-	-	-	-
	Guard locking switch	●*2	●*2	●*3	●*3	●*2	●*3
	Light curtain	-	-	-	-	-	-
	Laser scanner	-	-	-	-	-	-
	Rope pull switch	-	-	-	-	-	-
	Safety mat	-	-	-	-	-	-
	Two hand control device*3	-	-	-	-	-	-
	Enabling device	-	-	-	-	-	-
	Other safety switches	●*4	●*4	-	-	-	-
	Other safety inputs	●*4	●*4	-	-	●*4	-
Other input devices	Reset switch	-	-	-	-	-	-
	Mode selecting switch	-	-	-	-	-	-
	EDM input	-	-	-	-	-	-
	Muting input	-	-	-	-	-	-
	Safety plug	-	-	-	-	-	-
	Hold-to-run switch	-	-	-	-	-	-
	Other switches	-	-	●*5	●*5	-	-
	Other inputs	-	-	●*5	●*5	-	●*5
	Power supply only	-	-	-	-	-	-

*1 Cascade connection using a Y-shaped connector is not supported.
*2 Pin 3 is used for the lock control output. Additionally, Pin 1 can be used for the advanced input depending on the setting.
*3 Pin 3 is used for the lock control output. Additionally, Pin 1 and Pin 6 can be used for the advanced input depending on the setting.
*4 Pin 3 is used for the non-safety output. Additionally, Pin 1 can be used for the advanced input depending on the setting.
*5 Pin 3 is used for the non-safety output. Additionally, Pin 1 and Pin 6 can be used for the advanced input depending on the setting.

Connection Method

GC-Link

Connect a safety sensor to the GC-Link port located on the top of the main controller "GC-1000/GC-1000R" using the dedicated cables.



Reference

Detailed information for connecting KEYENCE safety sensors to the GC-Link port is provided in the following pages.

"GL-R Series"(page 6-65)
"GL-S Series"(page 6-74)
"GS Series (Non-contact Type)"(page 6-79)
"GS Series (Lock Type)"(page 6-79)
"GS-M Series"(page 6-79)
"SZ-V Series"(page 6-93)
"SZ Series"(page 6-106)

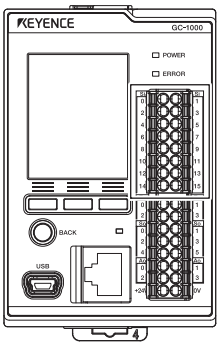
Terminal blocks

Connection to the connector terminal block of the main controller "GC-1000"/"GC-1000R" and expansion unit "GC-S84"/"GC-S16".

Model	Output points
GC-1000	Safety input 16 points*
GC-1000R	Safety input 14 points*
GC-S84	Safety input 8 points*
GC-S16	Safety input 16 points*

* These can also be used as inputs of a non-safety device.

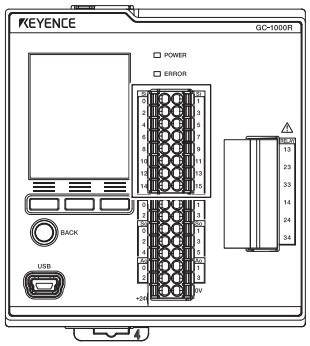
GC-1000



Signal

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	Si14	Si15	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	So4	So5	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		

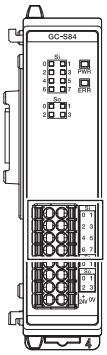
GC-1000R



Signal

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	N.C.	N.C.	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	N.C.	N.C.	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		

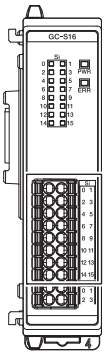
GC-S84



Signal

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
0	To0	To1	1	Test outputs To
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
	+24V	0V		

GC-S16



Signal

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	Si14	Si15	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	

Safety input specifications

Item	GC-1000	GC-1000R	GC-S84	GC-S16
Input device	Contact output device or PNP output device			
Input type	Type3			
ON level (voltage/current)	Min. 11 V/2 mA			
OFF level (voltage/current)	Max. 2 V/1.5 mA			
Short-circuit current	Si 0 to 3: Approx. 5 mA	Si 0 to 3: Approx. 5 mA	Approx. 3 mA	Approx. 5 mA
	Si 4 to 15: Approx. 3 mA	Si 4 to 13: Approx. 3 mA		
Protection circuit	Surge protection circuit, wrong wiring protection circuit			
Maximum cable length	Max. 100 m			

Connection example for connecting an input device to the terminal block

Reference

Detailed information for connecting KEYENCE safety sensors to the terminal block is provided in the following pages.

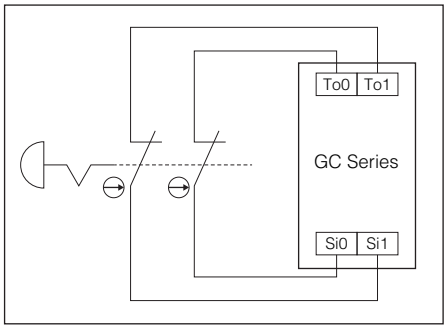
"GL-R Series"(page 6-111)
"GL-S Series"(page 6-117)
"GS Series (Non-contact Type)"(page 6-122)
"GS Series (Lock Type)"(page 6-127)
"GS-M Series"(page 6-133)
"SZ-V Series"(page 6-138)
"SZ Series"(page 6-149)

● When connecting a safety input device of contact type

(Wiring examples)

When using an emergency stop switch in a duplicate manner, combine the connection with the test output terminal.

Connection type: 2 inputs + 2 test outputs

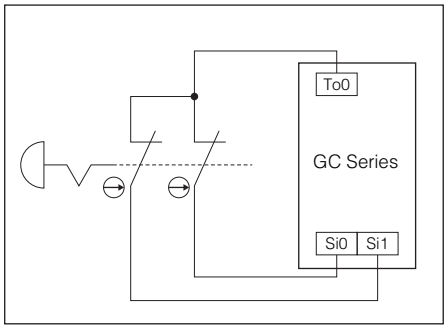


GC Configurator setting example

EMS00(Emerg. stop) M0 Si0 To0 - Si1 To1

Terminal	ID	Label	Test terminal
Si0	00	EMS00(Emerg. stop)	To0
Si1			To1

Connection type: 2 inputs + 1 test output



GC Configurator setting example

EMS00(Emerg. stop) M0 Si0 To0 - Si1 To0

Terminal	ID	Label	Test terminal
Si0	00	EMS00(Emerg. stop)	To0
Si1			To0

Reference

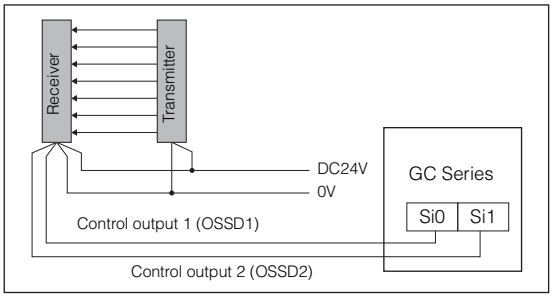
For the wiring diagram by connection type, refer to "Connection Types" (page 6-24).
For the GC Configurator settings, refer to "10-4 Registering Input Devices" (page 10-5).

● When connecting a safety input device of PNP output type

(Wiring examples)

The following shows a wiring example for connecting the PNP output type such as safety light curtain.

Connection type: PNP 2 inputs



GC Configurator setting example

LC00(Light curtain) M0 Si0 - Si1

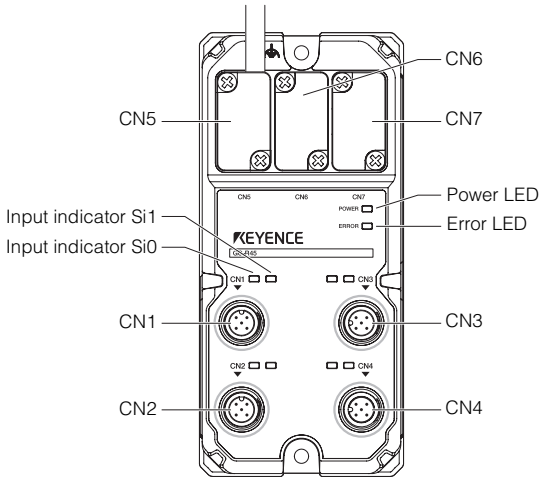
Terminal	ID	Label	Test terminal
Si0	00	LC00(Light curtain)	
Si1			

Reference

For the wiring diagram by connection type, refer to "Connection Types" (page 6-24).
For the GC Configurator settings, refer to "10-4 Registering Input Devices" (page 10-5).

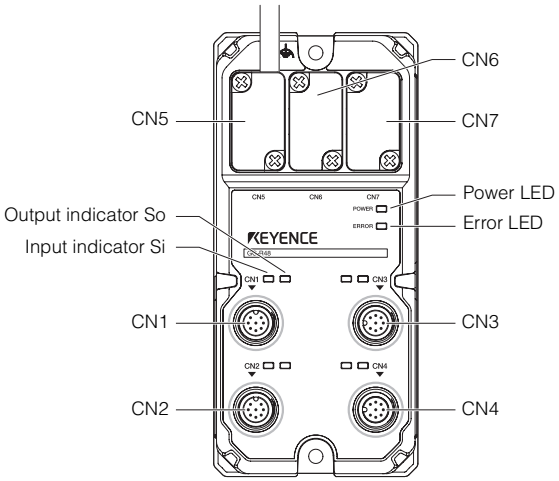
Remote I/O modules

GC-R45 (M12 5 pins)



Pin number	Function
Pin 1	+24 V/To1
Pin 2	Si1/Ao
Pin 3	0 V
Pin 4	Si0
Pin 5	+24 V/Ai/To0

GC-R48 (M12 8 pins)



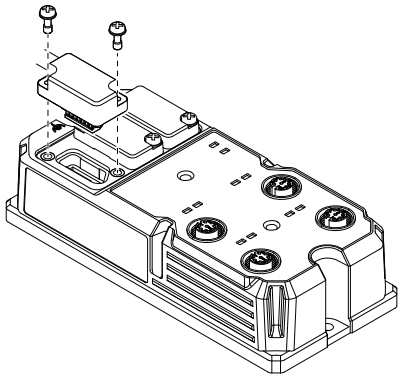
Pin number	Function
Pin 1	Ai
Pin 2	+24 V
Pin 3	So (lock control output)
Pin 4	+24 V/To0
Pin 5	Si0
Pin 6	Si1
Pin 7	0 V
Pin 8	+24 V/To1

Item	Details
CN1 to CN4	Ports used to connect external devices. (GC-R45: M12 5 pins, GC-R48: M12 8 pins)
CN5	Power supply + communication with the main controller
CN6	Communication with the main controller
CN7	Cascade connection (connection with downstream remote I/O module)
Input indicators	Turns ON in green at H input or turns off at L input for CN1 to CN4 inputs.
Output indicators	Turns ON in green at output (GC-R48 only).
Power LED	Turns ON in green while power is supplied.
Error LED	Blinks in red when a remote I/O module error occurs.

■ Connection method

1 Connect the main controller and remote I/O modules.

Attach the connector cable (tightening torque: 0.24 N·m).



2 Connect an input device to a remote I/O module.

Use an M12 connector (tightening torque: 0.4 N·m).

▶ Important

- **Perform tightening at the specified torque to prevent poor connection or accidental release. Note that IP65/67 cannot be fulfilled with a loose connector. If it is difficult to manage the torque, tighten by hand and then re-tighten with a tool such as pliers by 5 to 10 °.**
- **Attach the supplied connector cap to an unused port and then tighten it at the specified torque.**

■ GC-R45 (M12 5 pins) pin functions

The pin function (signal) varies depending on the "connection type". Set the "connection type" for each connector terminal with the GC Configurator. For the setting method, refer to "Input Device Basic Settings" (page 10-6).

Pin number	Connection type							
	PNP 1 input	PNP 2 inputs	1 input *2	1 input + 1 test output*2	2 inputs	2 inputs + 2 test outputs	AUX outputs *3	Power supply only *4
Pin 1	+24 V	+24 V	+24 V	+24 V	+24 V	To1	(+24 V)	+24 V
Pin 2	(IN1)*1	Si1	(IN)*1	(IN)*1	Si1	Si1	Ao0	
Pin 3	0 V	0 V	0 V	0 V	0 V	0 V	0 V	0 V
Pin 4	Si0	Si0	Si0	Si0	Si0	Si0		
Pin 5	(IN2)*1	(IN)*1	+24 V	To0	+24 V	To0		

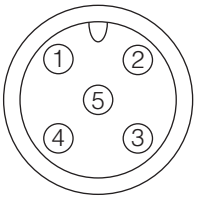
*1 The advanced input can be used depending on the setting.

*2 When selecting "reset switch" or "other switch" for an input device, Pin 2 can be used for the AUX output.

*3 When selecting "AUX output" for an output device, Pin 2 becomes "Ao0".

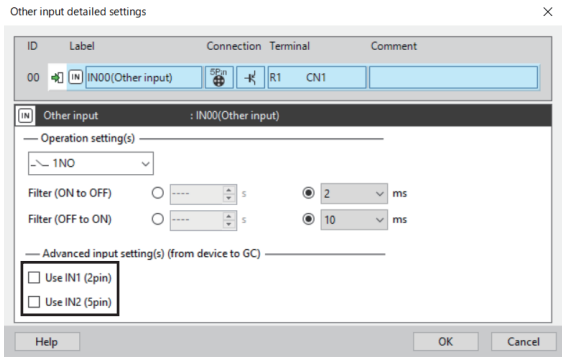
*4 When selecting "power supply" for an input device, Pins 1 and 3 can be used as an external power supply.

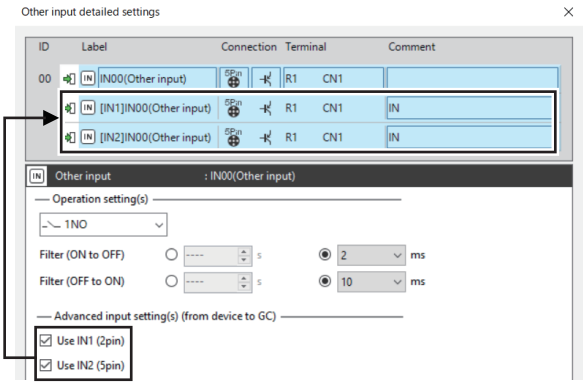
Name	Function
Si0/Si1	Connects a safety input (OSSD, etc.) from a safety input device.
To0/To1	Test output terminal.
(IN)	Connects a AUX-IN (non-safety input) when the advanced input is set.
Ao	Connects an AUX output (non-safety output) when "AUX-OUT" is selected by an output device.
+24 V	24 V supply terminal.
0 V	0 V terminal.



● Advanced input

The advanced input can be added in the detailed settings of the input device.





Connection example for connecting an input device to GC-R45 (M12 5 pins)

Reference

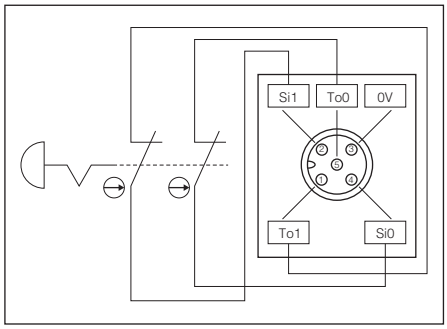
Detailed information for connecting KEYENCE safety sensors to the GC-R45 (M12 5 pins) is provided in the following pages.

"GL-R Series"(page 6-158)
"GL-S Series"(page 6-162)
"GS Series (Non-contact Type)"(page 6-166)
"SZ-V Series"(page 6-179)
"SZ Series"(page 6-183)

● When connecting an emergency stop switch of contact type

(Wiring examples)

Connection type: 2 inputs + 2 test outputs

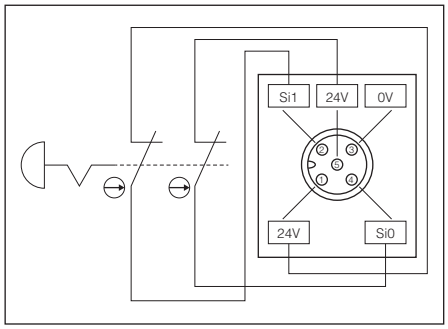


GC Configurator setting example

EMS00(Emerg. stop) 5Pin R1 CN1

Terminal	ID	Label
CN1	00	EMS00(Emerg. stop)
CN2		----
CN3		----
CN4		----

Connection type: 2 inputs



GC Configurator setting example

EMS00(Emerg. stop) 5Pin R1 CN1

Terminal	ID	Label
CN1	00	EMS00(Emerg. stop)
CN2		----
CN3		----
CN4		----

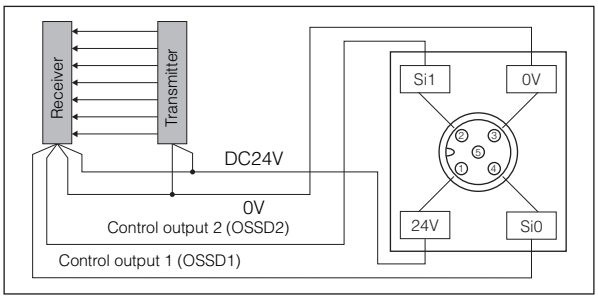
Reference For the wiring diagram by connection type, refer to "Connection Types" (page 6-24).
For the GC Configurator settings, refer to "10-4 Registering Input Devices" (page 10-5).

● When connecting a safety input device of PNP output type

(Wiring examples)

The following shows a wiring example for connecting the PNP output type such as safety light curtain.

Connection type: PNP 2 inputs



GC Configurator setting example

LC00(Light curtain) 5Pin R1 CN1

Terminal	ID	Label
CN1	00	LC00(Light curtain)
CN2		----
CN3		----
CN4		----

Reference For the wiring diagram by connection type, refer to "Connection Types" (page 6-24).
For the GC Configurator settings, refer to "10-4 Registering Input Devices" (page 10-5).

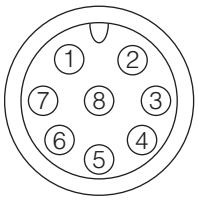
■ GC-R48 (M12 8 pins) pin functions

The pin function (signal) varies depending on the "connection type". Set the "connection type" for each connector terminal with the GC Configurator. For the setting method, refer to "Input Device Basic Settings" (page 10-6).

Pin number	Connection type					
	PNP 1 input	PNP 2 inputs	1 input	1 input + 1 test output	2 inputs	2 inputs + 2 test outputs
Pin 1	(IN2)*1	(IN)*1	(IN2)*1	(IN2)*1	(IN)*1	(IN)*1
Pin 2	+24 V	+24 V	+24 V	+24 V	+24 V	+24 V
Pin 3*2	So (lock control output)	So (lock control output)	So (lock control output)	So (lock control output)	So (lock control output)	So (lock control output)
Pin 4	+24 V	+24 V	+24 V	To0	+24 V	To0
Pin 5	Si0	Si0	Si0	Si0	Si0	Si0
Pin 6	(IN1)*1	Si1	(IN1)*1	(IN1)*1	Si1	Si1
Pin 7	0 V	0 V	0 V	0 V	0 V	0 V
Pin 8	+24 V	+24 V	+24 V	+24 V	+24 V	To1

*1 The advanced input can be used depending on the setting.

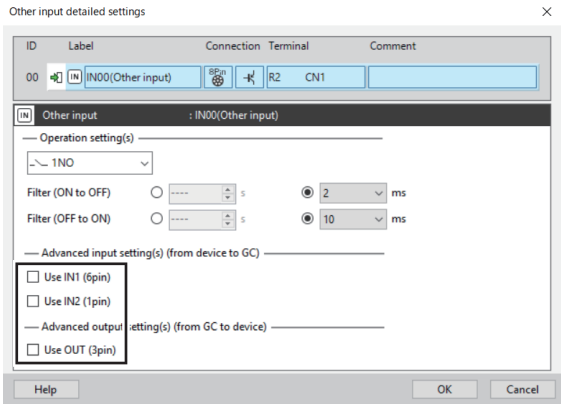
*2 When selecting "other safety switch", "other safety input", "other switch" or "other input" for an input device, Pin 3 can be used for the nonsafety output.

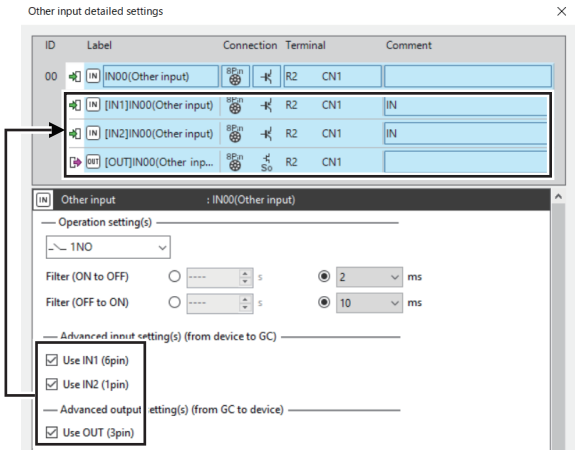


Name	Function
Si0/Si1	Connects a safety input (OSSD, etc.) from a safety input device.
To0/To1	Test output terminal.
(IN)	Connects a AUX-IN (non-safety input) when the advanced input is set.
So (lock control output)	Lock control output for the GS Series (lock type) and guard locking switch.
+24 V	24 V supply terminal.
0 V	0 V terminal.

● Advanced input

The advanced input can be added in the detailed settings of the input device.





Connection example for connecting an input device to GC-R48 (M12 8 pins)

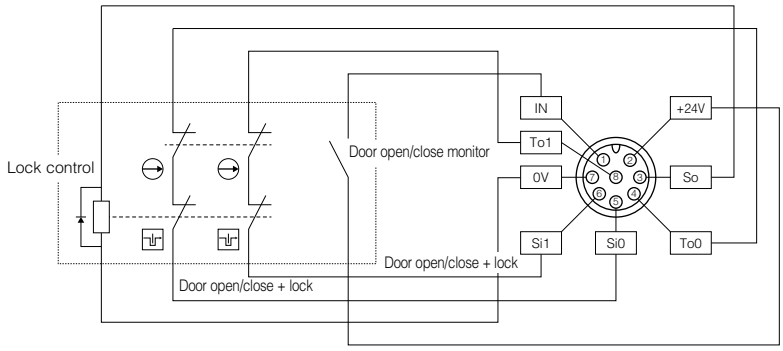
Reference

Detailed information for connecting KEYENCE safety sensors to the GC-R48 (M12 8 pins) is provided in the following pages.

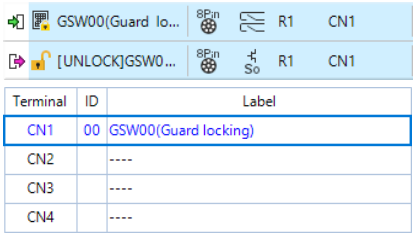
"GS Series (Non-contact Type)"(page 6-166)
"GS Series (Lock Type)"(page 6-170)
"GS-M Series"(page 6-175)

● When connecting a guard locking switch of contact type

Connection type: 2 inputs + 2 test outputs

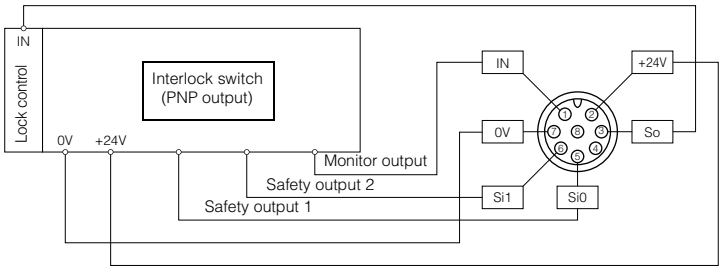


GC Configurator setting example

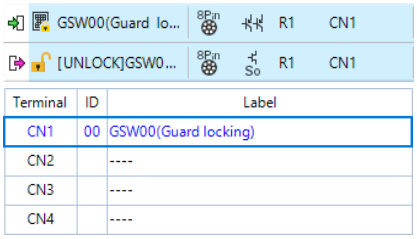


● When connecting a guard locking switch of PNP output type

Connection type: PNP 2 inputs



GC Configurator setting example



Reference

For the wiring diagram by connection type, refer to "Connection Types" (page 6-24).
For the GC Configurator settings, refer to "10-4 Registering Input Devices" (page 10-5).

6-4 Connecting Output Devices

This section describes how to connect an output device to the GC Series.

Output Types

The GC Series provides the following outputs. Select an output in consideration of the input specifications and supporting safety standards of the device to be connected.

Output type		Corresponding output block	Connection type	Number of outputs	Number of outputs of each unit					
					GC-1000	GC-1000R	GC-S84	GC-S1R	GC-A16	GC-R45
Safety output	PNP output	S-OUT	Safety output x 1	1	6	4	4			
			Safety output x 2	2						
		S-OUT EDM enabled	Safety output x 1	1						
			Safety output x 2	2						
	Relay output	S-OUT (relay output)	Relay output	1 (3a)		1 (3a)		1 (3a)		
		S-OUT (relay output) EDM enabled	Relay output	1 (3a)						
Non-safety output	PNP output	AUX-OUT	AUX outputs	1	4	4			16	4

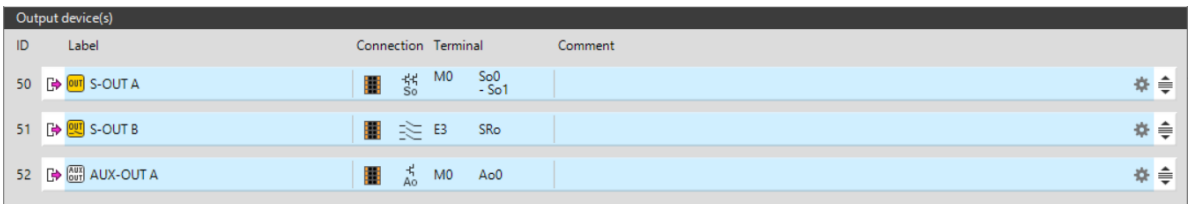
Output blocks such as "S-OUT" arranged in a program are assigned to these outputs. When an output block is either "S-OUT" or "S-OUT EDM enabled", select a connection type from "Safety output x 1" and "Safety output x 2".

Point

The connection type for the output block "S-OUT (relay output)" or "S-OUT (relay output) EDM enabled" is a 3a relay output. This cannot be changed.

Reference

Select a connection destination or connection type in registering an output device with the GC Configurator.
For details, refer to "10-5 Registering Output Devices" (page 10-12).



Connection Destinations

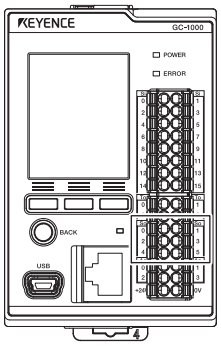
Safety outputs (S-OUT)

Connection to the connector terminal block of the main controller "GC-1000"/"GC-1000R" and expansion unit "GC-S84".

Model	Output points
GC-1000	Safety output 6 points*
GC-1000R	Safety output 4 points*
GC-S84	Safety output 4 points*

* These can also be used as outputs to non-safety devices.

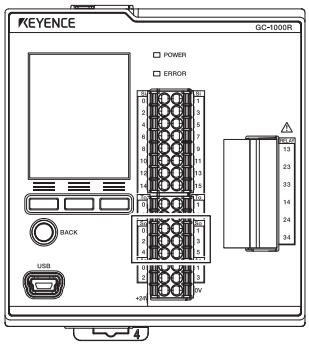
GC-1000



Signal

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	Si14	Si15	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	So4	So5	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		

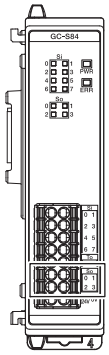
GC-1000R



Signal

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	N.C.	N.C.	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	N.C.	N.C.	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		

GC-S84



Signal

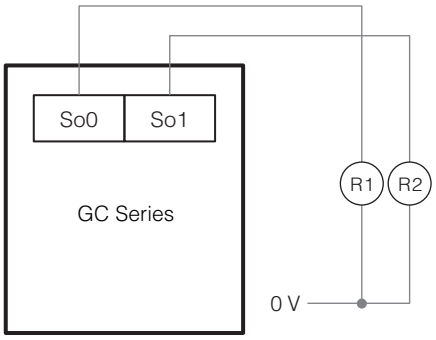
0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
0	To0	To1	1	Test outputs To
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
	+24V	0V		

Safety output specifications

Item	Specification
Output type	PNP transistor output (DC-13, Type 0.5, protected outputs)
Maximum load current	500 mA
Residual voltage (during ON)	Max. 2.0 V
Leakage current (during OFF)	Max. 0.5 mA
Maximum capacitive load	0.5 µF (with load resistance of 100 Ω)
Load wiring resistance	Max. 2.5 Ω
Protection circuit	Overcurrent protection circuit, reverse connection protection circuit
Maximum cable length	Max. 30 m

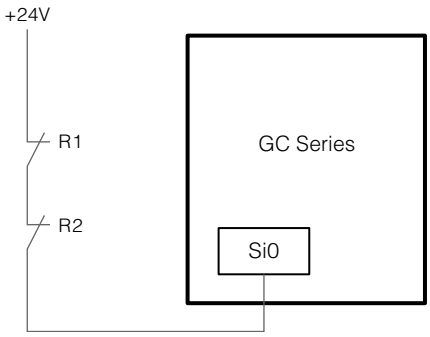
Connection example for connecting a safety device to the terminal block

(Wiring examples)



R1, R2: External devices

Reference Wiring example for using the EDM input (1 input)



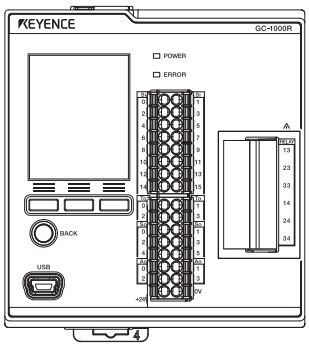
R1, R2: External devices

Safety outputs S-OUT (relay output)

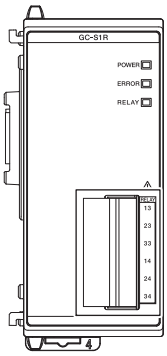
Connection to the relay terminal block of the main controller "GC-1000R" and expansion unit "GC-S1R".

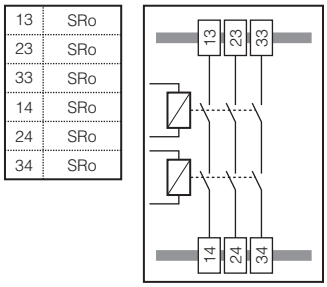
Model	Output points
GC-1000R	Safety output 1 point (3a)
GC-S1R	Safety output 1 point (3a)

GC-1000R



GC-S1R





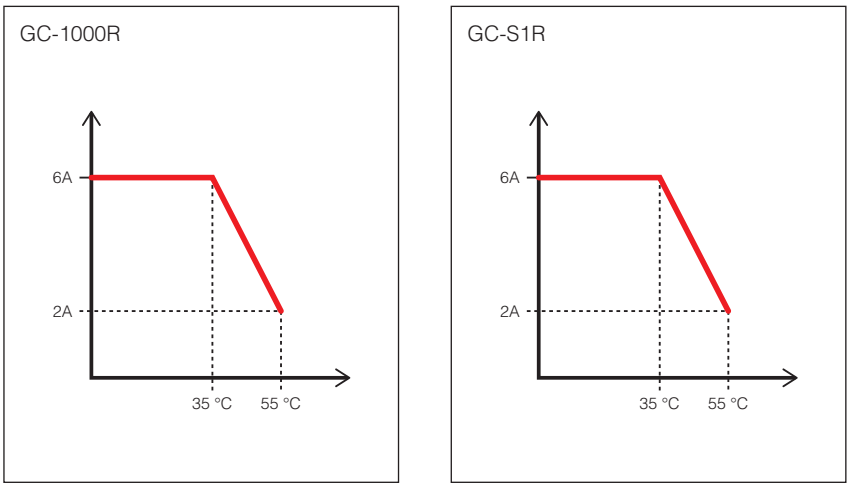
Safety output specifications (relay output)

Output type	Relay (3a) (Externally-protected outputs)*1
Rated load (resistance load)	250 VAC 6 A / 30 VDC 6 A*2
Rated load (inductive load)	240 VAC 2 A (AC-15) / 24 VDC 1 A (DC-13)
Relay output mechanical life	Resistance load (250 VAC 6 A/30 VDC 6 A): Min. 100,000 times
	Resistance load (250 VAC 1 A/30 VDC 1 A): Min. 500,000 times
	Inductive load (AC-15: 240 VAC 2 A): Min. 100,000 times (cosø = 0.3)
	Inductive load (DC-13: 24 VDC 1 A): Min. 100,000 times (L/R = 48 ms)
Maximum cable length	Max. 100 m
B10d	With rated load: 400,000 With low load: 2,000,000

*1 To comply with the requirements of IEC61131-2, connect 10A fast blow fuse (IEC 60127) in series to each contact.

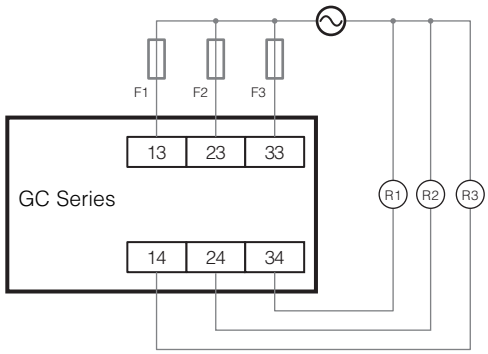
*2 Check the derating characteristics described later.

Derating characteristics



Connection example for connecting a safety device to the relay output terminal block

(Wiring examples)



R1, R2, R3: External devices
F1, F2, F3: Fuses 10A Fast blow fuse (IEC 60217)

AUX outputs (non-safety output)

For the AUX output, either "terminal block" or "remote I/O module (M12 5 pins)" can be selected as a connection destination.

■ Terminal blocks

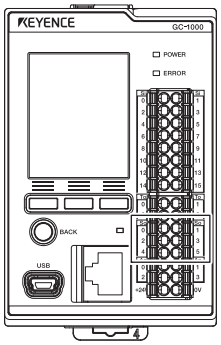
Connection to the connector terminal block of the main controller "GC-1000"/"GC-1000R" and expansion unit "GC-A16".

Model	Output points
GC-1000	AUX output 4 points
GC-1000R	AUX output 4 points
GC-A16	AUX output 16 points

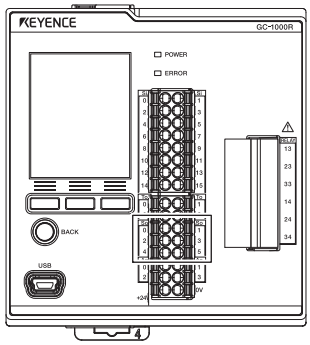
Reference

The safety output terminals of "GC-1000", "GC-1000R" and "GC-S84" can be used as outputs to non-safety devices, as well as for the purpose of safety.

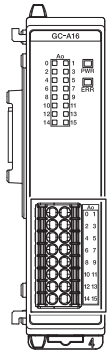
GC-1000



GC-1000R



GC-A16



Signal

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	Si14	Si15	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	So4	So5	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		

Signal

0	Si0	Si1	1	Safety inputs Si
2	Si2	Si3	3	
4	Si4	Si5	5	
6	Si6	Si7	7	
8	Si8	Si9	9	
10	Si10	Si11	11	
12	Si12	Si13	13	
14	N.C.	N.C.	15	
0	To0	To1	1	Test outputs To
2	To2	To3	3	
0	So0	So1	1	Safety outputs So
2	So2	So3	3	
4	N.C.	N.C.	5	
0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
	+24V	0V		

Signal

0	Ao0	Ao1	1	AUX outputs Ao
2	Ao2	Ao3	3	
4	Ao4	Ao5	5	
6	Ao6	Ao7	7	
8	Ao8	Ao9	9	
10	Ao10	Ao11	11	
12	Ao12	Ao13	13	
14	Ao14	Ao15	15	

AUX output specifications

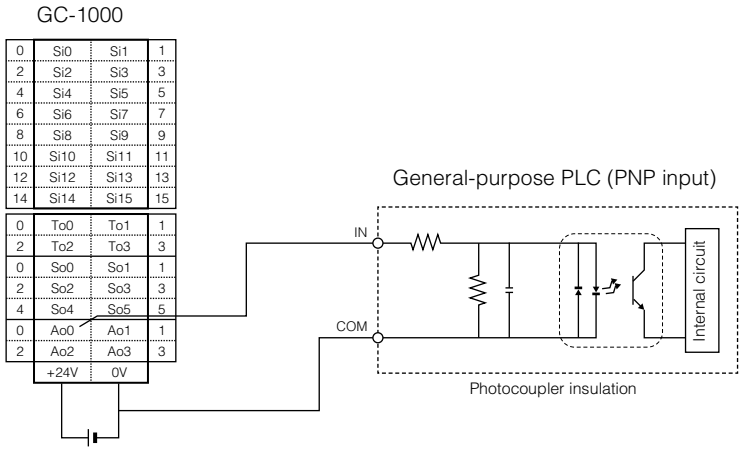
Item	Specification	
	GC-1000/1000R	GC-A16
Output type	Transistor output (PNP/NPN selectable by wiring) PNP output (DC-13, Type 0.1, protected outputs)*1 *2	PNP transistor output (DC-13, Type 0.1, protected outputs)*1
Maximum load current	PNP: 100 mA, NPN: 20 mA	100 mA
Residual voltage (during ON)	Max. 2.0 V	
Leakage current (during OFF)	Max. 0.5 mA	
Protection circuit	Overcurrent protection circuit, reverse connection protection circuit	
Maximum cable length	Max. 30 m	

*1 Paragraph 6.4.6 Temporary overload of IEC 61131-2 supports up to 1.2 times the maximum load current.

*2 The AUX outputs (NPN output) and test outputs do not comply with paragraph 6.4.6 of IEC 61131-2.

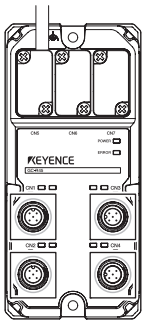
Connection example for connecting an external device to the AUX output terminal block

(Wiring examples)

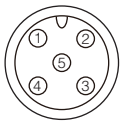


■ Remote I/O modules (M12 5 pins)

Connection to the remote I/O module "GC-R45" (M12 5 pins).



Pin number	Function
Pin 1	(+24 V)
Pin 2	Ao
Pin 3	0 V
Pin 4	
Pin 5	



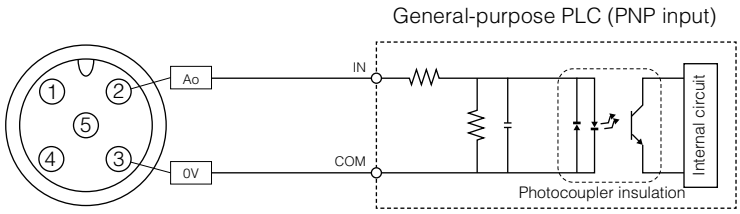
AUX output specifications

Item	Specification
Output type	PNP transistor output (DC-13, Type 0.1, protected outputs)*1
Maximum load current	100 mA
Residual voltage (during ON)	Max. 2.0 V
Leakage current (during OFF)	Max. 0.5 mA
Protection circuit	Overcurrent protection circuit
Maximum cable length	Max. 30 m

*1 Paragraph 6.4.6 Temporary overload of IEC 61131-2 supports up to 1.2 times the maximum load current.

Connection example for connecting an external device to the AUX output terminal block

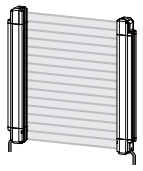
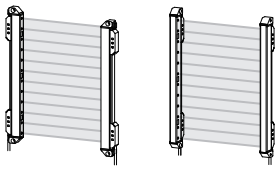
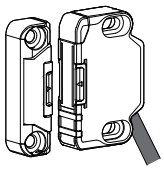
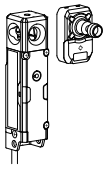
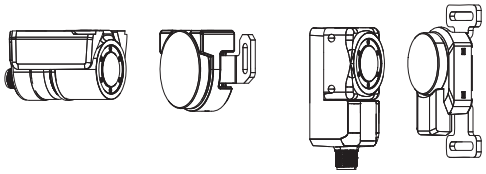
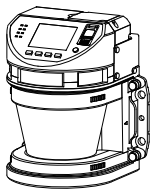
(Wiring examples)



6-5 Connecting KEYENCE Safety Sensors

This section describes the settings and wiring for the case of connecting KEYENCE safety sensors.

KEYENCE Safety Sensors

Safety Light Curtains	GL-R Series	
	GL-S Series	
Safety Interlock Switches	GS Series (Non-contact)	
	GS Series (Lock)	
	GS-M Series	
Safety Laser Scanners	SZ-V Series	
	SZ Series	

Point

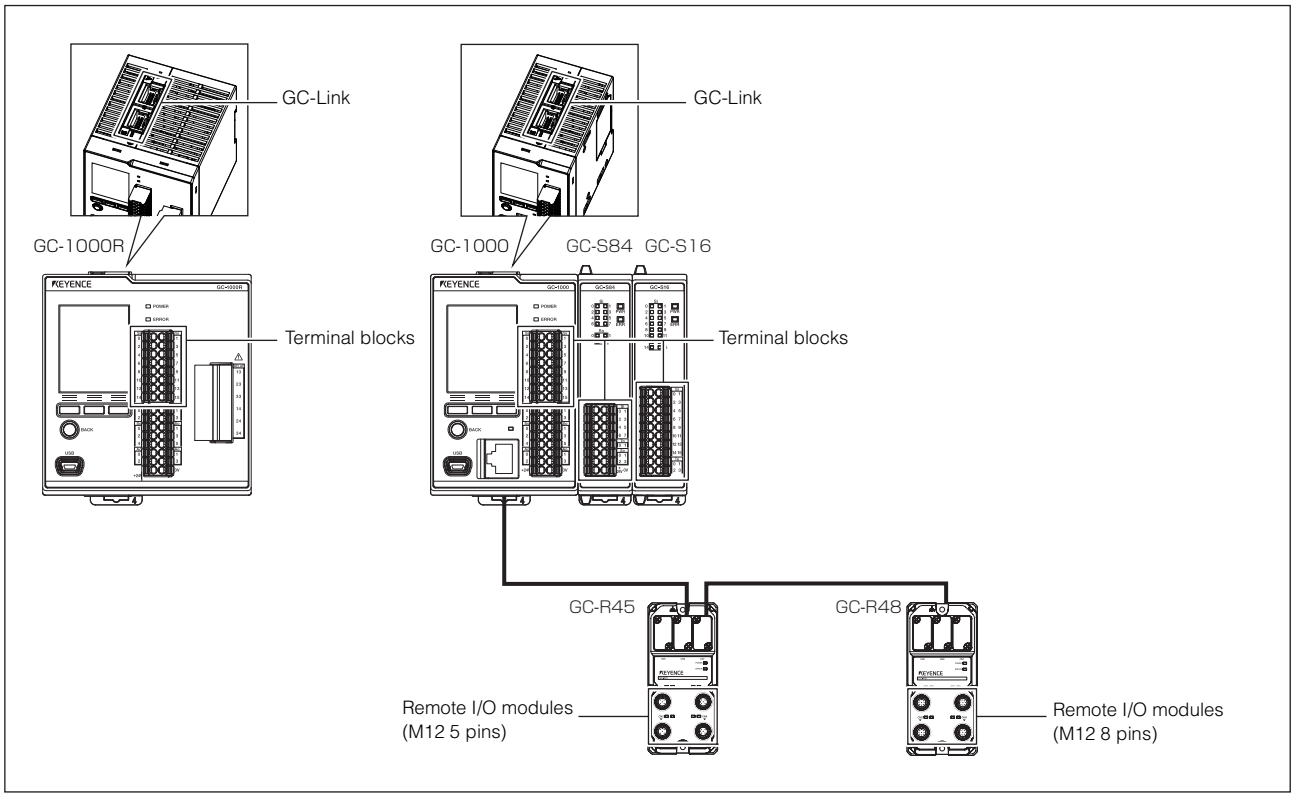
When using KEYENCE safety sensors, the usable functions may vary by the connection destination of the GC Series. Review the function(s) you will use before selecting a connection destination.

"Destinations and Compatible KEYENCE Safety Sensors" (page 6-49)

Connection Destinations

When connecting a KEYENCE safety sensor to the GC Series, select a connection destination from the following options.

- GC-Link
- Terminal blocks
- Remote I/O modules GC-R45 (M12 5 pins)
- Remote I/O modules GC-R48 (M12 8 pins)



Point

The GC-1000R cannot be connected to expansion units or remote I/O modules.

Destinations and Compatible KEYENCE Safety Sensors

The compatible destinations vary by the KEYENCE safety sensor series.

	Series	GC-Link	Terminal blocks	Remote I/O modules	
				M12 5 pins	M12 8 pins
Safety Light Curtains	GL-R Series	O	O	O	-
	GL-S Series	O	O	O	-
Safety Interlock Switches	GS Series (Non-contact)	O	O	O	O
	GS Series (Lock) / GS-M Series	O	O	-	O
Safety Laser Scanners	SZ-V Series	O	O	O	-
	SZ Series	O	O	O	-

The available safety sensor functions vary by the connection destination.
Review the function(s) you will use before selecting a connection destination.

Step 1. Review the available connection destinations for the function you will use.

↓

Step 2. Determine the connection destination.

For the functions that can be used by KEYENCE safety sensors, refer to the following pages.

"GL-R Series"(page 6-50)
"GL-S Series"(page 6-52)
"GS Series (Non-contact Type)"(page 6-54)
"GS Series (Lock Type)"(page 6-56)
"GS-M Series"(page 6-58)
"SZ-V Series"(page 6-60)
"SZ Series"(page 6-63)

Safety Light Curtain GL-R Series

Step 1. Review the available connection destinations for the function you will use.

<Function details by connection destination>	Connection destination		
	GC-Link	Terminal blocks	Remote I/O modules M12 5 pins
GC Series functions			
GL-R received-light-amount monitoring with the GC main controller LCD	O	x	x
GL-R received-light-amount monitoring with the GC Configurator	O	x	x
Received-light-amount decrease alert acquisition (threshold setting available)	O	x	x
GL-R OSSD OFF history acquisition	O	x	x
GL-R error history acquisition	O	x	x
GL-R Series functions			
GL-R wiring system	Wire synchronization	Optical synchronization/ One-line/Wire synchronization	Optical synchronization/ One-line
OSSD output	O	Available functions vary by wiring system. Refer to <GL-R function details by wiring system>(page 6-51)	O
AUX outputs	O*1		O*1
Error output	O*2		x
Muting	O*1		O*1
Partial muting function*3	x		x
Muting bank function*3	x		x
Muted condition output*3	O*1		O*1
Muting lamp output	x		x
Override function	O*1		O*1
Interlock function*3	O*1		O*1
Interlock-reset-ready output*3	O*1		O*1
EDM function	O*1	O*1	O*1
Wait input	x	Usable functions vary by wiring system. Refer to <GL-R function details by wiring system>(page 6-51)	x
Alert output*3	O*4		x
Clear/Block output*3	x		x
Reset input (error clear)	x		x
Reduced resolution function*3	PC		PC
Fixed blanking function*3	PC		PC
Channel configuration (light interference prevention function)	O*5		O
Center indicator configuration	x		x
Monitoring function	O	PC	PC

"PC" indicates that the function can be configured with the GL-R configuration software; "Safety Device Configurator".

*1 These functions can be supported with the GC Series program using function blocks.

*2 An error number can be reviewed via an industrial network.

*3 These functions cannot be used on the GL-RHG/GL-RFG. Additionally, you cannot change the settings using the configuration software on the GL-RHG/GL-RFG.

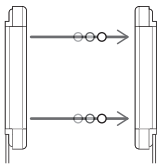
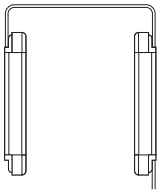
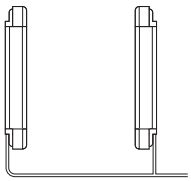
*4 A threshold for received-light-amount can be set on the GC Series main controller to perform the alert output.

*5 The light interference prevention function is enabled automatically, and thus channel configuration is not necessary.

Reference

The available functions of the GL-R Series vary by the wiring system and cable used.
When connecting the GL-R Series to the "terminal block", refer to the following <GL-R function details by wiring system>(page 6-51).

<GL-R function details by wiring system>

Wiring system		Optical synchronization system	One-line system	Wire synchronization system
Wiring image		Transmitter Receiver 	Transmitter Receiver 	Transmitter Receiver 
Applicable cables	Transmitter	5-core cable	Connection cable	7-core cable
	Receiver	5-core cable 11-core cable	5-core cable 11-core cable	7-core cable 11-core cable

Wiring system		Optical synchronization		One-line system		Wire synchronization			
Cable combination	Transmitter cable	5-core		Connected		7-core		11-core	
	Receiver cable	5-core	11-core	5-core	11-core	7-core	11-core	7-core	11-core
OSSD output		O	O	O	O	O	O	O	O
AUX outputs		x	O	x	O	PC	O	PC	O
Error output		x	PC	x	PC	O	O	O	O
Muting		x	PC	x	PC	x	PC	O	O
Partial muting function*1		x	PC	x	PC	x	PC	PC	PC
Muting bank function*1		x	x	x	x	x	x	x	PC
Muted condition output*1		x	PC	x	PC	x	PC	PC	PC
Muting lamp output		x	x	x	x	x	x	O	O
Override function		x	x	x	x	x	x	O	O
Interlock function*1		x	O	x	O	x	O	x	O
Interlock-reset-ready output*1		x	PC	x	PC	x	PC	x	PC
EDM function		x	O	x	O	x	O	x	O
Wait input		x	x	x	x	O	O	O	O
Alert output*1		x	PC	x	PC	PC	PC	PC	PC
Clear/Block output*1		x	PC	x	PC	PC	PC	PC	PC
Reset input (error clear)		x	O	x	O	x	O	x	O
Reduced resolution function*1		O	O	O	O	O	O	O	O
Fixed blanking function*1		PC	PC	PC	PC	PC	PC	PC	PC
Channel configuration (light interference prevention function)		O	O	O	O	O	O	O	O
Center indicator configuration		O	O	O	O	O	O	O	O

*1 These functions cannot be used on the GL-RHG. Additionally, you cannot change the settings using the configuration software on the GL-RHG.

Step 2. Determine the connection destination.

After you determine the connection destination, perform the wiring and configure the settings with the GC Configurator. For the wiring of each connection destination and the configuration of the settings with the GC Configurator, refer to the following pages.

Connecting to GC-Link(page 6-65)
Connecting to Terminal Blocks(page 6-111)
Connecting to Remote I/O Modules(page 6-158)

Safety Light Curtain GL-S Series

Step 1. Review the available connection destinations for the function you will use.

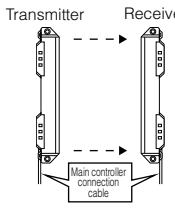
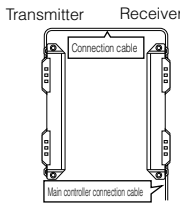
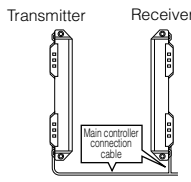
		Connection destination		
		GC-Link	Terminal blocks	Remote I/O modules M12 5 pins
GC Series functions				
GL-S center indicator control		O	x	x
GL-S Series functions				
GL-S wiring system		Wire synchronization	Optical synchronization/ One-line/Wire synchronization	Optical synchronization/ One-line
OSSD output		O	*2	O
Muting		O*1		O*1
Interlock function		O*1		O*1
EDM function		O*1	O*1	O*1
Channel configuration (light interference prevention function)		O	*2	O
Center indicator control	Fixed mode	O		O*3
	External control mode	O*4		x

*1 These functions can be supported with the GC Series program using function blocks.
*2 The available functions vary by the wiring system. Refer to <GL-S function details by wiring system>(page 6-52).
*3 Receivers only. Transmitters turn OFF.
*4 The center indicator control function can be enabled by using the indicator control output block.

Reference

The available functions of the GL-S Series vary by the wiring system and cable used.
When connecting the GL-S Series to the "terminal block", refer to the following <GL-S function details by wiring system>(page 6-52).

<GL-S function details by wiring system>

Wiring system		Optical synchronization	One-line system	Wire synchronization
				
OSSD output		O	O	O
Muting		x	x	O*1
Interlock function		x	x	O
EDM function		x	x	O
Channel configuration (light interference prevention function)		O	O	O
Center indicator control	Fixed mode	x*3	O	O
	External control mode	x	O	O*2

*1 While using the muting function, the interlock and EDM functions cannot be used.
*2 When using the center indicator in the external control mode, the muting, interlock and EDM functions cannot be used.
*3 Only receivers turn ON in the "fixed mode".

Step 2. Determine the connection destination.

After you determine the connection destination, perform the wiring and settings configuration with the GC Configurator. For the wiring of each connection destination and the configuration of the settings with the GC Configurator, refer to the following pages.

Connecting to GC-Link(page 6-74)
Connecting to Terminal Blocks(page 6-117)
Connecting to Remote I/O Modules(page 6-162)

Safety Interlock Switch GS Series (Non-contact)

Compatible destinations by model

Type	Model	Cable shape	GC-Link	Terminal blocks	Remote I/O modules	
					M12 5 pins	M12 8 pins
Simple function type	GS-10PC	M12 connector	--	O	O*2	--
Standard types	GS-11PC	M12 connector	O*1	O	--	O*2
	GS-11P5/11P10	Cable draw-out	--	O	--	--
Advanced function types	GS-13PC	M12 connector	--	O	--	--
	GS-13P5	Cable draw-out	--	O	--	--

*1 GS-Y11 and GS-Y12 are required.

*2 Cascade connection using a Y-shaped connector is not supported.

Step 1. Review the available connection destinations for the function you will use.

	GC-Link	Terminal blocks	Remote I/O modules	
			M12 5 pins	M12 8 pins
Cascade connection				
Using Y-shaped connector*1	O (16 units*2)	*3	x	x
Not using Y-shaped connector*1	--		x	x
GC Series functions				
GS indicator mode setting	O	x	x	x
Coding level high operation check	O	x	x	x
Open/close state check in cascade connection	O	x	x	x
GS indicator control	O	x	x	x
GS Series functions				
OSSD	O	O	O	O
AUX outputs	O	*3	O	O
Interlock	O*4		O*4	O*4
EDM	O*4	O	O*4	O*4
Coding level switching	O*5	O	O*5	O*5

*1 The available Y-shaped connector and end connector vary by the connection method.

Connection destination	Compatible model	Y-shaped connector	End connector
GC-Link	GS-11PC	GS-Y11	GS-Y12
Terminal blocks	GS-11PC	GS-Y01	GS-Y02

*2 Up to 16 units can be cascade-connected with the coexistence of non-contact and lock types (Max. four units for the lock type).

*3 Depends on the GS Series type/model. Refer to <Function details by type>(page 6-55)(page 6-57).

*4 These functions can be supported with the GC Series program using function blocks.

*5 Coding level switching cannot be executed while the GC Series is connected. Execute coding level switching on the GS alone and then connect to the GC Series.

Reference

The available functions of the GS Series vary by the type used.
When connecting the GS Series to the "terminal block", refer to the following <Function details by type>(page 6-55).

<Function details by type>

	Simple function type	Standard types	Advanced function types
OSSD	O	O	O
AUX outputs	1	1	1
Cascade connection (Using Y-shaped connector)	x	O (4 units*1 *2)	x
Cascade connection (Not using Y-shaped connector)	x	O	x
Open/close state check in cascade connection	O*3	O*3	O*3
Interlock	x	x	O
EDM	x	x	O
Coding level switching	O	O	O

*1 Only the M12 connector type can be cascade-connected.

*2 When the AUX outputs are not acquired separately, up to ten units can be connected.

*3 The check can be performed using the AUX output.

Step 2. Determine the connection destination.

After you determine the connection destination, perform the wiring and settings configuration with the GC Configurator. For the wiring of each connection destination and the configuration of the settings with the GC Configurator, refer to the following pages.

Connecting to GC-Link(page 6-79)

Connecting to Terminal Blocks(page 6-122)

Connecting to Remote I/O Modules(page 6-166)

Safety Interlock Switch GS Series (Lock)

Compatible destinations by model

Type		Model	Cable shape	GC-Link	Terminal blocks	Remote I/O modules	
						M12 5 pins	M12 8 pins
Power-to-release	Standard types	GS-51PC	M12 connector	O	O	--	O
		GS-51P5/P10	Cable draw-out	--	O	--	--
	Advanced function type	GS-53PC	M12 connector	--	O	--	--
Power-to-lock	Standard types	GS-71PC	M12 connector	O	O	--	O
		GS-71P5/P10	Cable draw-out	--	O	--	--
	Advanced function type	GS-73PC	M12 connector	--	O	--	--

Step 1. Review the available connection destinations for the function you will use.

	GC-Link	Terminal blocks	Remote I/O modules
			M12 8 pins
Cascade connection			
Using Y-shaped connector	O (4 units[*1] [*2])	x	x
Not using Y-shaped connector	--	[*3]	x
GC Series functions			
GS indicator mode setting	O	x	x
OSSD operation switching (set via the GC Configurator)	O	x	x
Coding level high operation check	O	x	x
Open/close state check in cascade connection	O	x	x
Lock state check in cascade connection	O	x	x
GS indicator control	O	x	x
GS Series functions			
OSSD	O	O	O
OSSD operation switching	O	[*3]	x
AUX outputs	O		O
Interlock	O[*4]		O[*4]
EDM	O[*4]	O[*4]	O[*4]
Coding level switching	O[*5]	[*3]	O[*5]
Lock control input	O[*6]		O
Auxiliary release	O		O
Escape release[*7]	O[*9]		O[*9]
Dedicated handle[*8]	O		O

*1 When establishing a cascade connection with the GC-Link, use the GS-Y11 (Y-shaped connector) and the GS-Y12 (end connector).

*2 Up to 16 units can be cascade-connected with the coexistence of non-contact and lock types (Max. four units for the lock type).

*3 Depends on the GS Series type/model. Refer to <Function details by type>(page 6-55)(page 6-57).

*4 These functions can be supported with the GC Series program using function blocks.

*5 Coding level switching cannot be executed while the GC Series is connected. Execute coding level switching on the GS alone and then connect to the GC Series.
*6 Only the power-to-release type has the guard locking function supporting Category 4/PLe.
*7 When using the optional escape release attachment (GS-H02)
*8 When using the optional dedicated handle (GS-H01)
*9 The M12 connector type (GS-51PC/71PC) only.

<Function details by type>

	Power-to-release		Power-to-lock	
	Standard types	**Advanced function types**	**Standard types**	**Advanced function types**
OSSD	○	○	○	○
OSSD operation switching	x	x	x	○
AUX outputs	1	2	1	2*1
Cascade connection (Using Y-shaped connector)	x	x	x	x
Cascade connection (Not using Y-shaped connector)	○	○	○	○
Open/close state check in cascade connection	○*2	○*2	○*2	○*2
lock state check in cascade connection	○*2	○*2	○*2	○*2
Interlock	x	○	x	○
EDM	x	○	x	○
Coding level switching	○	○	○	○
Lock control input	1	2	1	1
Auxiliary release	○	○	○	○
Escape release*3	○*5	○	○*5	○
Dedicated handle*4	○	○	○	○

*1 The number of AUX outputs is 1 when the OSSD operation is in open/close link mode.
*2 The checks can be performed using the AUX output.
*3 When using the optional escape release attachment (GS-H02)
*4 When using the optional dedicated handle (GS-H01)
*5 The M12 connector type only.

Step 2. Determine the connection destination.

After you determine the connection destination, perform the wiring and settings configuration with the GC Configurator.

For the wiring of each connection destination and the configuration of the settings with the GC Configurator, refer to the following pages.

Connecting to GC-Link(page 6-79)
Connecting to Terminal Blocks(page 6-127)
Connecting to Remote I/O Modules(page 6-170)

Safety Interlock Switch GS-M Series

Compatible destinations by model

Type		Model	GC-Link	Terminal blocks	Remote I/O modules	
					M12 5 pins	M12 8 pins
Terminal		GS-M50P	--	O	--	--
M12 connector	Standard types	GS-M51P/M91P/ ML51P	O	O	--	O
	Advanced function type	GS-M53P/M93P/ ML53P	--	O	--	--

Step 1. Review the available connection destinations for the function you will use.

	GC-Link	Terminal blocks	Remote I/O modules
			M12 8 pins
Cascade connection			
Using Y-shaped connector	O (4 units[*1 *2])	x	x
Not using Y-shaped connector	--	O	x
GC Series functions			
GS indicator mode setting	O	x	x
OSSD operation switching (set via the GC Configurator)	O	x	x
Coding level high operation check	O	x	x
Open/close state check in cascade connection	O	x	x
Lock state check in cascade connection	O	x	x
GS indicator control	O	x	x
Set higher holding force when unlocked	O	x	x
GS-M Series functions			
OSSD	O	O	O
OSSD operation switching	O	O	x
AUX outputs	O	[*3]	O
Interlock	O[*4]		O[*4]
EDM	O[*4]	O[*4]	O[*4]
Coding level switching to “High”	O	O	O
Lock control input	O	O	O

*1 When establishing a cascade connection with the GC-Link, use the GS-Y11 (Y-shaped connector) and the GS-Y12 (end connector).

*2 Up to 16 units can be cascade-connected with the coexistence of GS(Non-contact) and GS(Lock) (Max. four units for the total of GS(Lock) and GS-M).

*3 Depends on the GS-M Series type. Refer to <Function details by type>(page 6-59).

*4 These functions can be supported with the GC Series program using function blocks.

<Function details by type>

	Terminal	M12 connector	
		Standard types	Advanced function types
OSSD	O	O	O
OSSD operation switching	O	O	O
AUX outputs	1*1	1*1	2
Cascade connection (Not using Y-shaped connector)	O	O	O
Open/close state check in cascade connection	O	O	O
Lock state check in cascade connection	x	x	O
Interlock	x	x	O
EDM	x	x	O
Coding level switching to “High”	O	O	O
Lock control input	O	O	O

*1 When the OSSD operation is in open/close link mode, the AUX cannot be used.

Step 2. Determine the connection destination.

After you determine the connection destination, perform the wiring and settings configuration with the GC Configurator.

For the wiring of each connection destination and the configuration of the settings with the GC Configurator, refer to the following pages.

Connecting to GC-Link(page 6-79)
Connecting to Terminal Blocks(page 6-133)
Connecting to Remote I/O Modules(page 6-175)

Safety Laser Scanner SZ-V Series

Compatible destinations by model

Type	Model	GC-Link*		Terminal blocks	Remote I/O modules	
		Use 1 port (simple connection)	Use 2 ports (advanced connection)		M12 5 pins	M12 8 pins
Multi-function type	SZ-V04(X)	O	O	O	O	--
Multi-bank type	SZ-V32(X)	--	O	O	--	--
Network type	SZ-V32N(X)	--	O	O	O	--

* The available functions vary by the connection method.

Step 1. Review the available connection destinations for the function you will use.

<SZ-V04(X)>

		GC-Link		Terminal blocks	Remote I/O module M12 5 pins
		Use 1 port (simple connection)	Use 2 ports (advanced connection)		
SZ-V04 functions					
Protection zone		1	2	2	1
Warning zone		1*1	2	2	1*1
Minimum detectable object size setting		ø20 to 150 mm			
Camera		O*2			
Interlock function		O*3	O*3	O	O*3
EDM function		O*3	O*3	O*3	O*3
Bank switching function	Maximum number of banks	1	4*4 *5	4	1
	Switching through wiring input	x	O*3	O	x
	Switching through encoder input	x	x	x	x
Multi-OSSD		x	O	O	x
Muting	Muting for all zones	O*3	O*3	O	O*3
	Muting for specified zone	x	x	O	x
Reference points monitoring		O			
AUX outputs		1	2	6	1
State information output		x	O	O	x
Detection history		O			
Ethernet communications		x			
Scanner head series connection		Up to 3 units			x

*1 Imported to the GC Series using the AUX output of SZ-V.
Two warning zones can be set with the SZ-V, however, the GC Series can only acquire either the warning zone (A) or warning zone (B) detection output.

*2 Only when using the camera type head

*3 These functions can be supported with the GC Series program using function blocks.

*4 The maximum number of banks is two when the multi-OSSD function is not used.

*5 The bank switching method of the SZ-V is set to "Binary" (excluding the case of using the "independent bank switching" function).

<SZ-V32(X)>

		GC-Link Use 2 ports (advanced connection)	Terminal blocks	Remote I/O module M12 5 pins
SZ-V32 functions				
Protection zone		1	1	1
Warning zone		2	2	1*1
Minimum detectable object size setting		ø20 to 150 mm		
Camera		O*2		
Interlock function		O*3	O	O*3
EDM function		O*3	O*3	O*3
Bank switching function	Maximum number of banks	4*4	32	1
	Switching through wiring input	O*3	O	x
	Switching through encoder input	x	x	x
Multi-OSSD		x	x	x
Muting	Muting for all zones	O*3	O	O*3
	Muting for specified zone	x	x	x
Reference points monitoring		O		
AUX outputs		2	4*5	1
State information output		O	O	x
Detection history		O		
Ethernet communications		x		
Scanner head series connection		Up to 3 units		x

*1 Imported to the GC Series using the AUX output of SZ-V.
Two warning zones can be set with the SZ-V, however, the GC Series can only acquire either the warning zone (A) or warning zone (B) detection output.

*2 Only when using the camera type head

*3 These functions can be supported with the GC Series program using function blocks.

*4 The bank switching method of the SZ-V is set to "Binary" (excluding the case of using the "independent bank switching" function).

*5 The number of AUX outputs that you can use varies by the setting.

<SZ-V32N(X)>

		GC-Link Use 2 ports (advanced connection)	Terminal blocks	Remote I/O module M12 5 pins
SZ-V32N functions				
Protection zone		1	1	1
Warning zone		2	2	1*1
Minimum detectable object size setting		ø20 to 150 mm		
Camera		O*2		
Interlock function		O*3	O	O*3
EDM function		O*3	O*3	O*3
Bank switching function	Maximum number of banks	4*4	32	1
	Switching through wiring input	O*3	O	x
	Switching through encoder input	x	O	x
Multi-OSSD		x	x	x
Muting	Muting for all zones	O*3	O	O*3
	Muting for specified zone	x	O	x
Reference points monitoring		O		
AUX outputs		2	4*5	1
State information output		O	O	x
Detection history		O		
Ethernet communications		O*6		
Scanner head series connection		Up to 3 units		x

*1 Imported to the GC Series using the AUX output of SZ-V.
Two warning zones can be set with the SZ-V, however, the GC Series can only acquire either the warning zone (A) or warning zone (B) detection output.

*2 Only when using the camera type head

*3 These functions can be supported with the GC Series program using function blocks.

*4 The bank switching method of the SZ-V is set to "Binary" (excluding the case of using the "independent bank switching" function).

*5 The number of AUX outputs that you can use varies by the setting.

*6 "PROFIsafe" cannot be selected as a communication protocol.

Step 2. Determine the connection destination.

After you determine the connection destination, perform the wiring and settings configuration with the GC Configurator. For the wiring of each connection destination and the configuration of the settings with the GC Configurator, refer to the following pages.

Connecting to GC-Link(page 6-93)
Connecting to Terminal Blocks(page 6-138)
Connecting to Remote I/O Modules(page 6-179)

Safety Laser Scanner SZ Series

Compatible destinations by model

Type	Model	GC-Link	Terminal blocks	Remote I/O modules	
				M12 5 pins	M12 8 pins
Simple function type	SZ-01S	○	○	○	--
Multi-function type	SZ-04M	--	○	--	--
Multi-bank type	SZ-16V	--	○	--	--
Network type	SZ-16D	--	○	--	--

Step 1. Review the available connection destinations for the function you will use.

<SZ-01S>

	GC-Link	Terminal blocks	Remote I/O modules
			M12 5 pins
Protection zone	1		
Warning zone	1		
Minimum detectable object size setting	ø30 to 150 mm		
Interlock function	○*1	○*1	○*1
EDM function	○*1	○*1	○*1
Reference points monitoring	○		
AUX outputs	1	2	1

*1 These functions can be supported with the GC Series program using function blocks.

Step 2. Determine the connection destination.

After you determine the connection destination, perform the wiring and settings configuration with the GC Configurator.

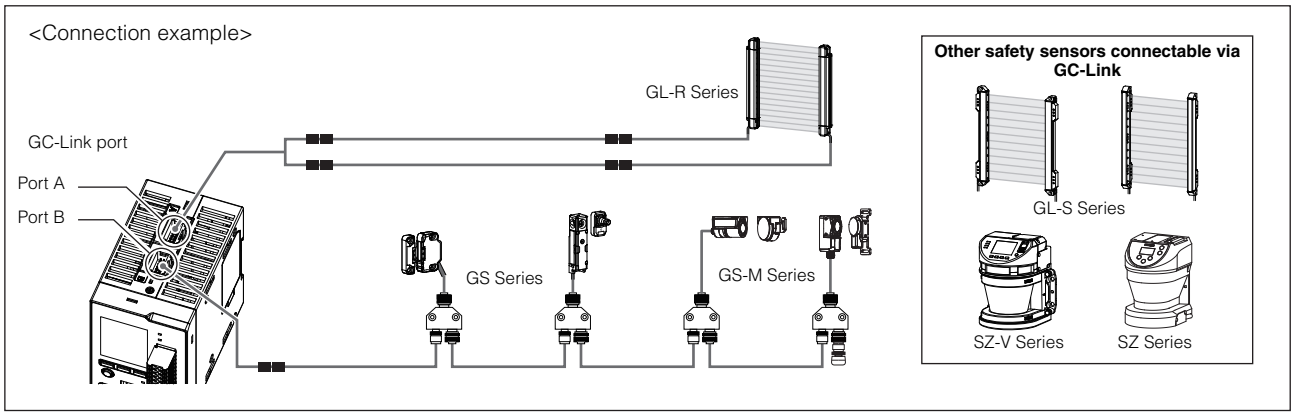
For the wiring of each connection destination and the configuration of the settings with the GC Configurator, refer to the following pages.

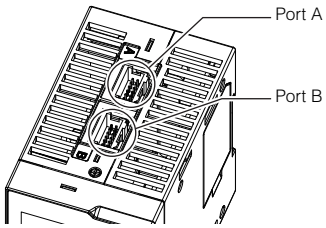
Connecting to GC-Link(page 6-106)
Connecting to Terminal Blocks(page 6-149)
Connecting to Remote I/O Modules(page 6-183)

Connecting to GC-Link

GC-Link connection port

The main controllers "GC-1000" and "GC-1000R" are equipped with two GC-Link connection ports on the top of the main controller.
You can connect KEYENCE safety sensors to the GC-Link Port A and Port B.





Point

- **A single GC-Link port can connect the units of the same series.**
- **The number of units connected to a single port varies by the series.**

For the wiring and settings of each series of KEYENCE safety sensors, refer to the following pages.

"GL-R Series"(page 6-65)
"GL-S Series"(page 6-74)
"GS Series (Non-contact Type)"(page 6-79)
"GS Series (Lock Type)"(page 6-79)
"GS-M Series"(page 6-79)
"SZ-V Series"(page 6-93)
"SZ Series"(page 6-106)

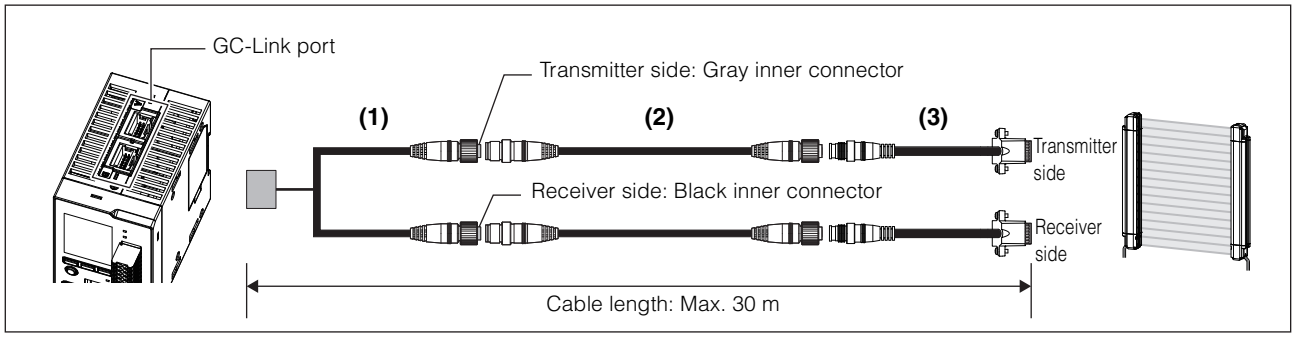
Safety Light Curtain GL-R Series

The following describes how to connect the Safety Light Curtain GL-R Series via the GC-Link and the settings.

Reference For the installation method and usage of the GL-R Series, refer to the following manual.
"Safety Light Curtain GL-R Series User's Manual"

Connection cables

Use the following cables to connect the GL-R Series via the GC-Link.



	Name	Model	Quantity	Length (m)
(1)	GC-Link cable for GL-R (8 pins), 0.3 m	GL-RCG03S	1 set (transmitter/ receiver)	0.3
(2)	Extension cable (8 pins), 7 m	GL-RCC7S	1	7
(3)	Main controller connection cable (for extension), 0.3 m	GL-RPC03PS	1	0.3

■ Cable length

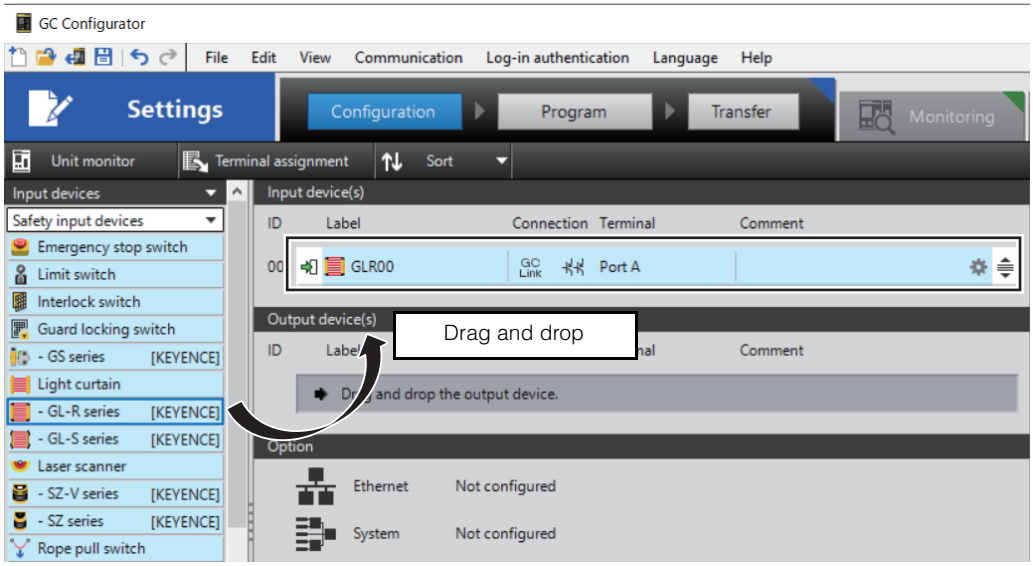
Prevent the cable length between the GC Series and the GL-R Series from exceeding 30 m on both the transmitter and receiver sides.

DANGER	**All of the cables must be used within the specified length range. Otherwise, the safety functions may not work properly, allowing for a dangerous situation to exist.**

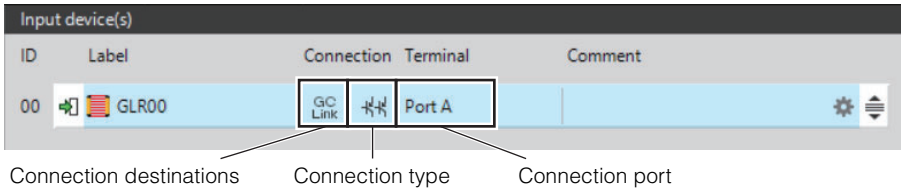
■ GC Configurator settings

1 Registering input devices

Select [GL-R series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.

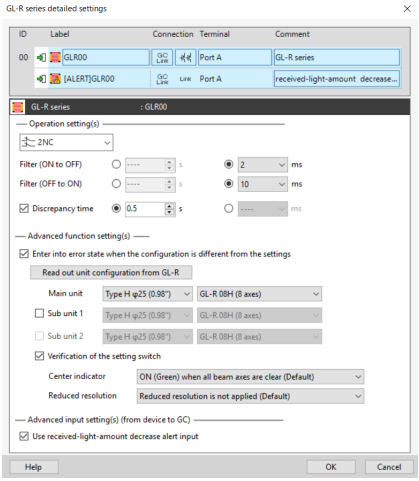


2 Input device basic settings



Item	Settings
Connection destinations	Select [GC-Link port].
Connection type	Fixed to [PNP 2 inputs].
Connection port	Select either [Port A] or [Port B].

3 GL-R Series detailed settings



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, discrepancy detection for two inputs is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced function setting(s)	Enter into error state when the configuration is different from the settings	With the check box checked, confirmation with the GL-R main unit configuration is performed, and the error state is entered if the configuration is different from the settings.
	Read out unit configuration from GL-R	Click this button to read the unit configuration from the GL-R Series connected to the GC-Link port.
	- Main controller/ Sub unit 1/2	When confirming with the GL-R main unit configuration, set the type and number of optical axes of the GL-R Series used. When using the GL-R Series units connected in series, set the type and number of optical axes for the sub units 1 and 2.
	Verification of the setting switch*1	With the check box checked, confirmation with the GL-R main unit setting switch settings is performed.
	- Center indicator*1	Performs a confirmation with the center indicator lighting method of the GL-R main unit setting switch.
	- Reduced resolution*1	Performs a confirmation with the reduced resolution setting of the GL-R main unit setting switch.
Advanced input setting(s)	Use received-light-amount decrease alert input	With the check box checked, the input block of "GL-R received-light-amount decrease alert" is added. The signal generated at the occurrence of the GL-R Series received-light-amount decrease alert can be used by the input block.

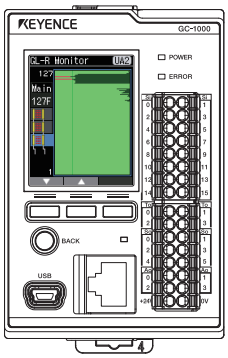
*1 For more information about the GL-R Series functions and settings, refer to the "Safety Light Curtain GL-R Series User's Manual".

Useful functions in using GC-Link connection

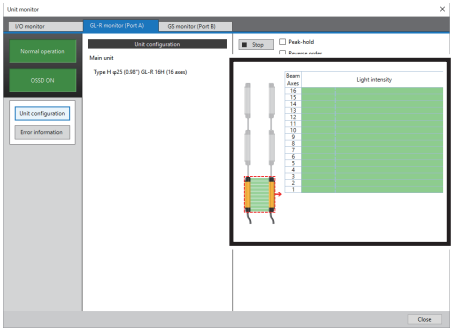
GL-R received-light-amount monitoring function

You can monitor the received-light-amount of the GL-R Series connected via the GC-Link through the GC-1000/1000R main controller LCD display and GC Configurator.

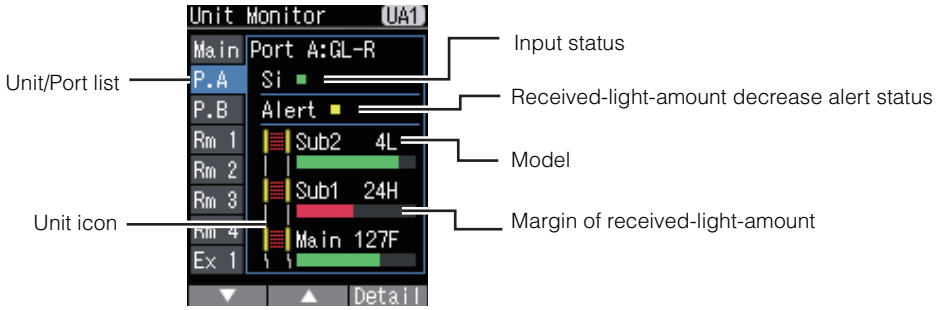
Main controller LCD display - [GL-R Monitor]



GC Configurator [GL-R monitor]



■ Main controller LCD display - [Unit Monitor]

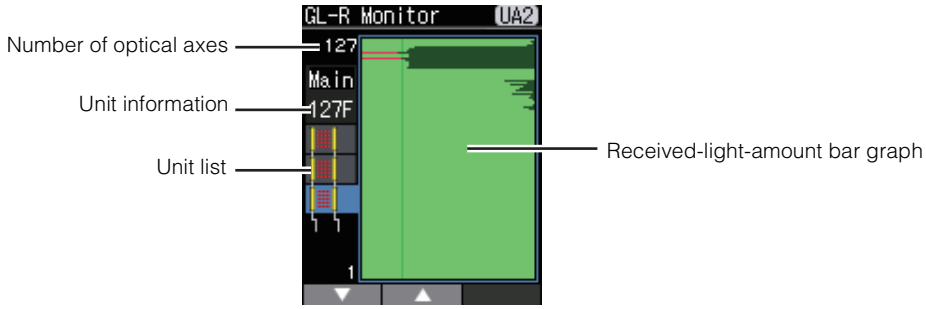


Item	Details
Unit/Port list	Displays the connected unit configuration. Use the [▼] and [▲] buttons to change the unit. Main: Displays the connector terminal status of the main controller. P.A/P.B: Displays the status of the safety sensor connected to the GC-Link port. Ex 1/2/3... : Displays the terminal status of the connected expansion unit. If an error occurs in the unit, GC-Link port or remote I/O module, the error icon is displayed.
Unit icon	Displays the GL-R Series unit configuration. When the units are connected in series, the main controller, sub unit 1 and sub unit 2 are displayed.
Input status	Displays the OSSD input status. (Green: ON, Red: OFF)
Received-light-amount decrease alert status	Displays the received-light-amount decrease alert status. (Yellow: Alert detected, Gray: Alert not detected) * This is not displayed when the received-light-amount decrease alert is disabled.
Model	Displays the model of the connected GL-R Series.
Margin of received-light-amount	Displays the margin of received-light-amount of the GL-R Series with a bar graph. The bar of the unit having blocked optical axis is displayed in red.
[▼], [▲]	Use the [▼] and [▲] buttons to change the unit.
[Detail]	Enters the [GL-R Monitor] screen.

Reference

For the operation method of the main controller LCD display and screen transition, refer to "5 Operating Main Controller" (page 5-1).

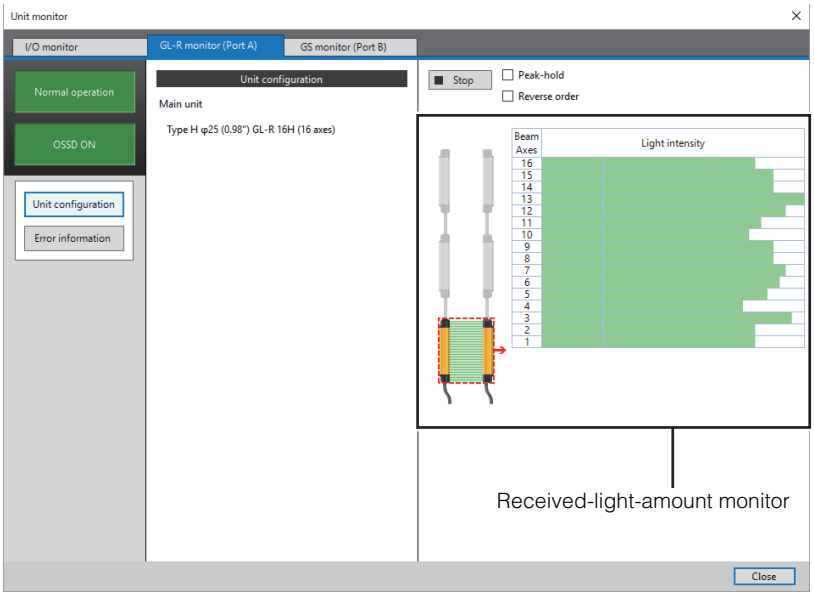
■ Main controller LCD display - [GL-R Monitor]



Item	Details
Number of optical axes	Displays the number of optical axes of the GL-R Series.
Unit information	Displays the GL-R Series unit configuration. Use the [▼] and [▲] buttons to change the unit.
Unit list	Displays the number of optical axes and type of the GL-R Series currently selected.
Received-light-amount bar graph	Displays the received-light-amount of the currently selected unit with a bar graph. (Green: Cleared, Red: Blocked, Yellow: Below received-light-amount decrease alert detection threshold)
[Adv.]	Enters the detailed settings screen.

Reference For the operation method of the main controller LCD display and screen transition, refer to "5 Operating Main Controller" (page 5-1).

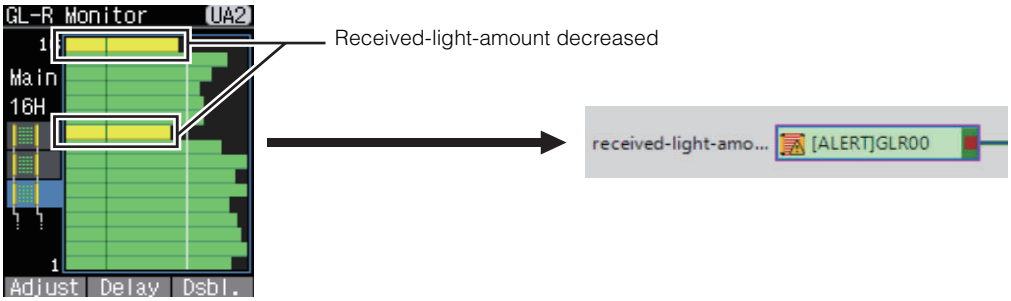
■ GC Configurator - [GL-R monitor]



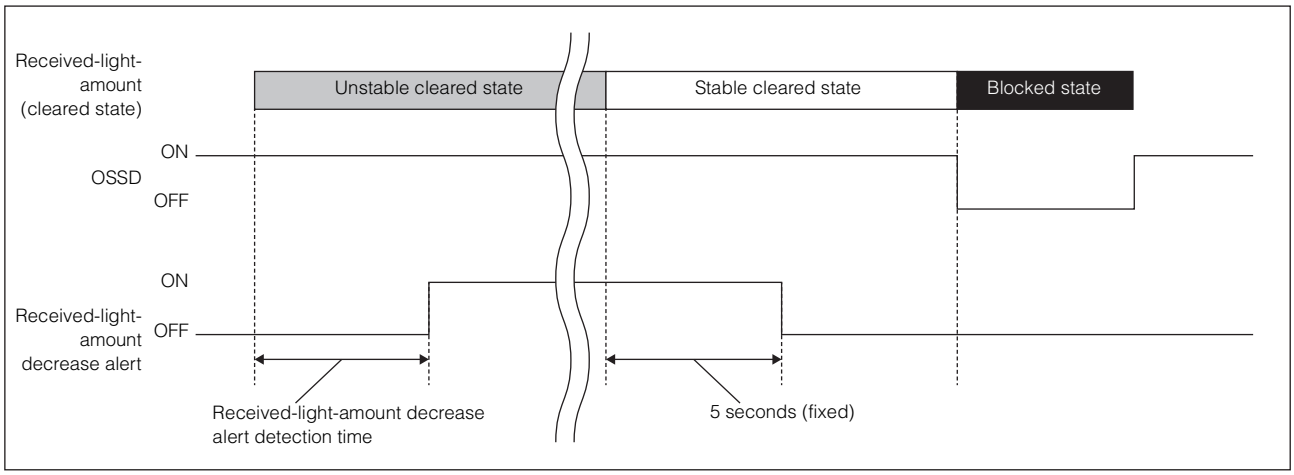
Reference For details, refer to "GL-R monitor" (page 13-11).

GL-R received-light-amount decrease alert

The input of the received-light-amount decrease alert turns ON when the unstable state of received-light-amount of the GL-R Series persists for the specified time or longer.
The received-light-amount decrease alert input can be used in a program as an input block, and can be transmitted to an external device such as a general-purpose PLC via the AUX output or industrial Ethernet communication.
Set the detection time and threshold of received-light-amount alert on the GC Series main controller. They can not be set with the GC Configurator.



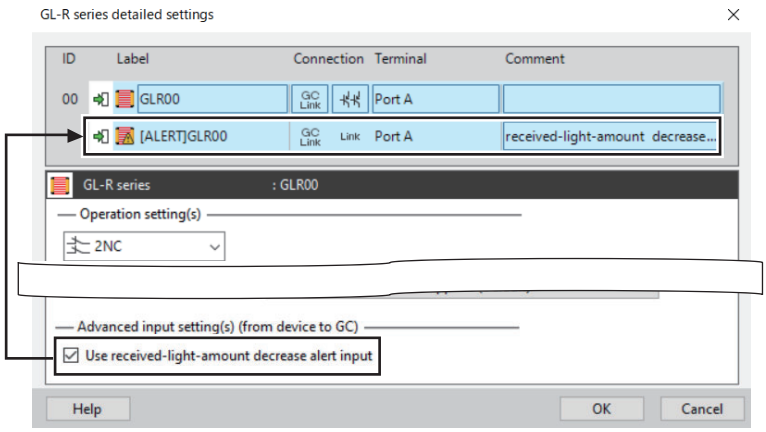
Timing chart



Reference When the GL-R Series main controller concludes that the received-light-amount is unstable, the input of the received-light-amount decrease alert will turn ON.

■ [GL-R series detailed settings]

To use the received-light-amount decrease alert input, check the check box of [Use received-light-amount decrease alert input] on the [GL-R series detailed settings] screen of the GC Configurator to enable the received-light-amount decrease alert input.

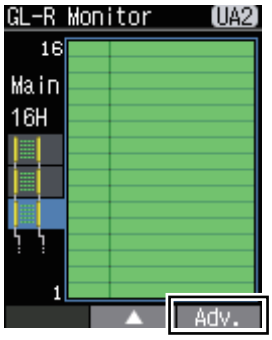


■ Setting the received-light-amount decrease alert (Main controller LCD display)

Set the threshold and detection time of received-light-amount decrease alert on the main controller. Before setting them, connect the GL-R to the GC Series and adjust the optical axis correctly.

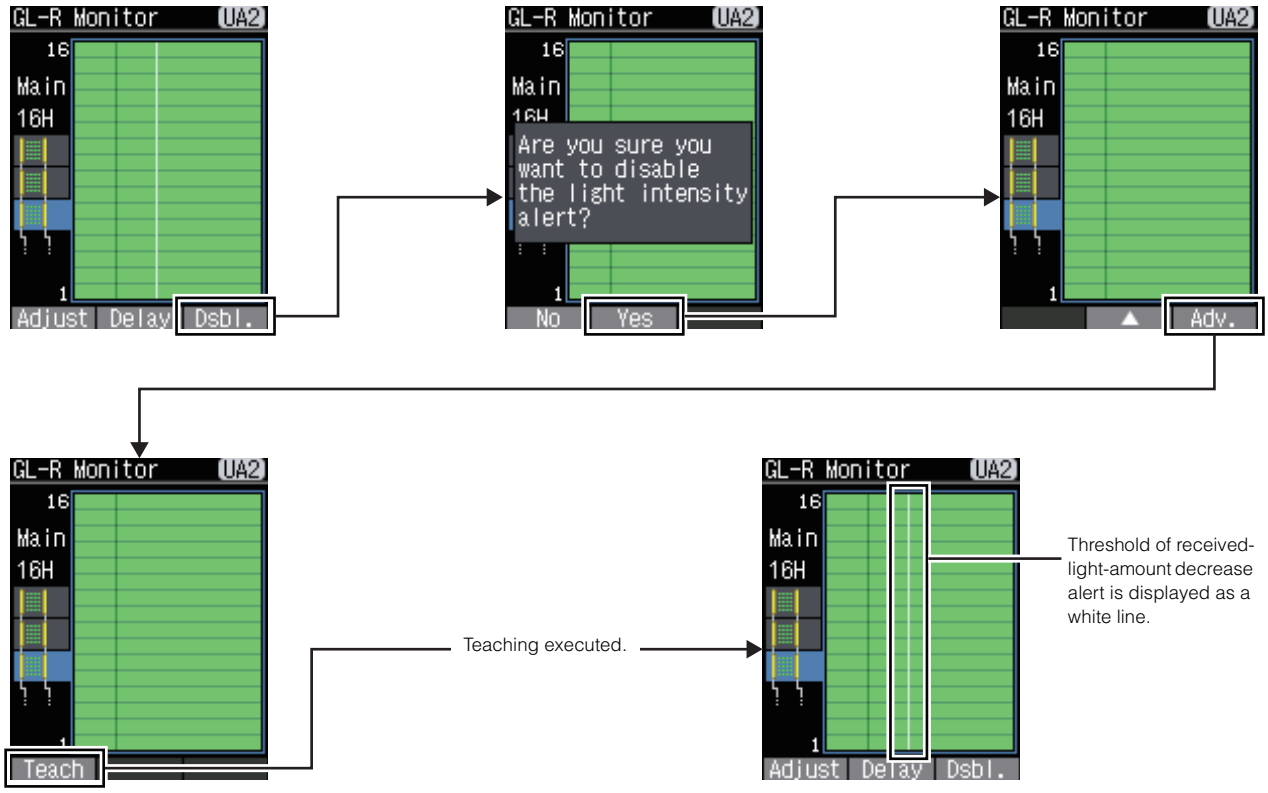
● Setting the threshold of received-light-amount decrease alert

1 Press the [Adv.] button on the [GL-R Monitor] screen to enter the detailed settings screen.



2 When you press the [Dsbl.] button, a message asking for the confirmation of disabling the registered received-light-amount decrease alert setting will appear.

Press the [Yes] button to clear the setting. Pressing the [Adv.] button on the next screen moves to the teaching screen.



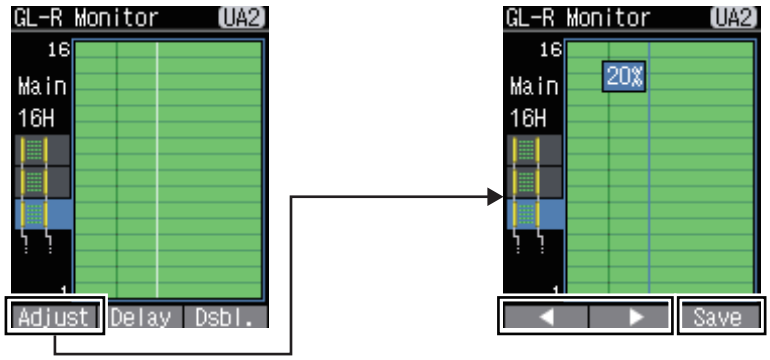
Point

- **The threshold of received-light-amount decrease alert is set based on the received-light-amount when teaching was executed.**
  Therefore, confirm that all of the optical axes of the GL-R are adjusted before executing teaching.
- **Teaching fails if the received-light-amount is too small.**

● Changing the threshold of received-light-amount decrease alert

Press the [Adjust] button to change the threshold. (Setting range: 0 to 80%, in increments of 10%)

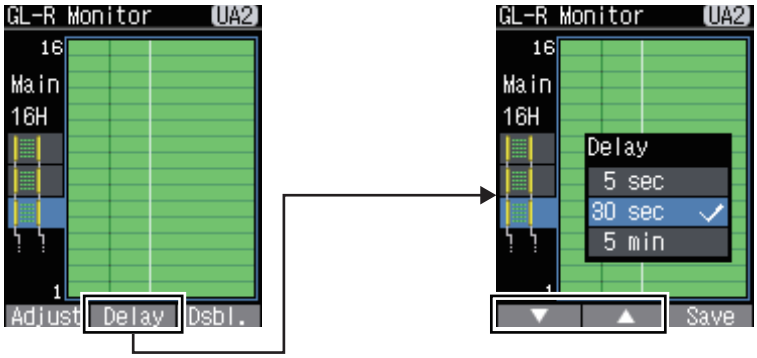
After setting, press the [Save] button to save the setting.



● **Setting the detection time of received-light-amount decrease alert**

Press the [Delay] button to change the detection time. (Options: 5 sec, 30 sec, 5 min Default: 30 sec)

After adjusting, press the [Save] button to save the setting.



GL-R OSSD OFF history

The GC Series can store the OSSD OFF history of the GL-R Series. The "GL-R OSSD OFF history" can be read from the GC Series main controller using the history function of the GC Configurator.

GL-R error history

The GC Series can store the error history of the GL-R Series. The "GL-R error history" can be read from the GC Series main controller using the history function of the GC Configurator.

Safety Light Curtain GL-S Series

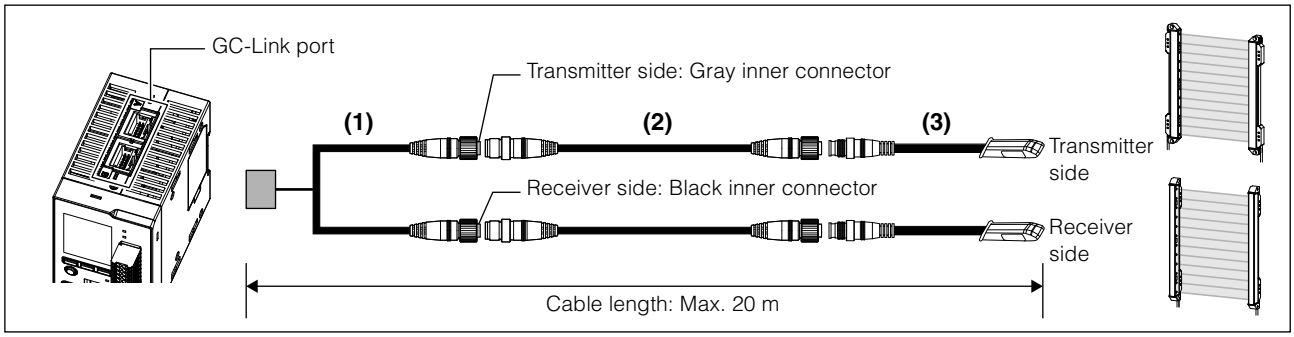
The following describes how to connect the Safety Light Curtain GL-S Series via the GC-Link and the settings.

Reference

For the installation method and usage of the GL-S Series, refer to the following manual.
"Safety Light Curtain GL-S Series User's Manual"

Connection cables

Use the following cables to connect the GL-S Series via the GC-Link.



	Name	Model	Quantity	Length (m)
(1)	GC-Link cable for GL-S (8 pins), 0.3 m	GL-SCG03S	1	0.3
(2)	Extension cable (8 pins), 7 m	GL-RCC7S	1	7
(3)	Main controller connection cable (8 pins), 0.3 m	GL-SPC03PS	1 set (transmitter/receiver)	0.3

■ Cable length

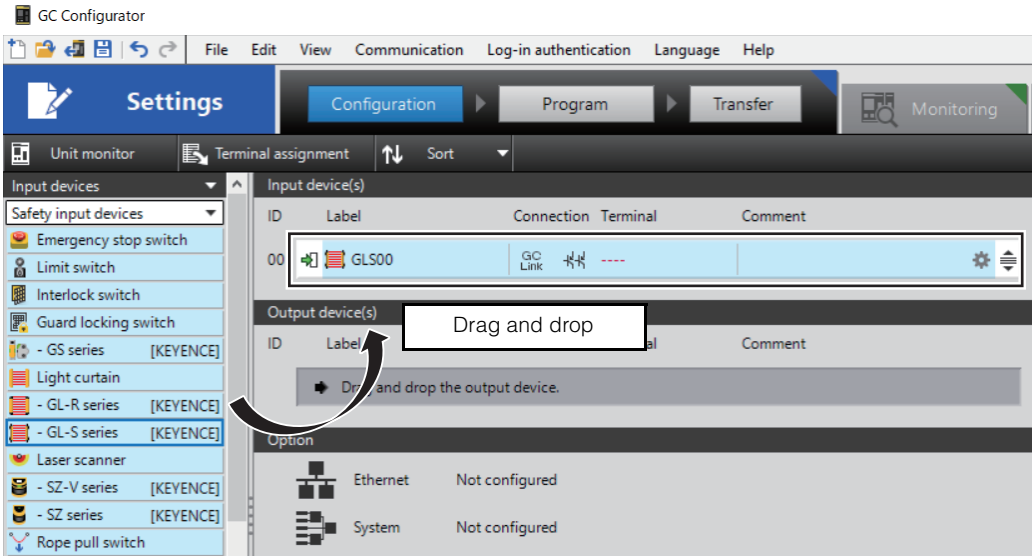
Prevent the cable length between the GC Series and the GL-S Series from exceeding 20 m on both the transmitter and receiver sides.

DANGER	**All of the cables must be used within the specified length range. Otherwise, the safety functions may not work properly, allowing for a dangerous situation to exist.**

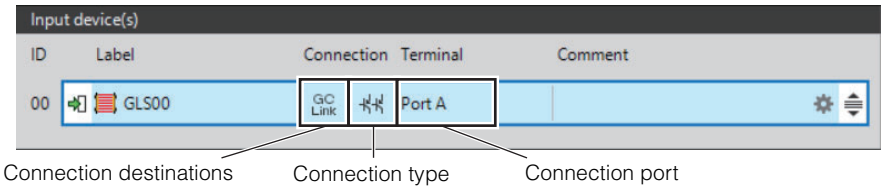
■ GC Configurator settings

1 Registering input devices

Select [GL-S series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.

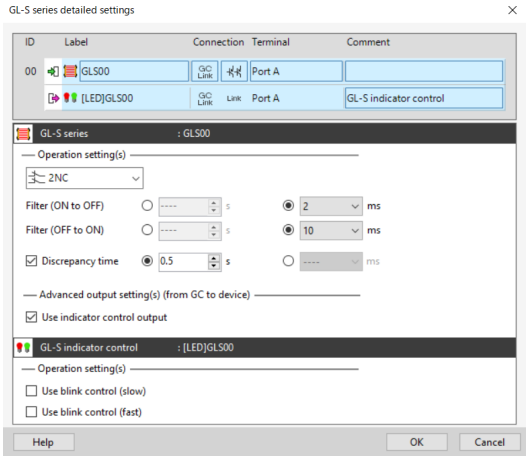


2 Input device basic settings



Item	Settings
Connection destinations	Select [GC-Link port].
Connection type	Fixed to [PNP 2 inputs].
Connection port	Select either [Port A] or [Port B].

3 GL-S Series detailed settings



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced output setting(s)*	Use indicator control output	With the check box checked, the output block of "indicator control output" is added. It can be used to control the center indicator of the GL-S Series.
Indicator control output*	Use blink control (slow)	With the check box checked, the blink control (slow) of the center indicator can be used. The "BS (Blink Slow)" port is added to the output block of "indicator control output".
	Use blink control (fast)	With the check box checked, the blink control (fast) of the center indicator can be used. The "BF (Blink Fast)" port is added to the output block of "indicator control output".

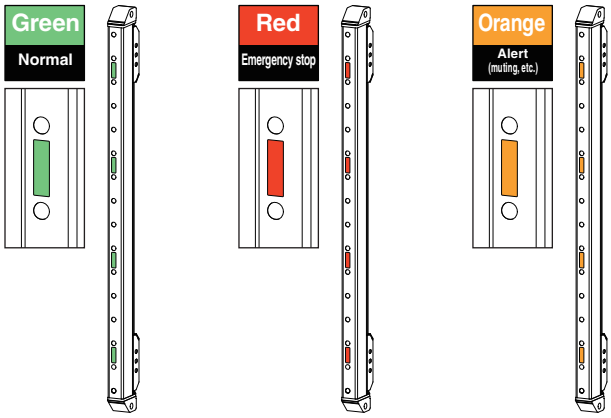
For the GL-S Series functions and settings, refer to "Safety Light Curtain GL-S Series User's Manual".

* Indicator control output cannot be used in the EASY mode.

Useful functions in using GC-Link connection

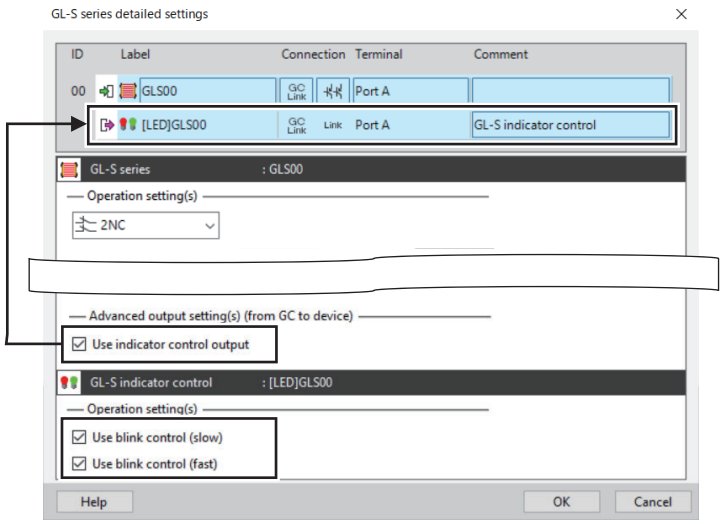
GL-S indicator control output

Controls the center indicator of the GL-S Series connected via the GC-Link.



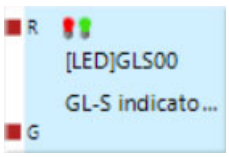
■ [GL-S series detailed settings]

To use the indicator control output, check the check box of [Use indicator control output] on the [GL-S series detailed settings] screen to enable the indicator control output.



Indicator control output block

[Initial setting]



[Setting blink control]

Truth table

R	G	Center indicator display color
1	0	Red
0	1	Green
1	1	Orange
0	0	OFF

BS	BF	Blinking operation
1	0	Blinks slowly
0	1	Blinks fast
1	1	Blinks fast
0	0	No blinking operation

Safety Interlock Switch GS Series (Non-contact)

Safety Interlock Switch GS Series (Lock)

Safety Interlock Switch GS-M Series

The following describes how to connect the Safety Interlock Switch GS Series (Non-contact)/GS Series (Lock)/GS-M Series via the GC-Link and the settings.

Reference

- The Safety Interlock Switch GS Series (Non-contact), GS Series (Lock), and the GS-M Series can be connected to the GC-Link port in a cascaded manner.
- For the installation method and usage of the GS/GS-M Series, refer to the following manual.
  "Safety Interlock Switch GS Series (Non-contact) User's Manual"
  "Safety Interlock Switch GS Series (Lock) User's Manual"
  "Safety Interlock Switch GS-M Series User's Manual"

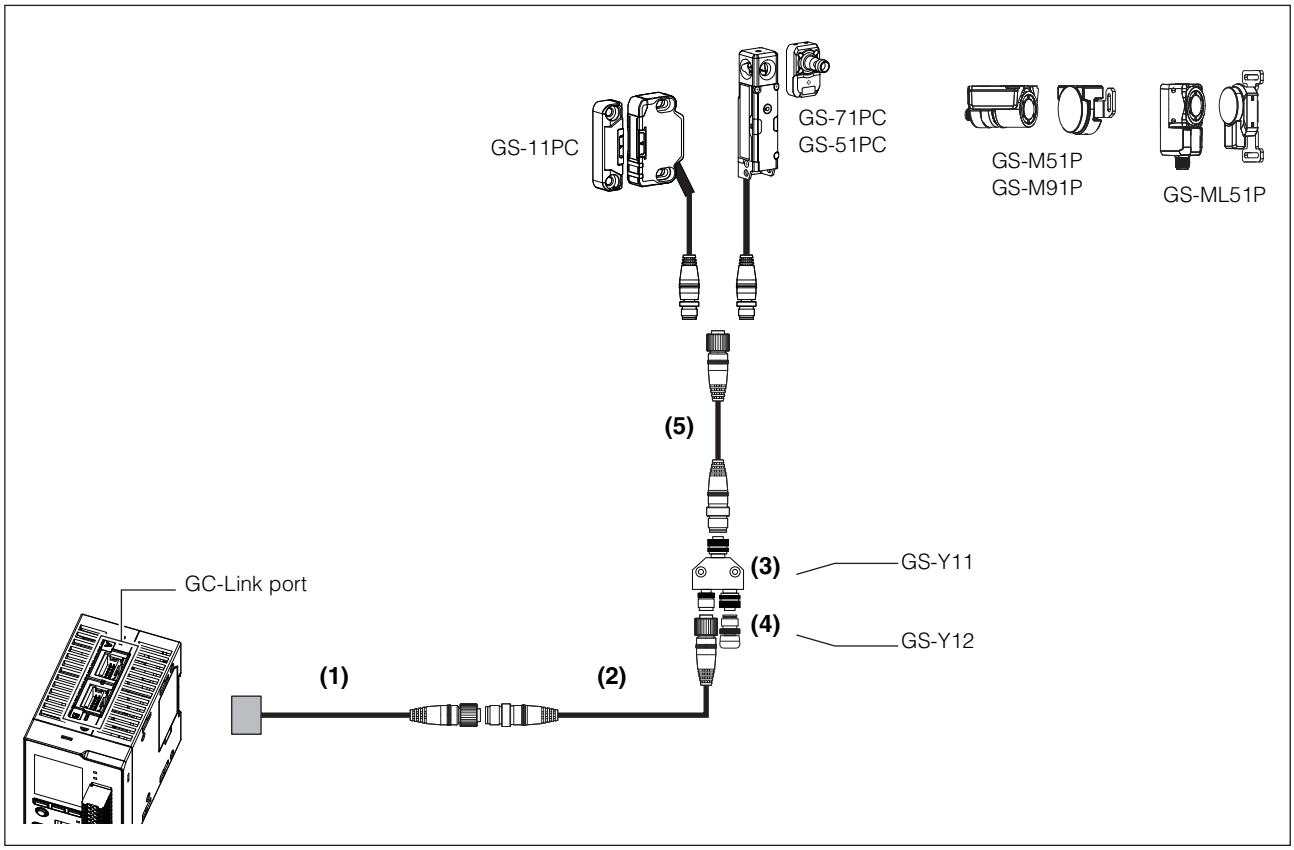
GC Link compatible GS/GS-M Series models

The following models of the GS Series can be connected to the GC-Link connection port.

Product name	Cable type	Output type	Model
GS Series non-contact, standard type	M12 connector type	PNP	GS-11PC
GS Series power-to-release, standard type	M12 connector type	PNP	GS-51PC
GS Series power-to-lock type, standard type	M12 connector type	PNP	GS-71PC
GS-M Series, standard type	M12 connector type	PNP	GS-M51P GS-M91P GS-ML51P

Connection cables

Use the following cables to connect the GS/GS-M Series via the GC-Link.

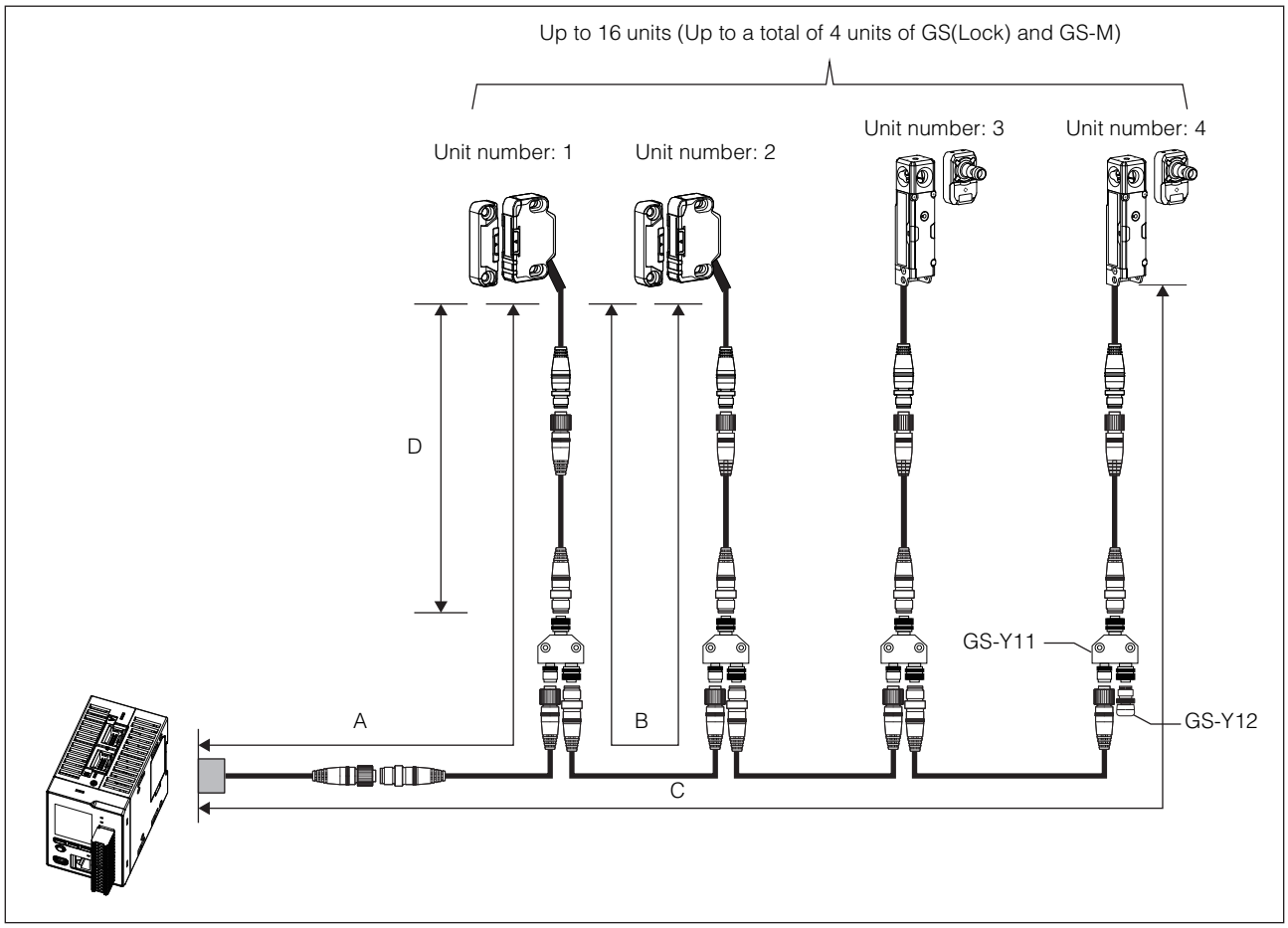


	Name	Model	Quantity	Length (m)
(1)	GC-LinkGS port cable	GS-P5CG03	1	0.3
(2)	M12 connector type 5-pin extension cable	GS-P5CC1	1	1
		GS-P5CC3	1	3
		GS-P5CC5	1	5
		GS-P5CC10	1	10
(3)	Y-shaped connector	GS-Y11	1	-
(4)	End connector	GS-Y12	1	-
(5)	M12 connector type 8-pin extension cable	GS-P8LC1	1	1
		GS-P8CC1	1	1
		GS-P8CC3	1	3
		GS-P8CC5	1	5

Point

- **When connecting via the GC-Link, the Y-shaped connector "GS-Y11" and end connector "GS-Y12" are required.**
- **The Y-shaped connector GS-Y01 and end connector GS-Y02 cannot be used for the GC-Link connection.**

■ Cable lengths and number of connected units



● Cable lengths

		GS Series	GS-M Series
A	Limitation of the distance between the main controller and the first GS/GS-M Series unit	Max. 30.6 m	Max. 31.3 m
B	Limitation of the distance between the GS/GS-M Series units	Max. 30.6 m	Max. 31.3 m
C	Limitation of the maximum cable length	Max. 60.6 m	Max. 61.3 m
D	Limitation of the distance between the Y-shaped connector and the GS Series	Max. 5.3 m	Max. 5 m

DANGER	**All of the cables must be used within the specified length range. Otherwise, the safety functions may not work properly, allowing for a dangerous situation to exist.**

● Number of cascaded units

When using the GC-Link, up to 16 units of the GS Series (Non-contact and Lock), GS-M Series can be connected in a cascaded manner (Up to a total of 4 units of GS(Lock) and GS-M).

● End connector

Be sure to connect the end connector "GS-Y12" to the Y-shaped connector "GS-Y11" which is installed to the end unit.

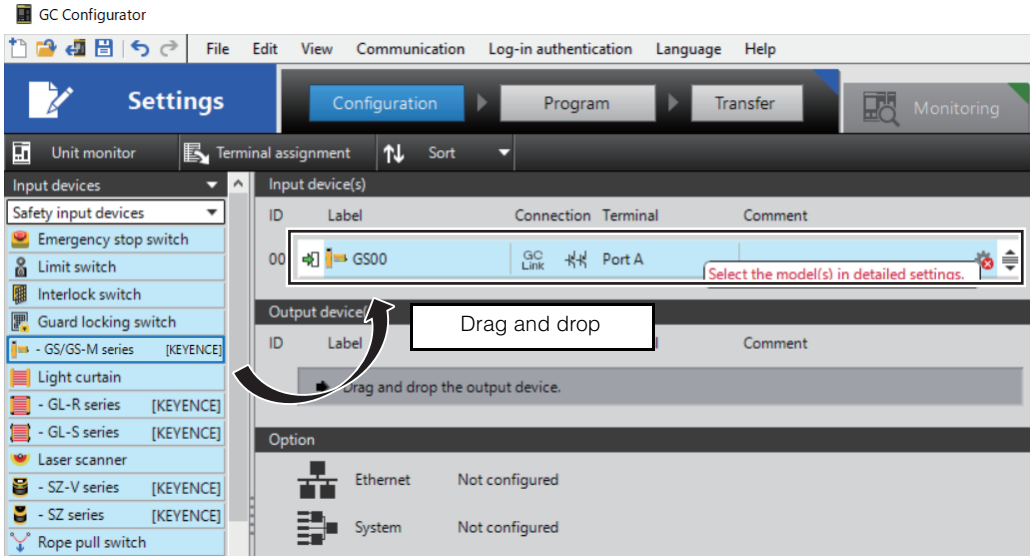
Point

The Y-shaped connector "GS-Y01" and end connector "GS-Y02" cannot be used for the GC-Link connection.

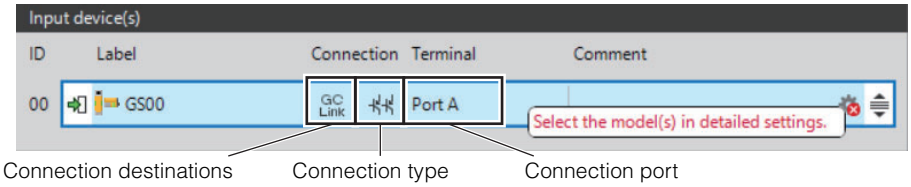
GC Configurator settings

1 Registering input devices

Select [GS/GS-M series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.

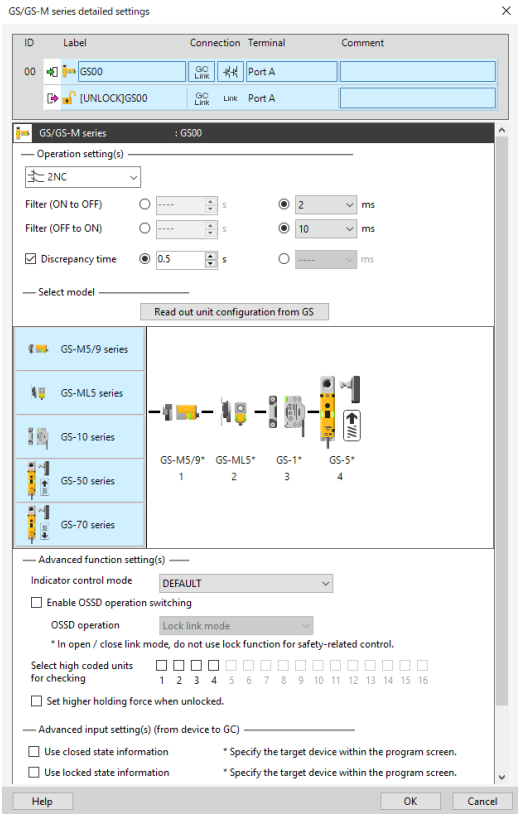


2 Input device basic settings



Item	Settings
Connection destinations	Select [GC-Link port].
Connection type	Fixed to [PNP 2 inputs].
Connection port	Select either [Port A] or [Port B].

3 GS/GS-M Series detailed settings



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Read out unit configuration from GS	Click this button to read the unit configuration from the GS/GS-M Series connected to the GC-Link port.
	(Connection models)	When setting the configuration of the GS/GS-M Series unit to be connected, register the target model by the drag-and-drop operation.

Item		Details
Advanced function setting(s)	Indicator control mode	Set the indicator display mode of the GS/GS-M Series main controller. [Normal operation]: Follows the GS/GS-M Series main controller setting. [OFF]: Turns OFF the indicator except for an error state. [OFF when door is closed (locked)]: The GS-10 Series turns off the indicator when the door is closed. The GS-M5/9, ML5, 50 and 70 Series turn OFF the indicator when the door is locked.
	Enable OSSD operation switching	Check this check box to enable the OSSD operation switching function. This can be used when selecting the GS-M5/9, ML5, 50 or 70 Series as the connection model.
	OSSD operation	Set the OSSD operation when [Enable OSSD operation switching] is enabled. [Lock link mode]: Links the OSSD with the lock operation. [Open / close link mode]: Links the OSSD with the open/close operation (actuator detected) of the door or similar objects. (Default: Lock link mode)
	Select high coded units for checking	Used to confirm if the coding level of the unit specified as check target is "high" at start-up. If the coding level is not "high", the GC will result in the GS configuration mismatch error.
	Set higher holding force when unlocked	With the check box checked, the GS-M set higher holding force when unlocked. This can be used when selecting the GS-M5/9 Series or the GS-ML5 Series as the connection model.
Advanced input setting(s)	Use closed state information	With the check box checked, the expansion block of "GS closed state" is added. The GS/GS-M Series closed state can be used in a program.
	Use locked state information	With the check box checked, the expansion block of "GS locked state" is added. The GS (Lock)/GS-M locked state can be used in a program. This can be used when selecting the GS-M5/9, ML5, 50 or 70 Series as the connection model.
Advanced output setting(s)	Use unlock output	With the check box checked, the output block of "unlock output" is added. This is used for the unlock output of the GS (Lock)/GS-M. This can be used when selecting the GS-M5/9, ML5, 50 or 70 Series as the connection device.
	Use indicator control output *	With the check box checked, the expansion block of "GS indicator control output" is added. This can be used to control the GS/GS-M Series indicator.

For the GS/GS-M Series functions and settings, refer to the following manuals.

"Safety Interlock Switch GS Series (Non-contact) User's Manual"

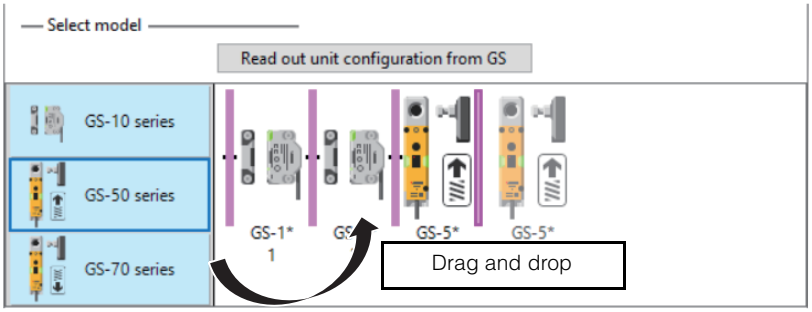
"Safety Interlock Switch GS Series (Lock) User's Manual"

"Safety Interlock Switch GS-M Series User's Manual"

* Indicator control output cannot be used in the EASY mode.

[Select model]

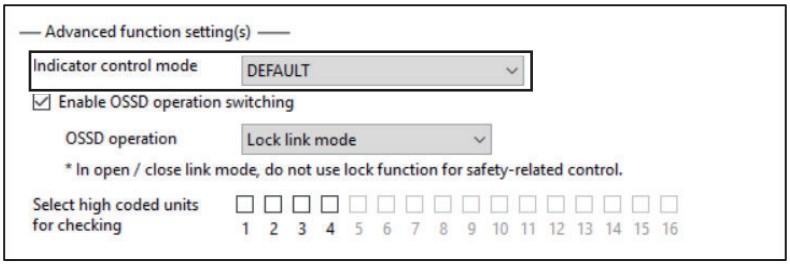
Register the GC-Link connection target, the GS/GS-M Series, by the drag-and-drop operation.



Useful functions in using GC-Link connection

GS indicator control output

You can set the lighting mode of the GS/GS-M Series connected via the GC-Link.



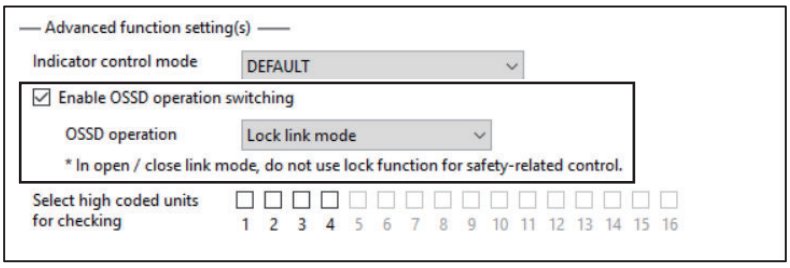
Settings	Details
Normal operation	Turns ON according to the default setting of the GS/GS-M Series.
OFF	Turns OFF except for an error state.*1
OFF when door is closed (locked)	The GS-10 Series: Turns OFF the indicator when the door is closed. The GS-50 Series, GS-70 Series, GS-M5/9 Series and the GS-ML5 Series: Turns OFF the indicator when the door is locked.

*1 At this time, the OSSD, INPUT READY, LOCK and MODE indicators will not turn OFF.

OSSD operation switching

You can set the OSSD operation of the GS/GS-M Series connected via the GC-Link.

Reference OSSD operation switching can be set when selecting the GS-50 Series, GS-70 Series, GS-M5/9 Series and the GS-ML5 Series as the connection model.

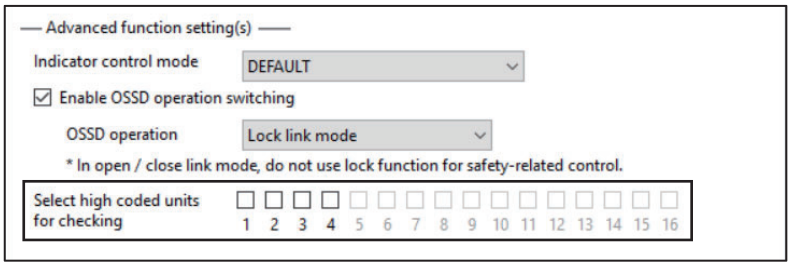


Settings	Details
Lock link mode	Links the OSSD with the lock operation.
Open / close link mode	Links the OSSD with the open/close operation (actuator detected) of the door or similar objects.

DANGER	**With [Open / close link mode] set, the lock function does not link with the OSSD. Therefore, you cannot confirm the locked state only with the OSSD (GS Series ON/OFF state).** **It is possible to use the lock function of the GS-50 Series as a guard locking function for safety, but it cannot be used as an interlocking function for safety control.**

Select high coded units for checking

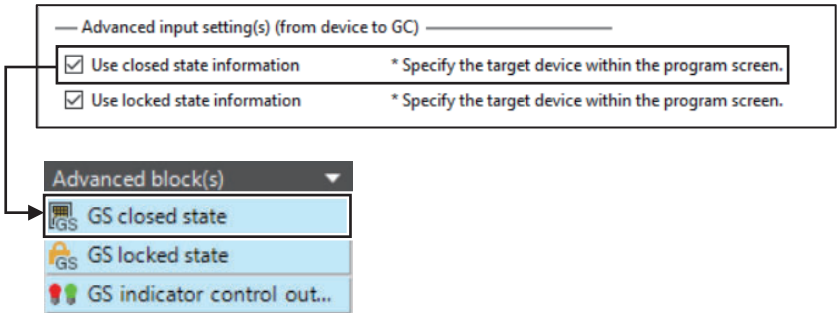
Used to confirm if the coding level of the unit specified as check target is "high" at start-up. If the coding level is not "high", the GC will result in the GS configuration mismatch error.



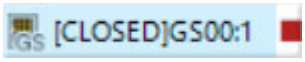
Closed state input

You can use the closed state of each GS/GS-M Series unit connected via the GC-Link in a program.
Using the GS closed state in a program as an expansion block enables transmission of the GS/GS-M Series door open/close state to an external device such as a general-purpose PLC via the AUX output or industrial Ethernet communication.

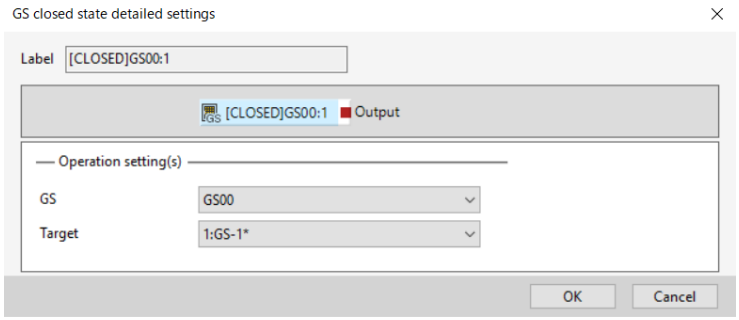
DANGER	**The closed state input cannot be used for safety-related control.**



GS closed state expansion block



■GS closed state detailed settings



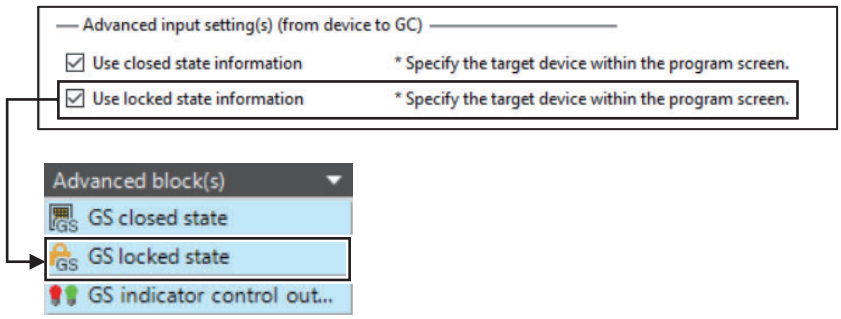
Item		Details
Operation setting(s)	GS	Select the label of the GS/GS-M Series assigned to the GC-Link port from the pull-down menu.
	Target	Select the GS/GS-M Series you want to check the door closed state from the pull-down menu.

Locked state input

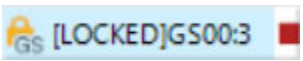
You can use the door locked state of each GS Series (Lock) or GS-M Series unit connected via the GC-Link in a program. Using the GS locked state in a program as an expansion block enables an output to an external device via the AUX output or transmission of the GS/GS-M Series locked state to a general-purpose PLC using the industrial Ethernet communication function.

Reference The locked state input can be set when selecting the GS-50 Series, GS-70 or the GS-M Series as the connection model.

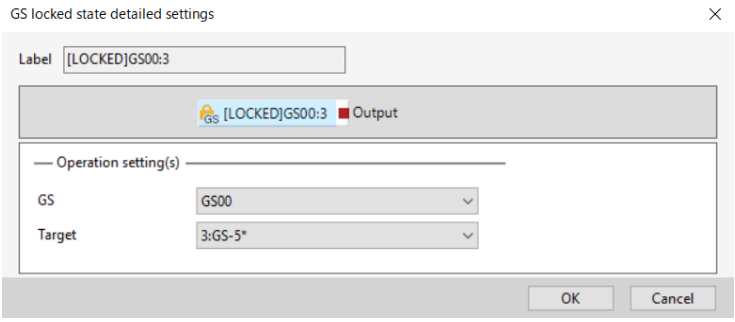
DANGER	**The locked state input cannot be used for safety-related control.**



GS locked state expansion block



■ GS locked state detailed settings



Item		Details
Operation setting(s)	GS	Select the label of the GS/GS-M Series assigned to the GC-Link port from the pull-down menu.
	Target	Select the GS Series you want to check the door locked state from the pull-down menu. Only the GS-50, GS-70, GS-M5/9 Series or the GS-ML5 Series unit can be selected as the target.

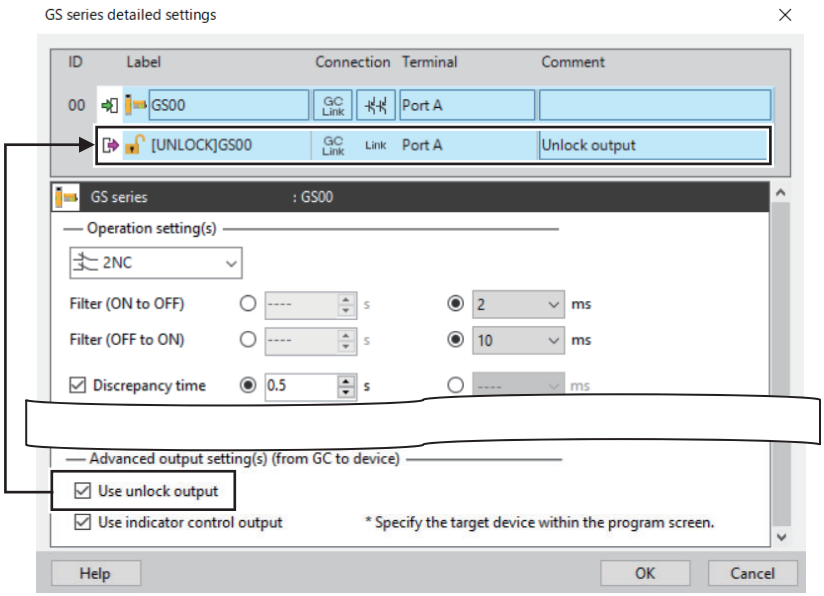
Unlock output

Controls the unlocking of each GS Series (Lock) or the GS-M Series unit connected via the GC-Link.

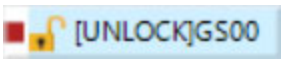
Reference The unlock output can be set when selecting the GS-50 Series, GS-70 Series, GS-M5/9 Series or the GS-ML5 Series as the connection model.

■ [GS/GS-M series detailed settings]

To use the unlock output, check the check box of [Use unlock output] on the [GS series detailed settings] screen to enable the unlock output.



GS unlock output block



● **Operation**

- Turning the GS unlock output block ON forces the GS unit to unlock.
- Turning the GS unlock output block OFF forces the GS unit to lock.

Point **The GS unlock output block controls all of the GS Series (Lock) or the GS-M Series units connected via the GC-Link in a batch.**

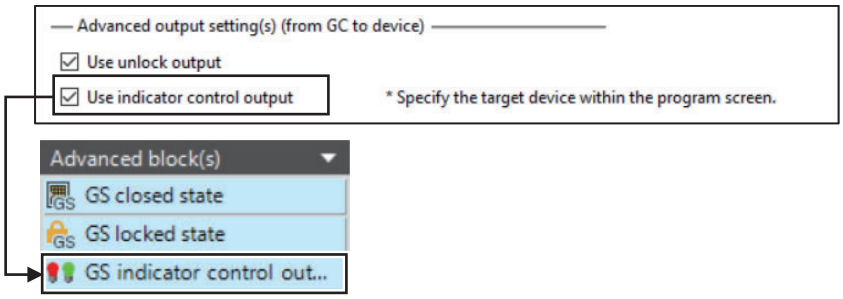
GS indicator control output

Controls the GS/GS-M Series connected via the GC-Link.

* Indicator control output cannot be used in the EASY mode.

■ [GS/GS-M series detailed settings]

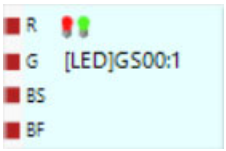
To use the indicator control output, check the check box of [Use indicator control output] on the [GS/GS-M series detailed settings] screen to enable the indicator control output.



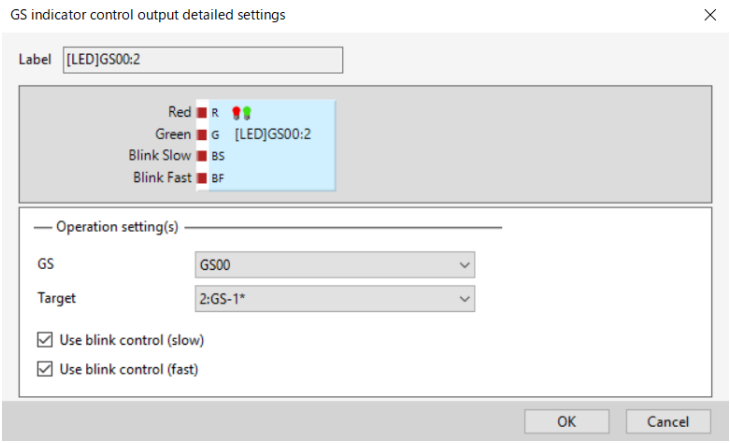
GS indicator control output block

[Initial setting]

[Setting blink control]



■ GS indicator control output detailed settings



Item		Details
Operation setting(s)	GS	Select the label of the GS/GS-M Series assigned to the GC-Link port from the pull-down menu.
	Target	Select the unit number targeted for indicator control from the pull-down menu.
	Use blink control (slow)	With the check box checked, the blink control (slow) of the indicator can be used. The "BS (Blink Slow)" port is added to the output block of "indicator control output".
	Use blink control (fast)	With the check box checked, the blink control (fast) of the indicator can be used. The "BF (Blink Fast)" port is added to the output block of "indicator control output".

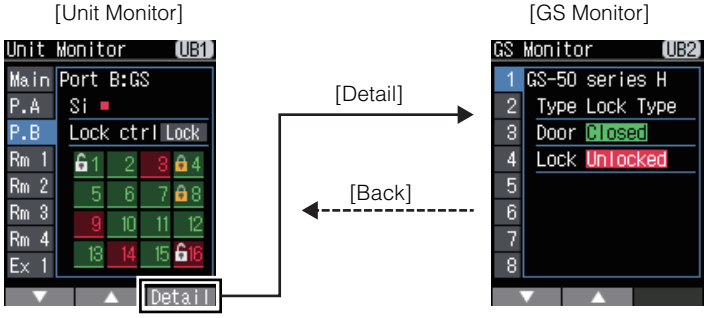
Truth table

R	G	Highly visible indicator display color
1	0	Red
0	1	Green
1	1	Orange
0	0	OFF

BS	BF	Blinking operation
1	0	Blinks slowly
0	1	Blinks fast
1	1	Blinks fast
0	0	No blinking operation

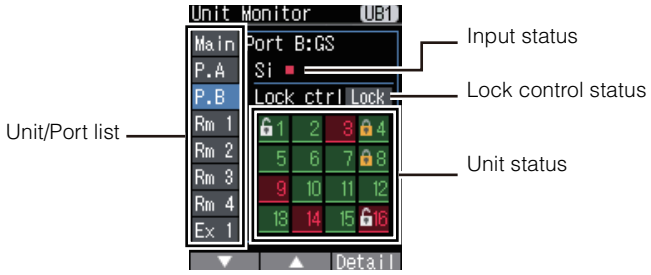
GS monitoring function

You can monitor the open/close and lock states of the GS/GS-M Series connected via the GC-Link on the main controller LCD display.



Reference For the operation method of the main controller LCD display and screen transition, refer to "5 Operating Main Controller" (page 5-1).

■ Main controller LCD display - [Unit Monitor]

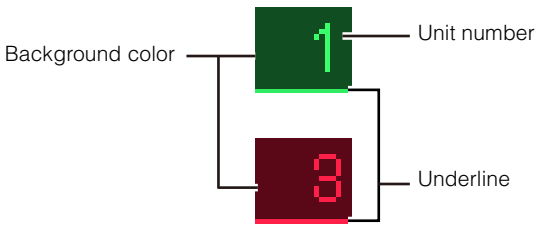


Item	Details
Unit/Port list	Displays the connected unit configuration. Use the [▼] and [▲] buttons to change the unit. Main: Displays the connector terminal status of the main controller. P.A/P.B: Displays the status of the safety sensor connected to the GC-Link port. Ex 1/2/3... : Displays the terminal status of the connected expansion unit.
Input status	Displays the OSSD input status. (Green: ON, Red: OFF)
Lock control status	Displays the lock control status when the GS (Lock)/GS-M is used. Locked state: Lock, Unlocked state: Unlock
Unit status	Displays icons indicating the open/close and lock states of the GS/GS-M Series.
[▼], [▲]	Use the [▼] and [▲] buttons to change the unit.
[Detail]	Enters the detailed settings screen.

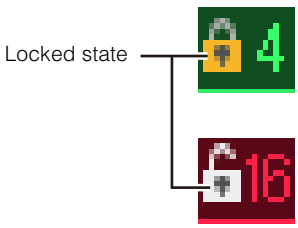
Unit status icon

Shows the door open/close and lock states using the background and underline colors of icons.

<Non-contact type>



<Lock type>



<GS(Non-contact)>

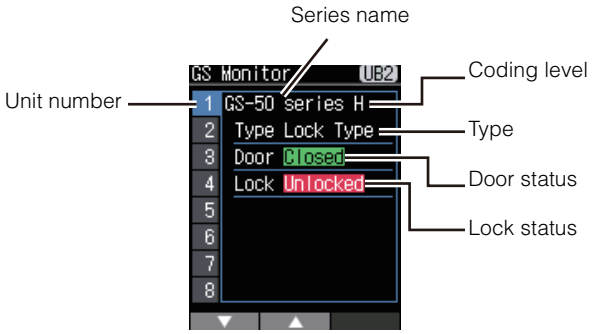
Door status	Background color	Underline color
OPEN	ON in red	Red
CLOSE	ON in green	Green

<GS(Lock) / GS-M>

Door status	Lock status	Background color	Underline color	
			Lock link*	Open/close link*
OPEN	UNLOCK	ON in red	Red	Red
OPEN	LOCK	ON in red	Red	Red
CLOSE	UNLOCK	Blinks in green	Red	Green
CLOSE	LOCK	ON in green	Green	Green

* These functions can be switched when the OSSD operation switching is set.

■ Main controller LCD display - [GS Monitor]



Item	Details
Unit number	Displays the number of GS/GS-M Series units connected via the GC-Link.
Series name	Displays the model (GS-10/50/70/M5/9/ML5 Series).
Coding level	Displays [H] when the coding level is set to "high".
Type	Displays the non-contact or lock type.
Door status	Displays the open/close state. Door opened: Open (red), Door closed: Closed (green)
Lock status	Displays the lock status for the lock type. Locked state: [Locked] (green), Unlocked state: [Unlocked] (red)

Safety Laser Scanner SZ-V Series

The following describes how to connect the Safety Laser Scanner SZ-V Series via the GC-Link and the settings.

Reference

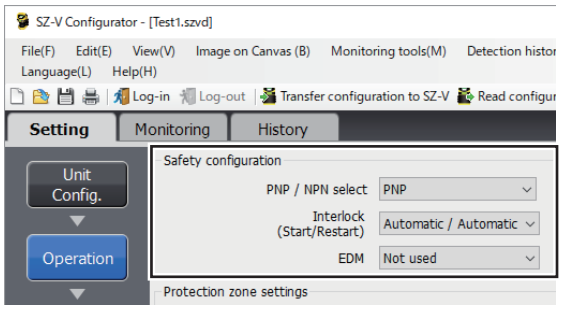
For the installation method and usage of the SZ-V Series, refer to the following manual.
"Safety Laser Scanner SZ-V Series User's Manual"

Point

To use the SZ-V Series, you need to set the SZ-V Series main controller using the SZ-V Configurator.

- **Use the following settings for [Safety configuration].**

Item	Settings
PNP/NPN selection	PNP
Interlock (Start/Restart)	Automatic / Automatic
EDM	Not used



- **Perform other settings according to the functions you will use.**

GC-Link connection methods and functions

The following shows the method for connecting the SZ-V Series via the GC-Link and the settable functions.

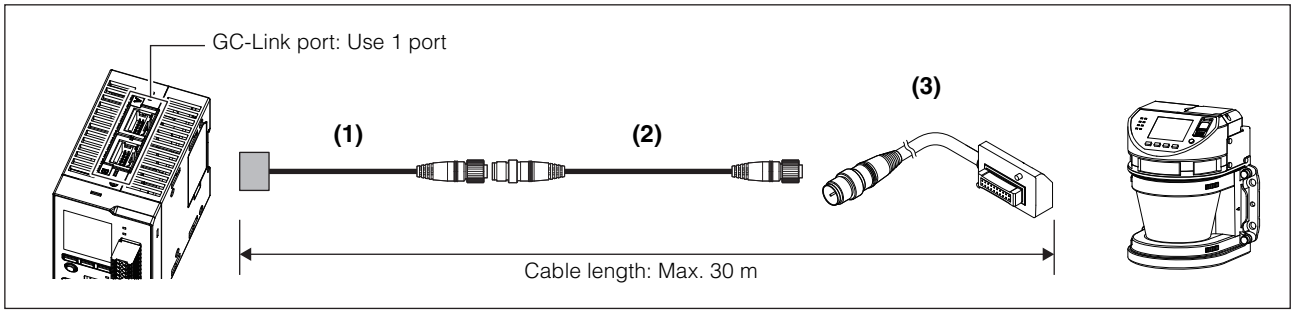
Connection method	Target model	Used GC-Link port	Settable function
SZ-V04 simple connection	SZ-V04(X)	Use 1 port	• AUX-IN
SZ-V04 advanced connection	SZ-V04(X)	Use 2 ports	• Multi-OSSD • Bank switching* • Independent bank switching* • AUX-IN1 • AUX-IN2
SZ-V32 advanced connection	SZ-V32(X)/ SZ-V32N(X)	Use 2 ports	• Bank switching (Max. 4 banks) • AUX-IN1 • AUX-IN2

* - A maximum of four banks when using multi-OSSD (independent bank not used).
- Fixed to two banks when using independent bank.
- Fixed to two banks when not using multi-OSSD.

Connection cables

■ SZ-V04 simple connection

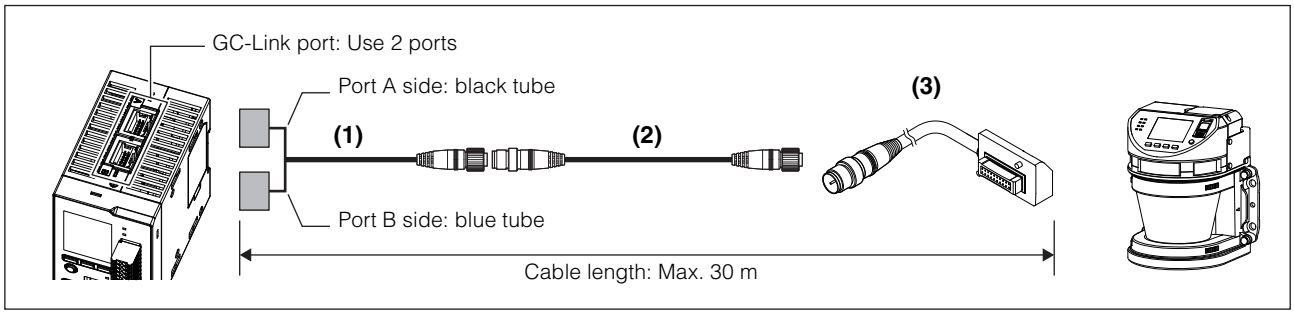
Connection method	Target model	Used GC-Link port
SZ-V04 simple connection	SZ-V04(X)	Use 1 port



	Name	Model	Quantity	Length (m)
(1)	GC-Link cable for SZ-V04 (5 pins), 0.3 m	SZ-VCG03	1	0.3
(2)	Extension cable (5 pins), 7 m	SZ-VCC7	1	7
(3)	SZ-V04 power cable (5 pins), 0.3 m	SZ-VPC03S	1	0.3

■ SZ-V04 advanced connection

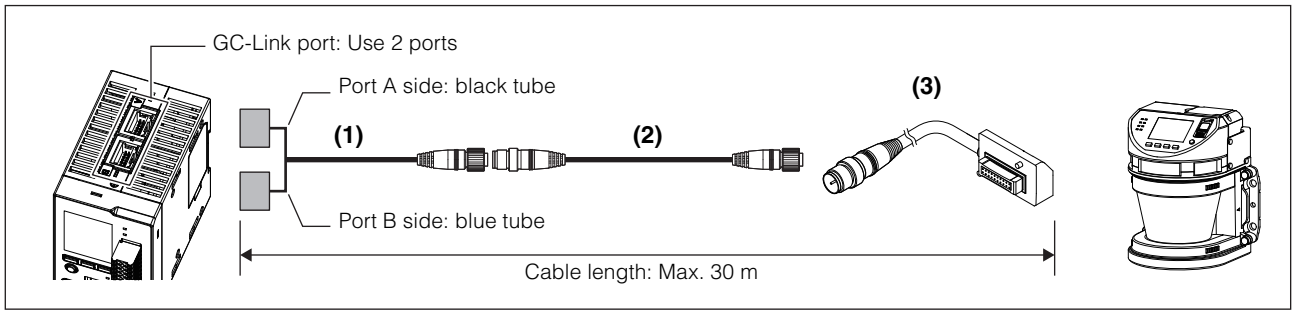
Connection method	Target model	Used GC-Link port
SZ-V04 advanced connection	SZ-V04(X)	Use 2 ports



	Name	Model	Quantity	Length (m)
(1)	GC-Link cable for SZ-V04/V32 (12 pins), 0.3 m	SZ-VCG03M	1	0.3
(2)	Extension cable (12 pins), 7 m	SZ-VCC7M	1	7
(3)	SZ-V04 power cable (12 pins), 0.3 m	SZ-VPC03M	1	0.3

■ SZ-V32 advanced connection

Connection method	Target model	Used GC-Link port
SZ-V32 advanced connection	SZ-V32(X)/SZ-V32N(X)	Use 2 ports



	Name	Model	Quantity	Length (m)
(1)	GC-Link cable for SZ-V04/V32 (12 pins), 0.3 m	SZ-VCG03M	1	0.3
(2)	Extension cable (12 pins), 7 m	SZ-VCC7M	1	7
(3)	SZ-V32 power cable (12 pins), 0.3 m	SZ-VPC03B	1	0.3

■ Cable length

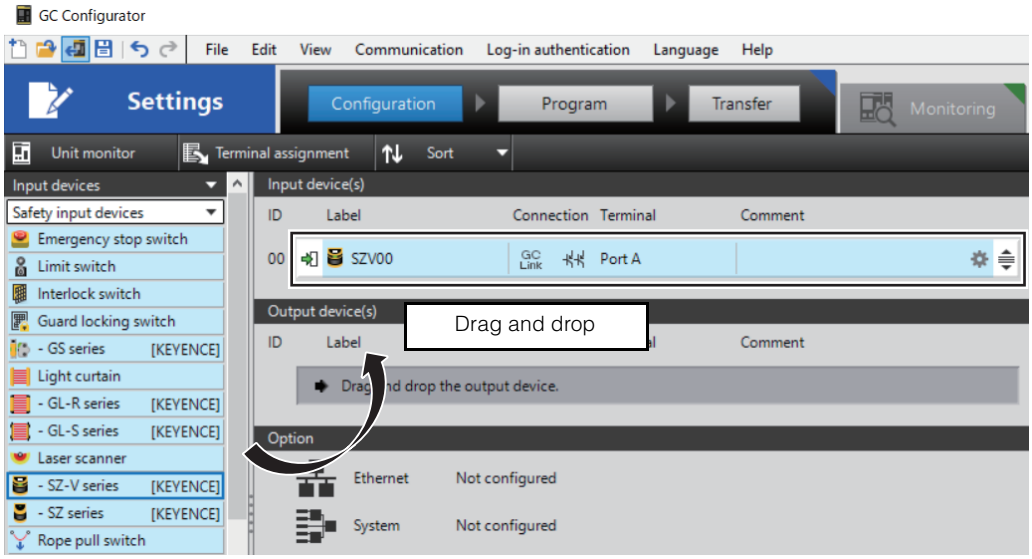
Prevent the cable length between the GC Series and the SZ-V Series from exceeding 30 m.

DANGER	**All of the cables must be used within the specified length range. Otherwise, the safety functions may not work properly, allowing for a dangerous situation to exist.**

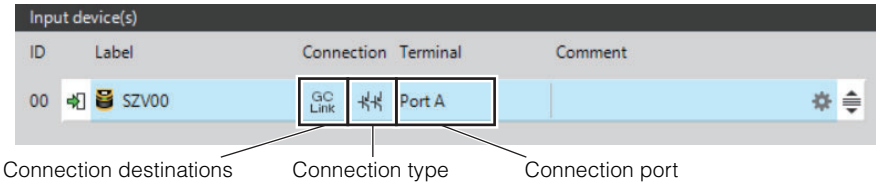
GC Configurator settings

1 Registering input devices

Select [SZ-V series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



2 Input device basic settings

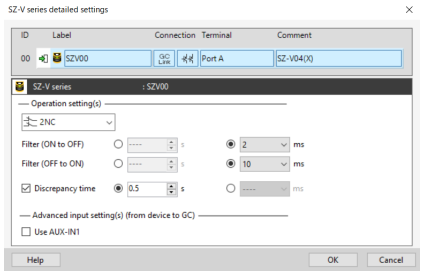


Item	Settings
Connection destinations	SZ-V04 simple connection: Select [GC-Link port]. SZ-V04 or SZ-V32 advanced connection: Select [GC-Link x 2].
Connection type	Fixed to [PNP 2 inputs].
Connection port	SZ-V04 simple connection: Select either [Port A] or [Port B]. SZ-V04 or SZ-V32 advanced connection: Use two ports [Port A] and [Port B].

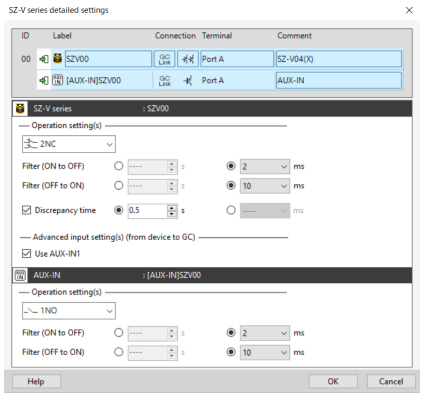
3 SZ-V Series detailed settings

■SZ-V04 simple connection

[Initial setting]



[Setting advanced input/output]

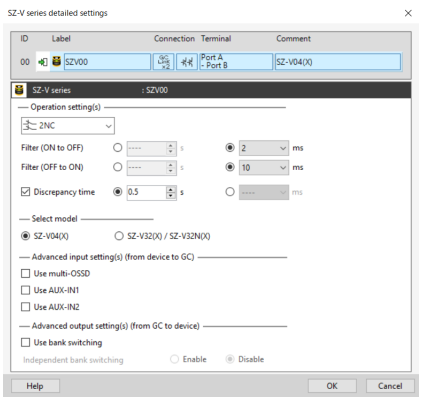


Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced input setting(s)	Use AUX-IN1	With the check box checked, the input block of "AUX-IN" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*1
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].

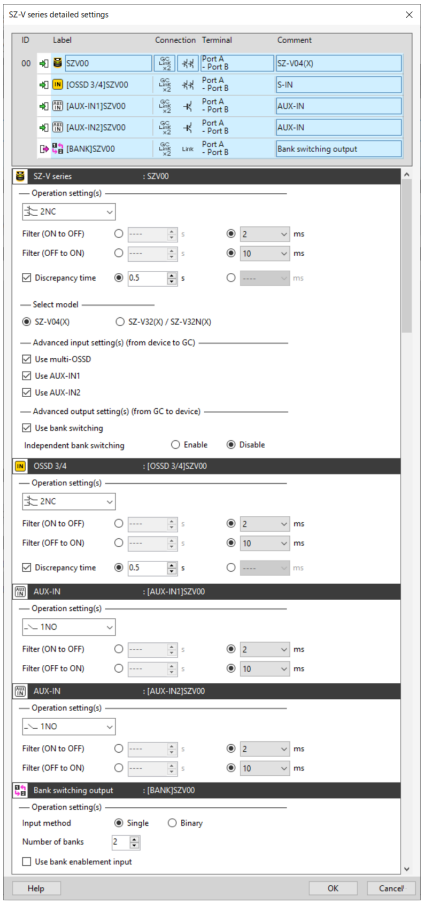
*1 For the SZ-V Series functions and settings, refer to "Safety Laser Scanner SZ-V Series User's Manual".

■ SZ-V04 advanced connection

[Initial setting]



[Setting advanced input/output]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [SZ-V04 (X)].

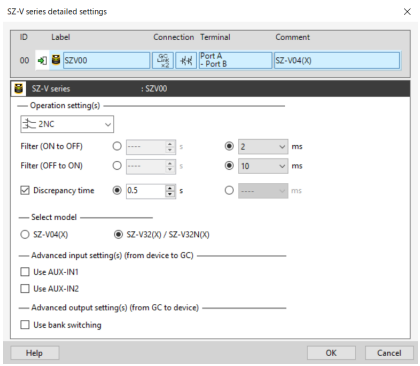
Item		Details
Advanced input setting(s)	Use multi-OSSD	With the check box checked, the input block of "OSSD 3/4" is added. This is used when the multi-OSSD function is enabled by the SZ-V04 (X).
	Use AUX-IN1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.* 1
	Use AUX-IN2	With the check box checked, the input block of "AUX-IN2" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.* 1
Advanced output setting(s)	Use bank switching*	With the check box checked, the output block of "BANK" is added. Bank switching can be performed from the GC Series.
	Independent bank switching	Select [Enable] or [Disable]. * Independent bank switching is enabled only when using multi-OSSD.
OSSD 3/4	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
	Discrepancy time	Same as the above [Discrepancy time].
AUX-IN1/ AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
Bank output	Input method*	Select [Single] or [Binary] when [Independent bank switching] is set to [Disable].
	Number of banks	Set the number of switching banks when [Independent bank switching] is set to [Disable] (Max. four banks). This is fixed to "2" when [Independent bank switching] is set to [Enable].
	Use bank enablement input	With the check box checked, the bank enablement input can be used. The "EN (Enable)" port is added to the output block of "BANK".

For the SZ-V Series functions and settings, refer to "Safety Laser Scanner SZ-V Series User's Manual".

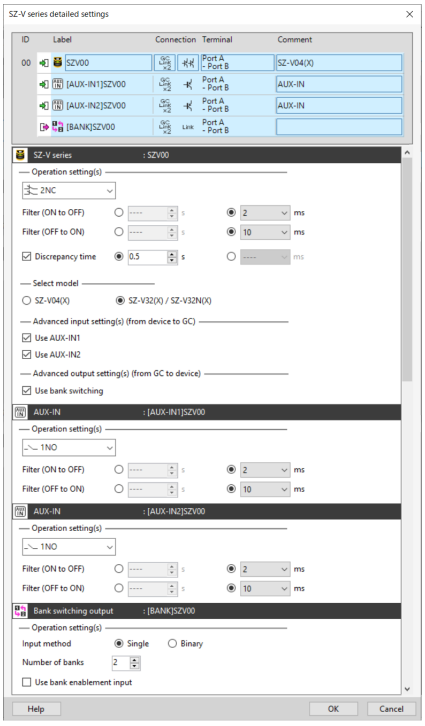
* The bank switching function cannot be used in the EASY mode.

■ SZ-V32 advanced connection

[Initial setting]



[Setting advanced input/output]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [SZ-V32(X)/SZ-V32N(X)].
Advanced input setting(s)	Use AUX-IN1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.* 1
	Use AUX-IN2	With the check box checked, the input block of "AUX-IN2" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.* 1
Advanced output setting(s)	Use bank switching*2	With the check box checked, the "bank switching output" block is added. Bank switching can be performed from the GC Series.

Item		Details
AUX-IN1/ AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
Bank output	Input method	Select [Single] or [Binary].
	Number of banks	Set the number of switching banks (Max. four banks).
	Use bank enablement input	With the check box checked, the bank enablement input can be used. The "EN (Enable)" port is added to the "bank switching output" block.

*1 For the SZ-V Series functions and settings, refer to "Safety Laser Scanner SZ-V Series User's Manual".

*2 The bank switching function cannot be used in the EASY mode.

Useful functions in using GC-Link connection

Bank switching

The bank switching function is used to switch the SZ-V Series protection zone, warning zone, etc.
Switch the bank of the SZ-V Series connected via the GC-Link using the "bank switching output" block.
* The bank switching function cannot be used in the EASY mode.

Reference For the SZ-V Series functions and settings, refer to "Safety Laser Scanner SZ-V Series User's Manual".

Settable bank switching method and number of banks

■ SZ-V04 advanced connection

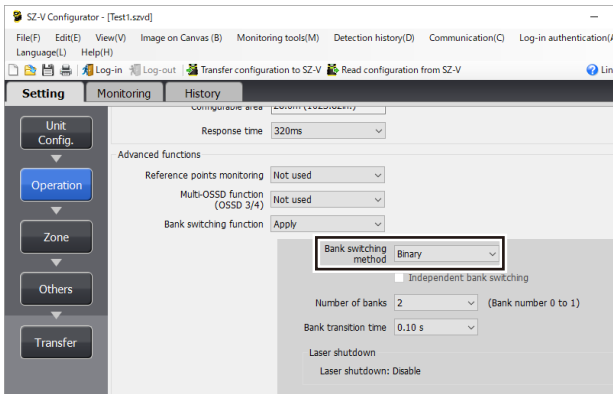
Item	Settings		
Multi-OSSD	Not used	Used	Used
Independent bank switching	-	Disabled	Enabled
(Operation settings)			
Input method	Single/Binary	Single/Binary	-
Number of banks	2 (Fixed)	2 to 4	2 (Fixed)

■ SZ-V32 advanced connection

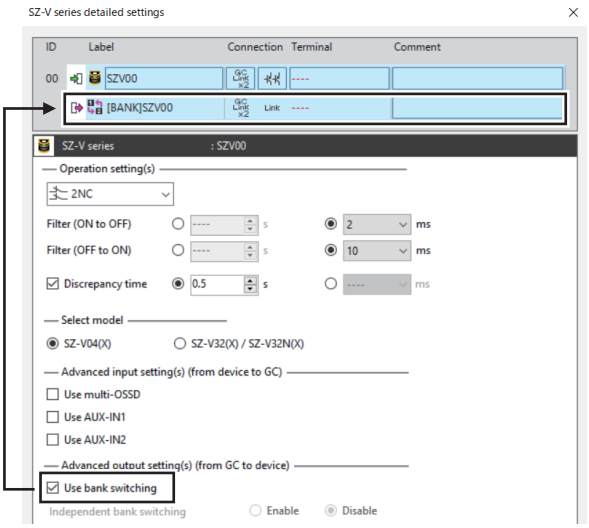
Item	Settings
(Operation settings)	
Input method	Single/Binary
Number of banks	2 to 4

Point **Set the bank switching method to [Binary] on the SZ-V Series side regardless of the bank switching input method setting [Single]/[Binary] of the GC Configurator.**

SZ-V Configurator setting (SZ-V04)

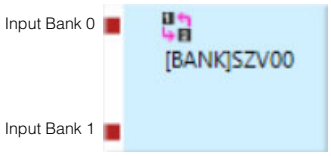


[SZ-V series detailed settings]

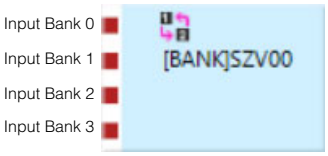


● Input method - Single

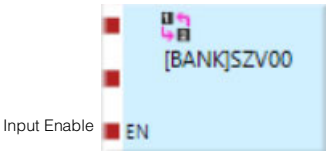
[Number of banks: 2]



[Number of banks: 4]



[Bank enablement input]



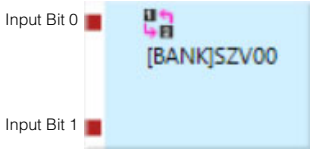
	Bank number			
	0	1	2	3
Bank input 0	ON	OFF	OFF	OFF
Bank input 1	OFF	ON	OFF	OFF
Bank input 2	OFF	OFF	ON	OFF
Bank input 3	OFF	OFF	OFF	ON

Point

- **An error occurs if a bank is not specified or multiple banks are specified.**
- **Select "Binary" as the bank switching method for SZ-V, regardless of the setting of the input method.**

● Input method - Binary

[Number of banks: 2 to 4]



[Bank enablement input]

	Bank number			
	0	1	2	3
Input bit 0	OFF	ON	OFF	ON
Input bit 1	OFF	OFF	ON	ON

Point

If a bank number larger than the set number of banks is specified, the GC Series main controller displays the [Bank Input Mismatch] information.

● Independent bank switching

[Protection zone A]

[Protection zone B]

[Bank enablement input]

	Bank number	
	0	**1**
Bank input 0	ON	OFF
Bank input 1	OFF	ON

Point

An error occurs if the bank input signal state differs from the specified state.

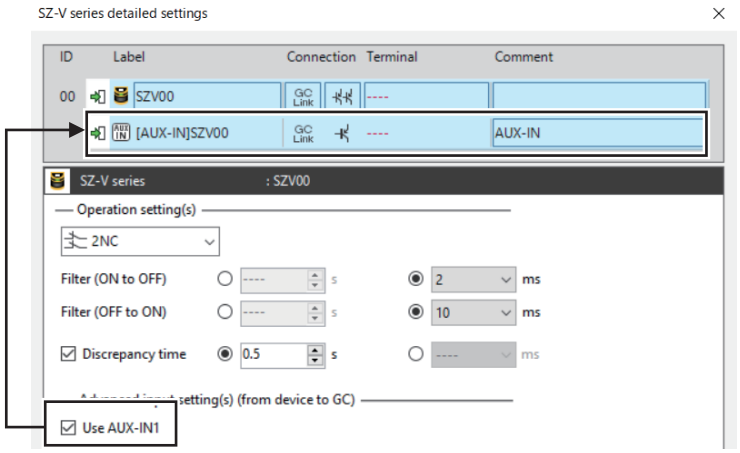
Reference

The independent bank switching function is used to perform switching of two zones independently when using the multi-OSSD function by the SZ-V04(X). Normally, when using the bank switching function, the protection zone of OSSD1/2 (protection zone A) and the protection zone of OSSD3/4 (protection zone B) are switched at the same time. When the independent bank switching function used, you can switch protection zone A and protection zone B at different times.

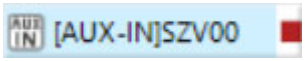
AUX-IN

You can use the AUX output of the SZ-V Series connected via the GC-Link in a program.
Set the function assigned to the AUX output using the SZ-V Configurator.

[SZ-V series detailed settings]



AUX-IN input block



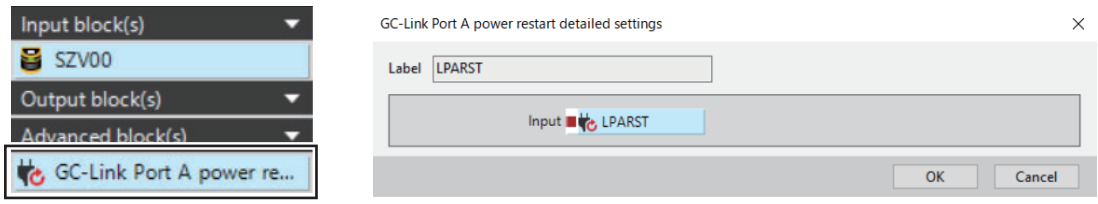
<Functions assigned to AUX>

	SZ-V04 Type	SZ-V32 Type	SZ-V32N Type
Error output	○	○	○
Alert output	○	○	○
Alert or error output	○	○	○
Muted or override state output	○	--	○
Muting lamp output	○	--	○
OSSD status output	○	○	○
Protection zone detection output	○	○	○
Warning zone detection output	○	○	○
Interlock-reset-ready output	○	○	○
Encoder error output	--	○	○
Normal operation transition output	○	○	○

Reference For the SZ-V Series functions and settings, refer to "Safety Laser Scanner SZ-V Series User's Manual".

GC-Link port A (B) power reset

You can restart the SZ-V Series connected via the GC-Link.
When the expansion block of "GC-Link port A (B) power reset" is turned on in a program, the SZ-V Series power supply will be reset for restart.



Safety Laser Scanner SZ Series

The following describes how to connect the Safety Laser Scanner SZ Series via the GC-Link and the settings.

Reference

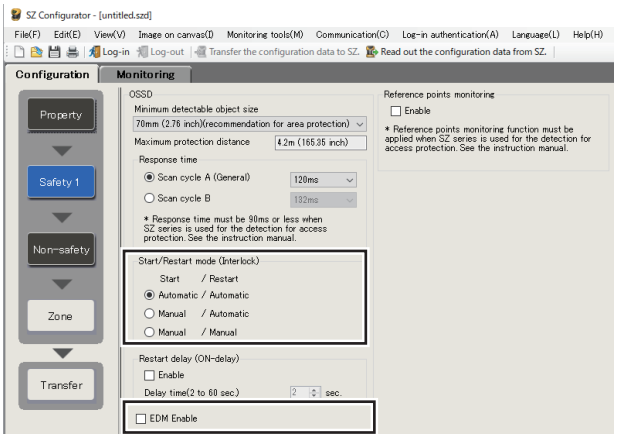
For the installation method and usage of the SZ Series, refer to the following manual.
"Safety Laser Scanner SZ Series User's Manual"

GC Link compatible SZ Series models

Only the SZ-01S can be connected to the GC-Link connection port. The SZ-04M/16V/16D cannot be connected.

Point

- **To use the SZ Series, you need to set the SZ Series main controller using the SZ Configurator.**
  •Use the following settings for [Safety 1].

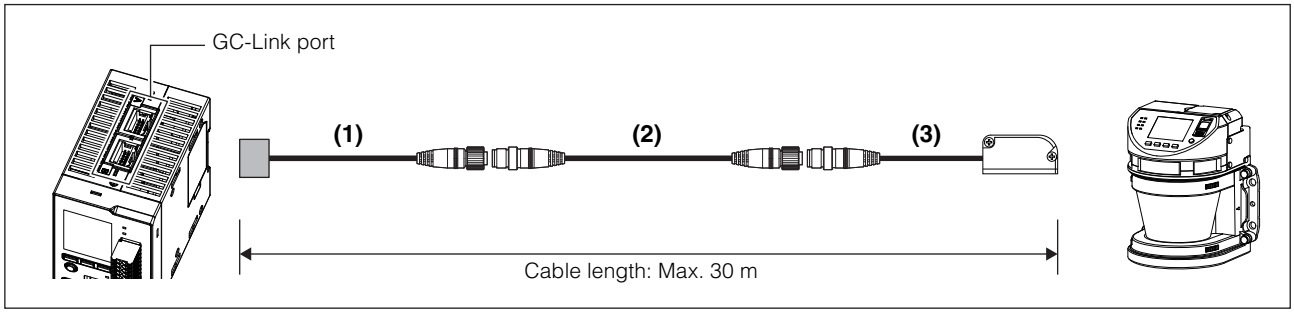


Item	Settings
Start/Restart mode (Interlock)	Automatic / Automatic
EDM enabled	Unchecked

•Perform other settings according to the functions you will use.

■ Connection cables

Use the following cables to connect the SZ Series via the GC-Link.



	Name	Model	Quantity	Length (m)
(1)	GC-Link cable for SZ-V04 (5 pins), 0.3 m	SZ-VCG03	1	0.3
(2)	Extension cable (5 pins), 7 m	SZ-CC7PS	1	7
(3)	Main controller connection cable (5 pins), 0.3 m	SZ-PC03PS	1	0.3

■ Cable length

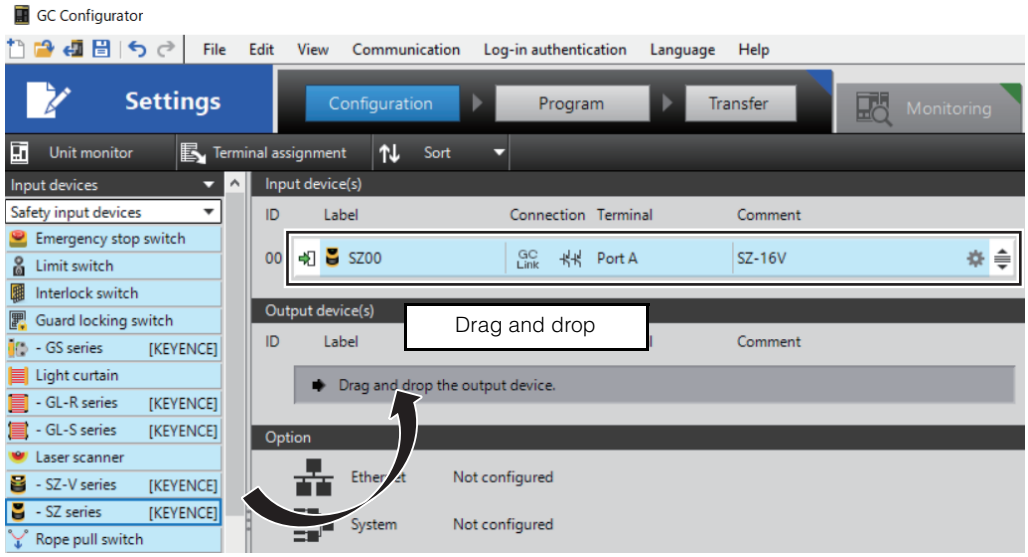
Prevent the cable length between the GC Series and the SZ Series from exceeding 30 m.

DANGER	**All of the cables must be used within the specified length range. Otherwise, the safety functions may not work properly, allowing for a dangerous situation to exist.**

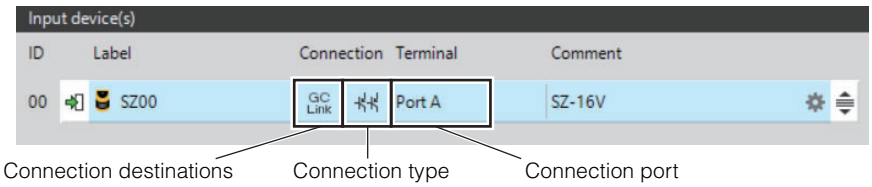
GC Configurator settings

1 Registering input devices

Select [SZ series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



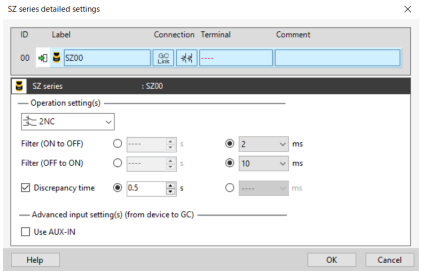
2 Input device basic settings



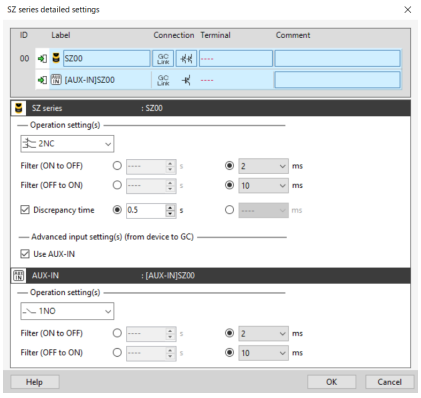
Item	Settings
Connection destinations	Select [GC-Link port].
Connection type	Fixed to [PNP 2 inputs].
Connection port	Select either [Port A] or [Port B].

3 SZ Series detailed settings

[Initial setting]



[Setting advanced input/output]



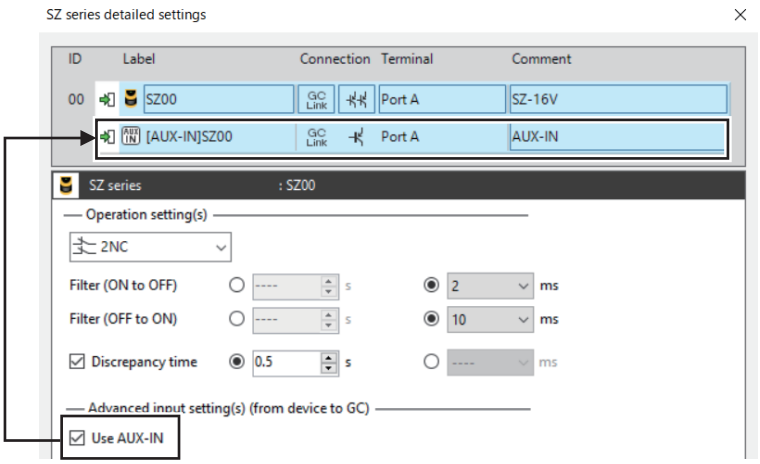
Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced input setting(s)	Use AUX-IN	With the check box checked, the input block of "AUX-IN" is added. The AUX output of the SZ Series can be used in a program. Set the function assigned to the AUX output using the SZ Configurator.* 1
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].

For the SZ Series functions and settings, refer to "Safety Laser Scanner SZ Series User's Manual".

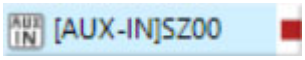
AUX-IN

You can use the AUX output of the SZ Series connected to the GC-Link port in a program.
Set the function assigned to the AUX output using the SZ-V Configurator.

[SZ series detailed settings]



AUX-IN input block



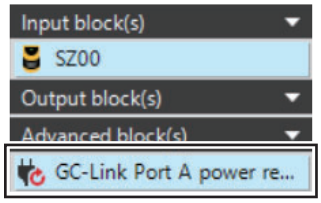
<Functions assigned to AUX>

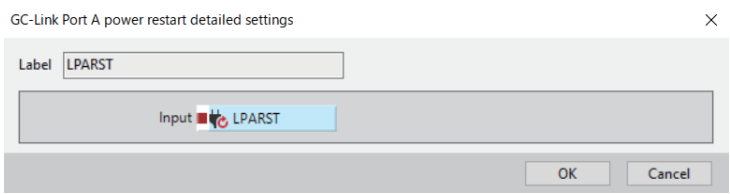
	SZ-01S	SZ-16V/16D
Error output	O	O
Alert output	O	O
Alert or error output	O	O
OSSD status output	O	O
Protection zone detection output	O	O
Warning zone detection output	O	O
Interlock-reset-ready output	O	O
State information output	-	O

Reference For the SZ Series functions and settings, refer to "Safety Laser Scanner SZ Series User's Manual".

GC-Link port A (B) power reset

You can restart the SZ Series connected via the GC-Link.
When the expansion block of "GC-Link port A (B) power reset" is turned on in a program, the SZ Series power supply will be reset for restart.



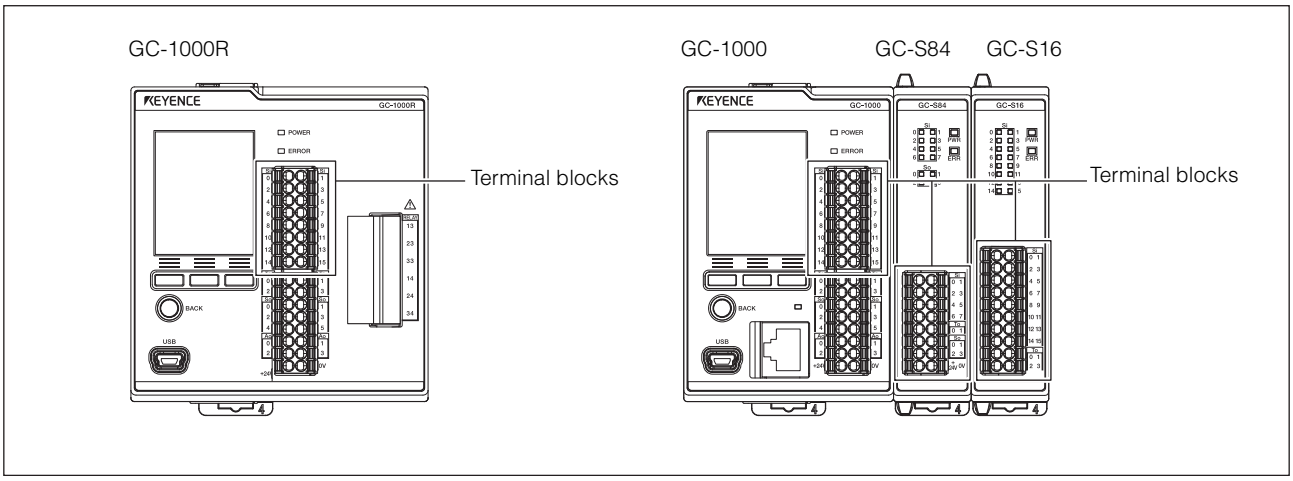


Connecting to Terminal Blocks

Connecting to terminal blocks

KEYENCE safety sensors can be connected to the terminal blocks of the main controller "GC-1000"/"GC-1000R" and expansion unit "GC-S84"/"GC-S16" connectors.

Model	Output points
GC-1000	Safety input 16 points
GC-1000R	Safety input 14 points
GC-S84	Safety input 8 points
GC-S16	Safety input 16 points



For the wiring and settings of each series of KEYENCE safety sensors, refer to the following pages.

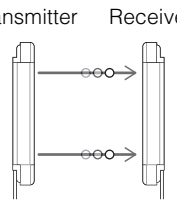
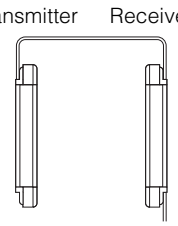
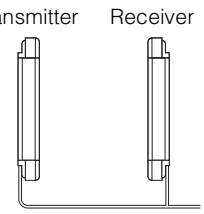
"GL-R Series"(page 6-111)
"GL-S Series"(page 6-117)
"GS Series (Non-contact Type)"(page 6-122)
"GS Series (Lock Type)"(page 6-127)
"GS-M Series"(page 6-133)
"SZ-V Series"(page 6-138)
"SZ Series"(page 6-149)

Safety Light Curtain GL-R Series

The following describes how to connect the Safety Light Curtain GL-R Series to the terminal block and the settings.

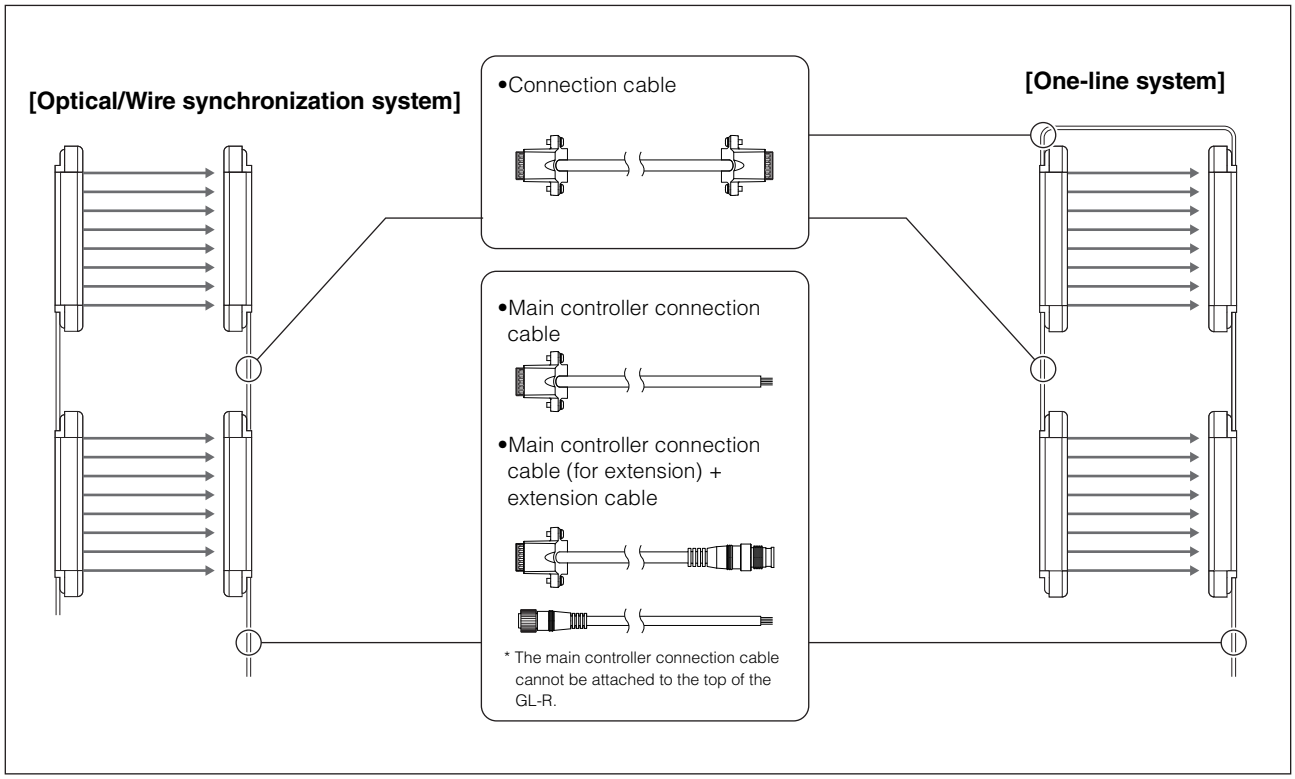
Reference For the installation method and usage of the GL-R Series, refer to the following manual.
"Safety Light Curtain GL-R Series User's Manual"

Wiring systems and applicable cables

Wiring system		Optical synchronization system	One-line system	Wire synchronization system
Wiring image				
	Transmitter	5-core cable	Connection cable	7-core cable
Applicable cables	Receiver	5-core cable 11-core cable	5-core cable 11-core cable	7-core cable 11-core cable

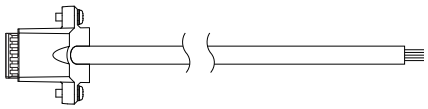
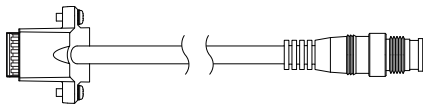
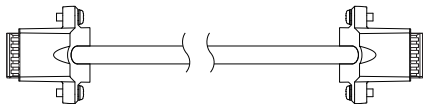
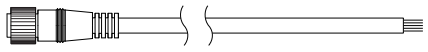
Reference The available functions vary by the combination of wiring system and cable used.
For details, refer to <GL-R function details by wiring system>(page 6-51).

■ Outline drawing for installation



■ Cables

Point **Only the PNP output type cable can be used.**

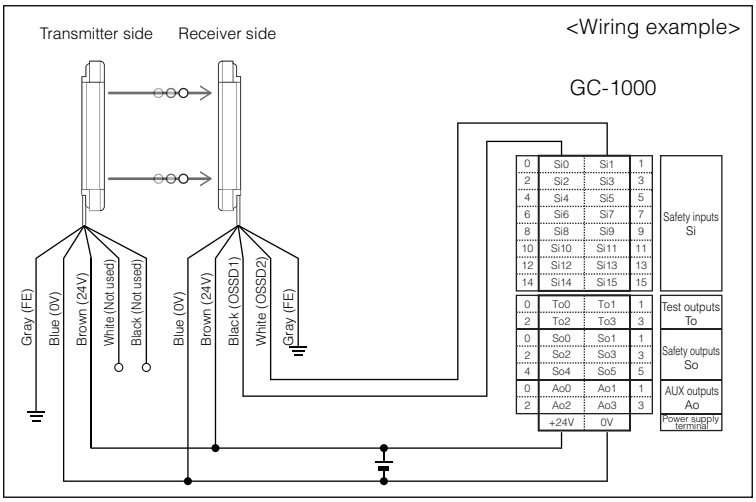
Shape	Number of cores	Length (m)	Model
Main controller connection cable 	5 cores	5	GL-RP5P
		10	GL-RP10P
	7 cores	5	GL-RP5PS
		10	GL-RP10PS
	11 cores	5	GL-RP5PM
		10	GL-RP10PM
Main controller connection cable for extension 	5 cores	0.3	GL-RPC03P
	7 cores	0.3	GL-RPC03PS
	11 cores	0.3	GL-RPC03PM
Connection cable 	Connection cable	0.08	GL-RS008
		0.15	GL-RS015
		0.5	GL-RS05
		1	GL-RS1
		3	GL-RS3
		5	GL-RS5
		10	GL-RS10
Extension cable* 	5-core M12 connector (5 pins, female)	5	GL-RC5
		10	GL-RC10
		20	GL-RC20
	7-core M12 connector (8 pins, female)	5	GL-RC5S
		10	GL-RC10S
		20	GL-RC20S
	11-core M14 connector (12 pins, female)	5	GL-RC5M
		10	GL-RC10M
		20	GL-RC20M

* For the combined use of the main controller connection cable for extension and extension cable, the cables must have the same number of cores.

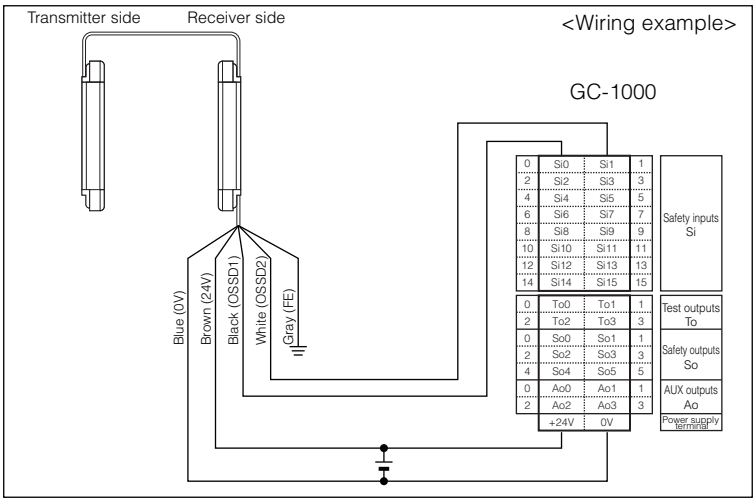
Wiring examples

Reference For the wiring method of the GL-R Series, refer to the following manual.
"Safety Light Curtain GL-R Series User's Manual"

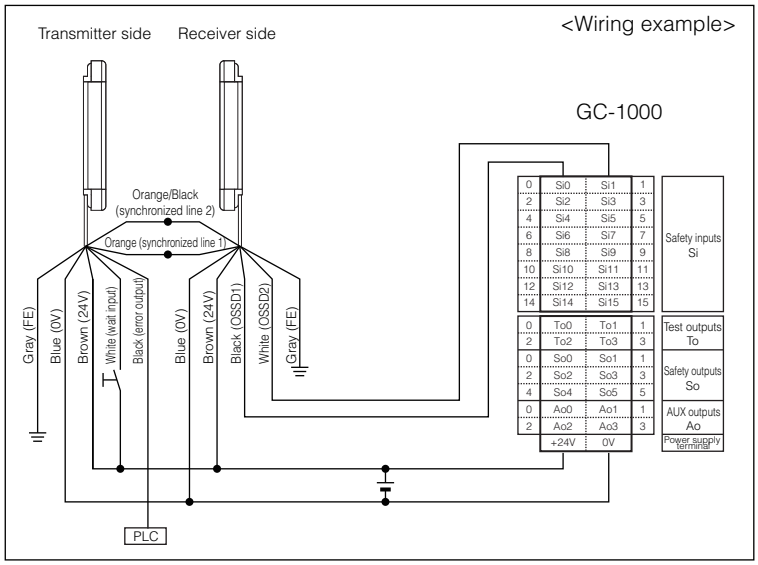
■ Optical synchronization system (Transmitter: 5-core cable, Receiver: 5-core cable)



■ One-line system (Transmitter: Connection cable, Receiver: 5-core cable)



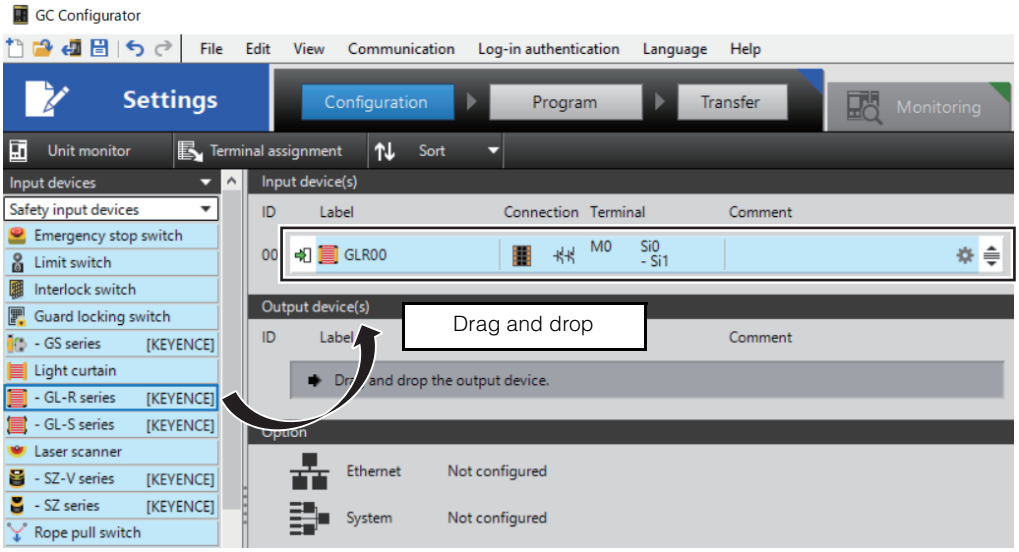
■ Wire synchronization system (Transmitter: 7-core cable, Receiver: 7-core cable)



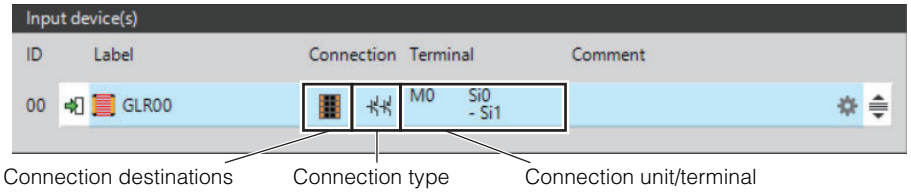
GC Configurator settings

1 Registering input devices

Select [GL-R series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.

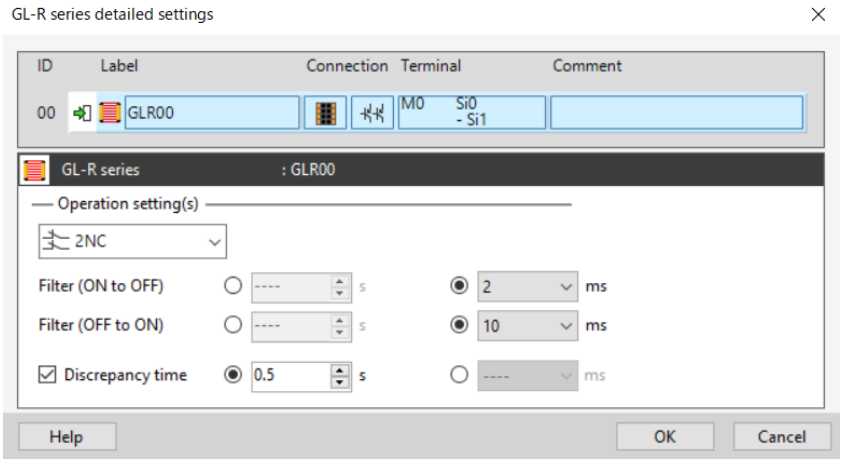


2 Input device basic settings



Item	Settings
Connection destinations	Select [Terminal block].
Connection type	Fixed to [PNP 2 inputs].
Connection unit/terminal	Assign the unit to be connected and the terminal.

3 GL-R Series detailed settings



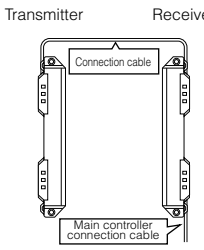
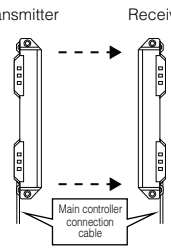
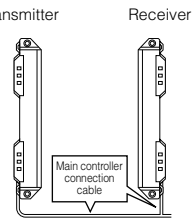
Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Safety Light Curtain GL-S Series

The following describes how to connect the Safety Light Curtain GL-S Series to the terminal block and the settings.

Reference For the installation method and usage of the GL-S Series, refer to the following manual.
"Safety Light Curtain GL-S Series User's Manual"

Wiring systems and applicable cables

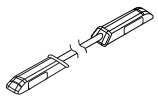
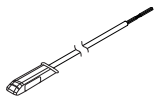
Wiring system	One-line system	Optical synchronization system	Wire synchronization system
Wiring image			

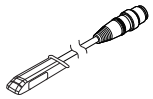
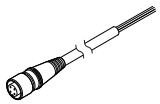
Reference The available functions vary by the combination of wiring system and cable used.
For details, refer to <GL-S function details by wiring system>(page 6-52).

■ Cables

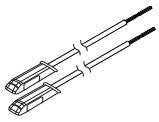
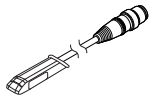
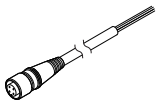
Point **Only the PNP output type cable can be used.**

One-line system

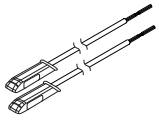
		Length (m)	Model
<Connection cable>			
Connection cable (Quantity: 1, for series connection)		0.07	GL-SS007
		0.15	GL-SS015
		0.5	GL-SS05
		1	GL-SS1
		2	GL-SS2
		3	GL-SS3
		5	GL-SS5
<Main controller connection cable>			
Not extended (Max. 10 m)	One-line system dedicated cable (Quantity: 1)		2	GL-SP2P1
			5	GL-SP5P1
			10	GL-SP10P1

			Length (m)	Model
Extended	Main controller connection cable (Quantity: 1)		0.3	GL-SPC03P
	M12 Standard cable (Quantity: 1)		2	OP-75721
			5	OP-87272
			10	OP-85502
	Extension cable (Quantity: 1)		2	OP-85503
			5	OP-85504

Optical synchronization system

			Length (m)	Model
<Main controller connection cable>				
Not extended (Max. 10 m)	Standard cable (Quantity: 1 set (transmitter/receiver))		2	GL-SP2P
			5	GL-SP5P
			10	GL-SP10P
Extended	Main controller connection cable (Quantity: 1) * 2 pieces required		0.3	GL-SPC03P
	M12 Standard cable (Quantity: 1) * 2 pieces required		2	OP-75721
			5	OP-87272
			10	OP-85502
	Extension cable (Quantity: 1) * 2 pieces required		2	OP-85503
			5	OP-85504

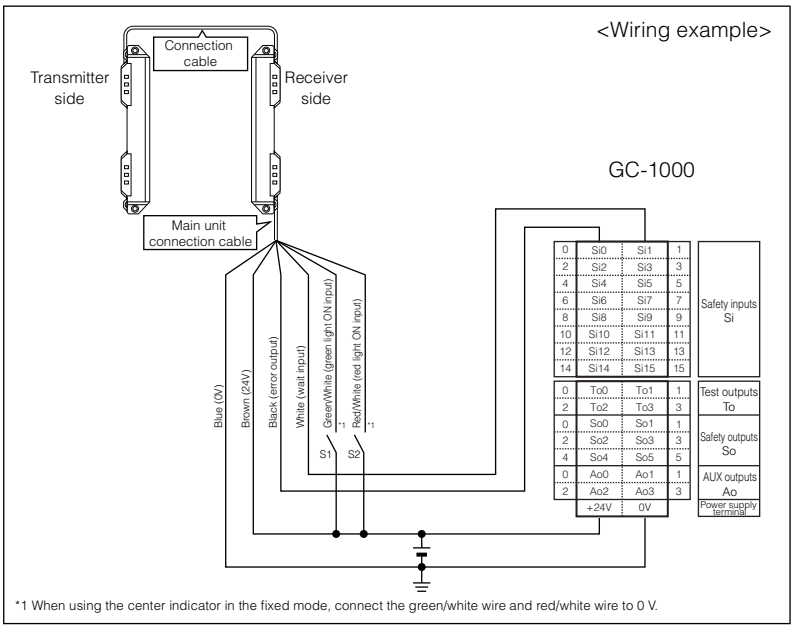
Wire synchronization system

		Length (m)	Model
<Main controller connection cable>			
Standard cable (Quantity: 1 set (transmitter/receiver))		2	GL-SP2P
		5	GL-SP5P
		10	GL-SP10P

Wiring examples

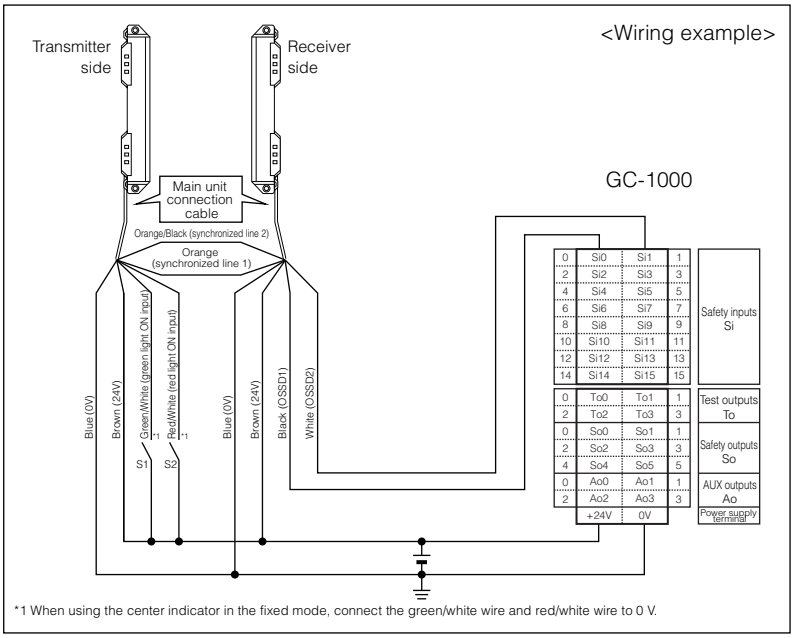
Reference For the wiring method of the GL-S Series, refer to the following manual.
"Safety Light Curtain GL-S Series User's Manual"

■ One-line system (one-line system dedicated cable)



*1 When using the center indicator in the fixed mode, connect the green/white wire and red/white wire to 0 V.

■ Wire/Optical synchronization system (standard cable)

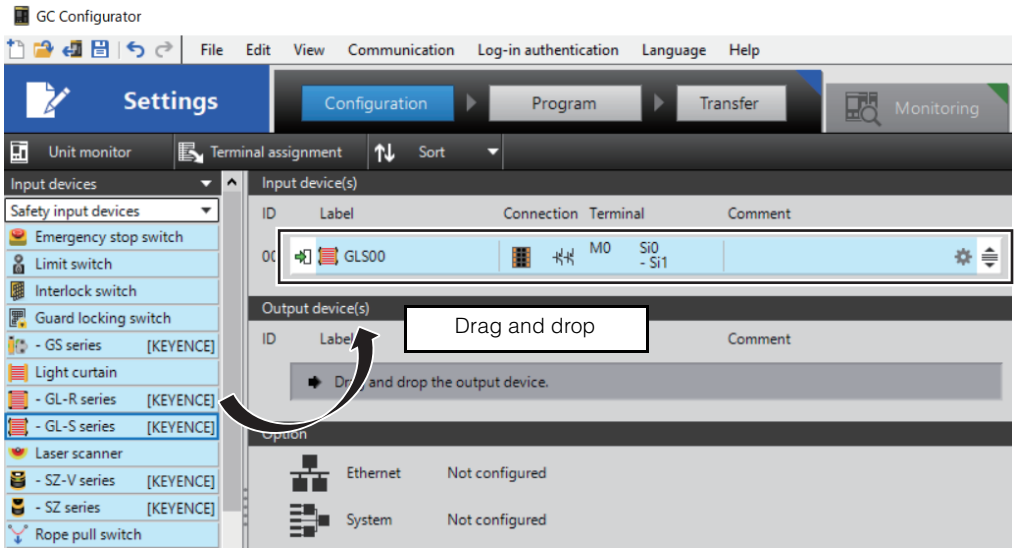


*1 When using the center indicator in the fixed mode, connect the green/white wire and red/white wire to 0 V.

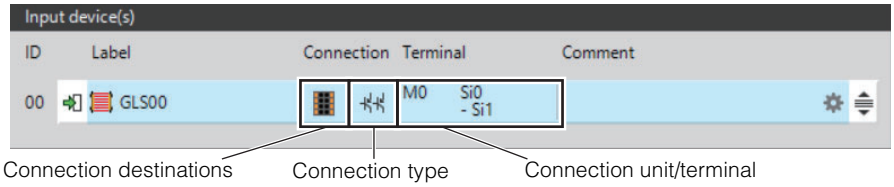
GC Configurator settings

1 Registering input devices

Select [GL-S series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.

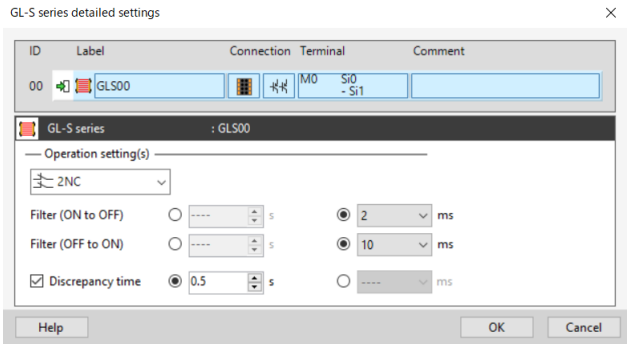


2 Input device basic settings



Item	Settings
Connection destinations	Select [Terminal block].
Connection type	Fixed to [PNP 2 inputs].
Connection unit/terminal	Assign the unit to be connected and the terminal.

3 GL-S Series detailed settings



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Safety Interlock Switch GS Series (Non-contact)

The following describes how to connect the Safety Interlock Switch GS Series (Non-contact) to the terminal block and the settings.

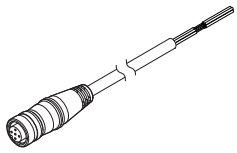
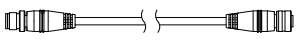
Reference For the installation method and usage of the GS Series (Non-contact), refer to the following manual.
"Safety Interlock Switch GS Series (Non-contact) User's Manual"

Compatible models and applicable cables

Point **Only the GS Series (Non-contact) PNP output types can be used.**

Cable type	Simple function type	Standard types	Advanced function types
Cable draw-out type (5 m)	-	GS-11P5	GS-13P5
Cable draw-out type (10 m)	-	GS-11P10	-
M12 connector type	GS-10PC	GS-11PC	GS-13PC

■ Cables for M12 connector type

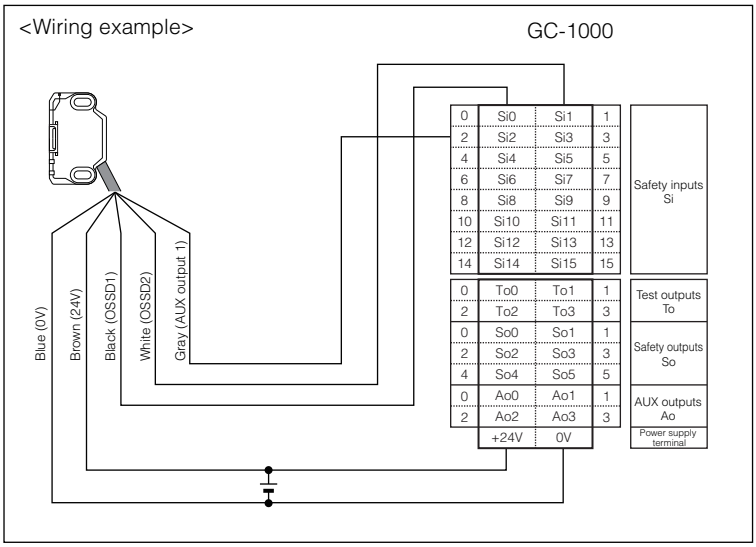
Type		Length (m)	Model
Standard cable: Simple function type (5 pins)		5	GS-P5C5
		10	GS-P5C10
Standard cable: Standard type (8 pins)		5	GS-P8C5
		10	GS-P8C10
Standard cable: Advanced function type (12 pins)		5	GS-P12C5
		10	GS-P12C10
		20	GS-P12C20
Extension cable: Simple function type (5 pins)		1	GS-P5CC1
		5	GS-P5CC5
		10	GS-P5CC10
Extension cable: Standard type (8 pins)		1	GS-P8CC1
		5	GS-P8CC5
		10	GS-P8CC10

Wiring examples

Reference For the wiring method of the GS Series (Non-contact), refer to the following manual.
"Safety Interlock Switch GS Series (Non-contact) User's Manual"

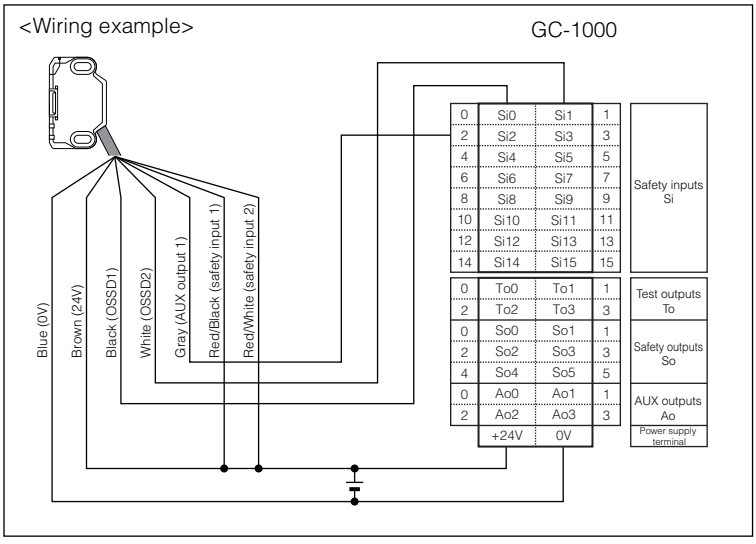
■ Simple function type

Simple function type
GS-10PC
PNP output



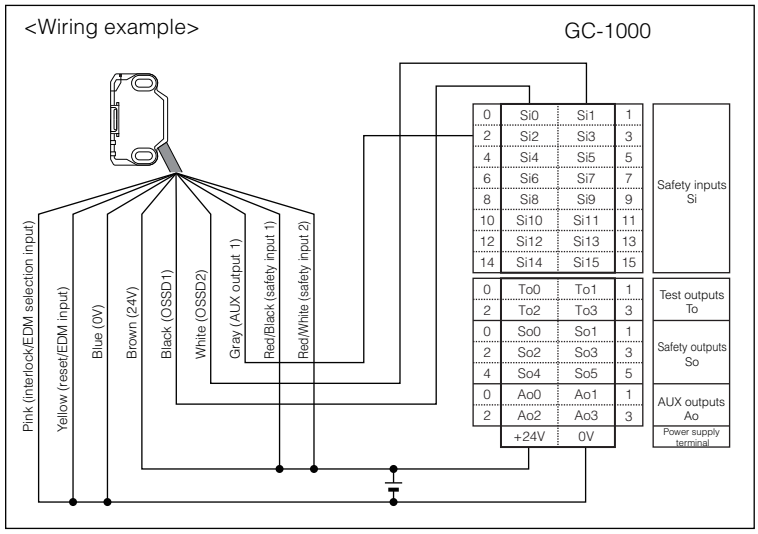
■ Standard types

Standard type
GS-11P5
PNP output
Cascade connection: None



■ Advanced function types

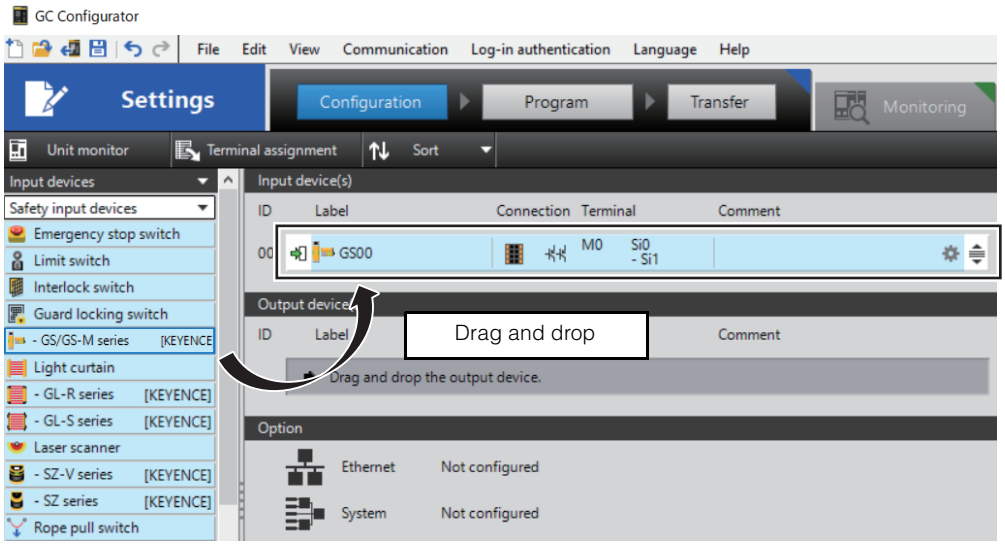
Standard type
GS-13P5
PNP output
Cascade connection: None
Interlock: Auto
EDM: Not used



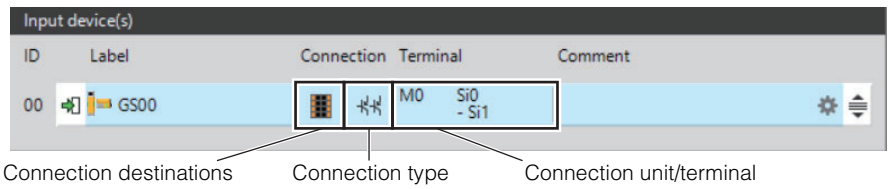
GC Configurator settings

1 Registering input devices

Select [GS series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



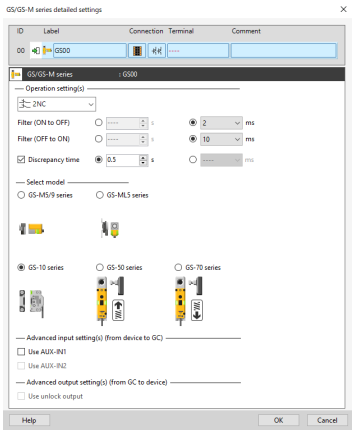
2 Input device basic settings



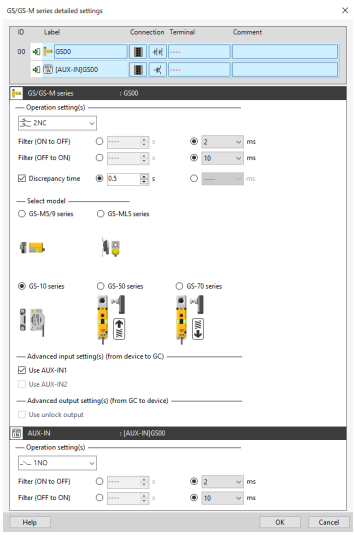
Item	Settings
Connection destinations	Select [Terminal block].
Connection type	Fixed to [PNP 2 inputs].
Connection unit/terminal	Assign the unit to be connected and the terminal.

3 GS Series detailed settings

[Initial setting]



[Setting advanced input/output]



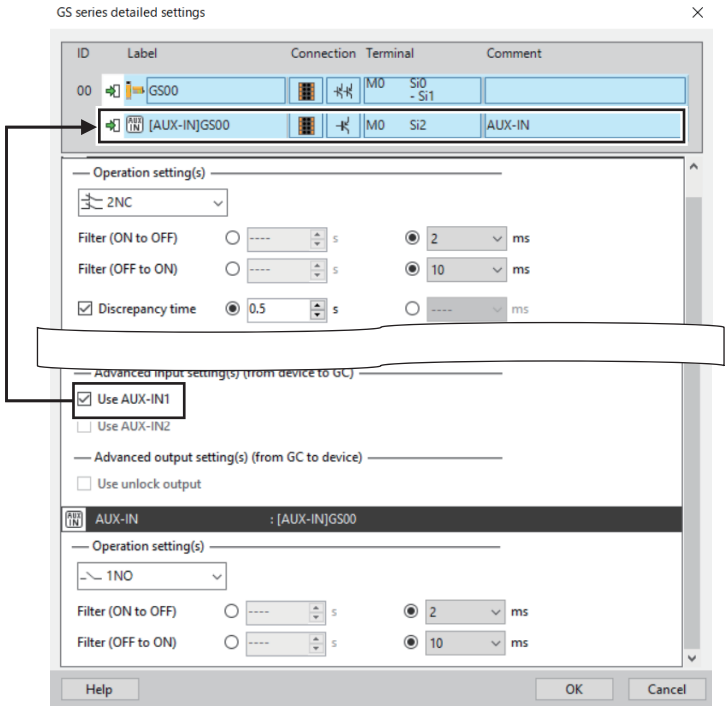
Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [GS-10 series].
Advanced input setting(s)	Use AUX-IN1	With the check box checked, the input block of "AUX-IN" is added. The AUX output of the GS Series can be used in a program.
	Use AUX-IN2	This cannot be selected by the GS-10 Series.
Advanced output setting(s)	Use unlock output	This cannot be selected by the GS-10 Series.

Item		Details
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].

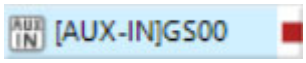
■ AUX-IN

The AUX output of the GS Series can be used in a program.

[GS series detailed settings]



AUX-IN input block



Safety Interlock Switch GS Series (Lock)

The following describes how to connect the Safety Interlock Switch GS Series (Lock) to the terminal block and the settings.

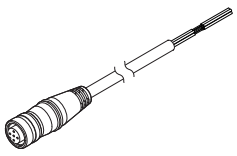
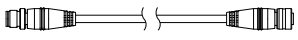
Reference For the installation method and usage of the GS Series (Lock), refer to the following manual.
"Safety Interlock Switch GS Series (Lock) User's Manual"

Compatible models and applicable cables

Point **Only the GS Series (Lock) PNP output types can be used.**

	Power-to-release		Power-to-lock	
Cable type	**Standard types**	**Advanced function types**	**Standard types**	**Advanced function types**
Cable draw-out type (5 m)	GS-51P5	-	GS-71P5	-
Cable draw-out type (10 m)	GS-51P10	-	GS-71P10	-
M12 connector type	GS-51PC	GS-53PC	GS-71PC	GS-73PC

■ Cables for M12 connector type

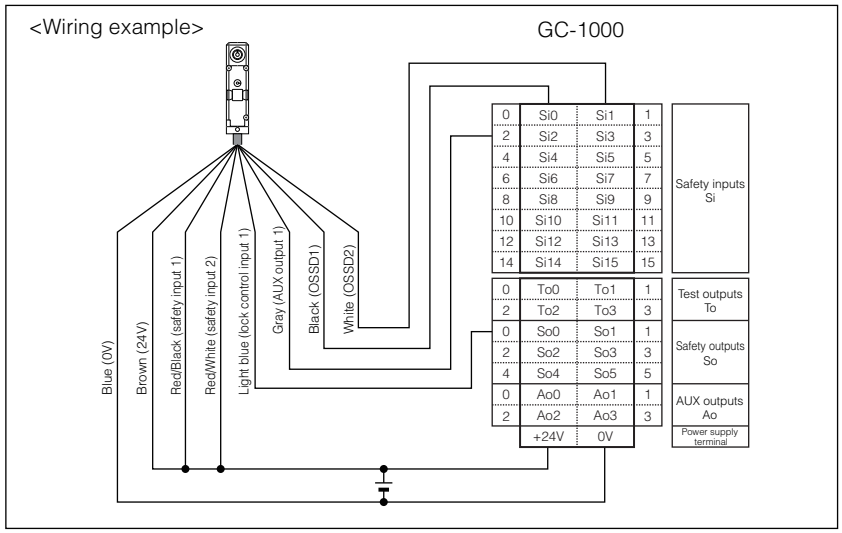
Type		Length (m)	Model
Standard cable: Simple function type (5 pins)		5	GS-P5C5
		10	GS-P5C10
Standard cable: Standard type (8 pins)		5	GS-P8C5
		10	GS-P8C10
Standard cable: Advanced function type (12 pins)		5	GS-P12C5
		10	GS-P12C10
		20	GS-P12C20
Extension cable: Simple function type (5 pins)		1	GS-P5CC1
		5	GS-P5CC5
		10	GS-P5CC10
Extension cable: Standard type (8 pins)		1	GS-P8CC1
		5	GS-P8CC5
		10	GS-P8CC10

Wiring examples

Reference For the wiring method of the GS Series (Lock), refer to the following manual.
"Safety Interlock Switch GS Series (Lock) User's Manual"

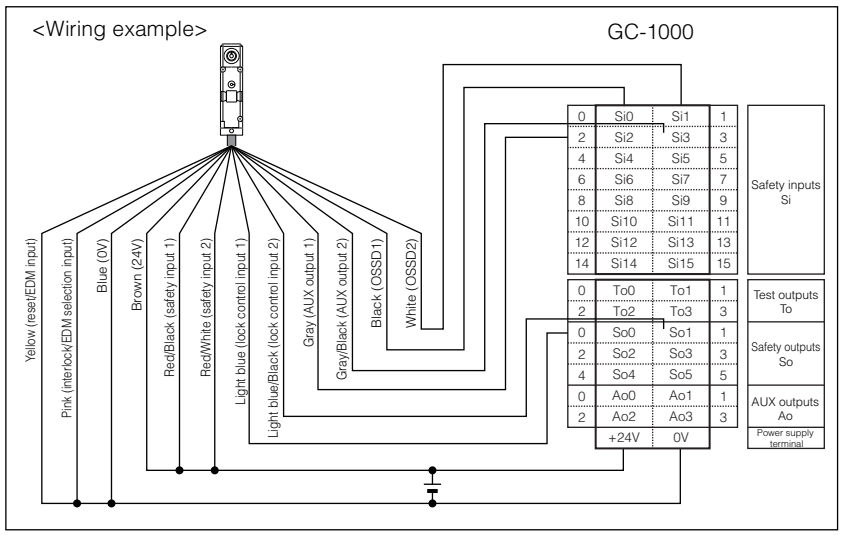
■ Power-to-release standard type

Power-to-release type
Standard type
GS-51P5
PNP output
Cascade connection: None



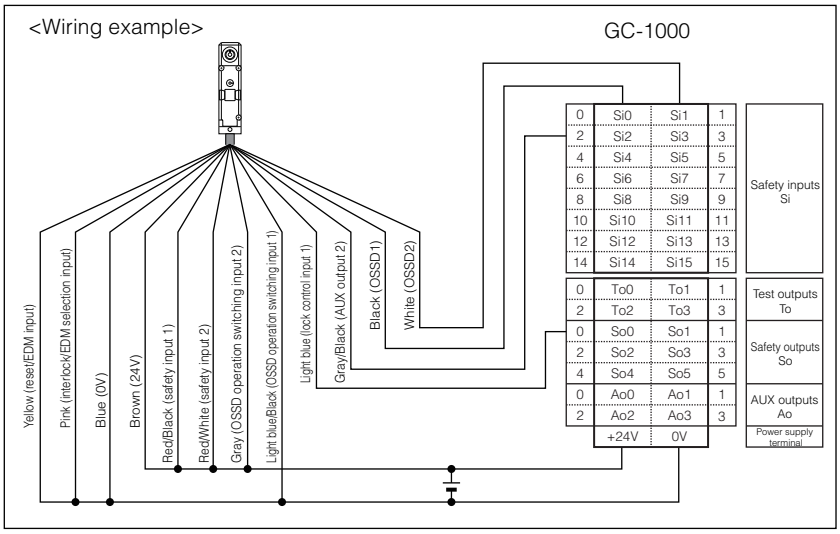
■ Power-to-release advanced function type

Power-to-release type
Advanced function type
GS-53PC
PNP output
Cascade connection: None
Interlock: Auto
EDM: Not used



■ Power-to-lock advanced function type

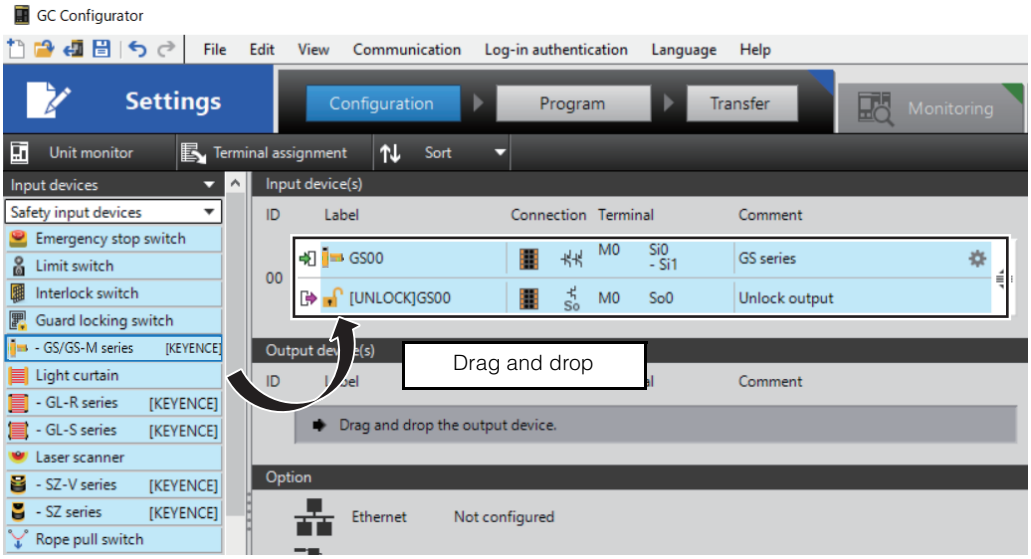
Power-to-lock type
Advanced function type
GS-73PC
PNP output
Cascade connection: None
Interlock: Auto
EDM: Not used
OSSD operation: Open/close link



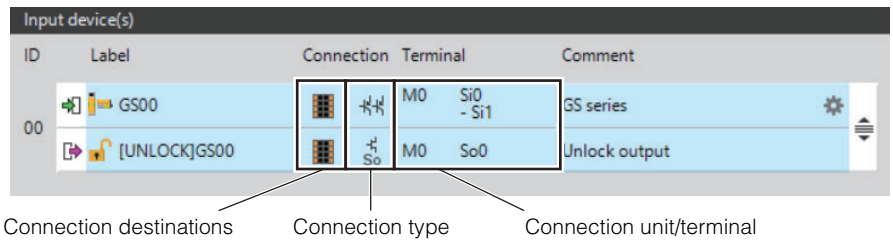
GC Configurator settings

1 Registering input devices

Select [GS series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



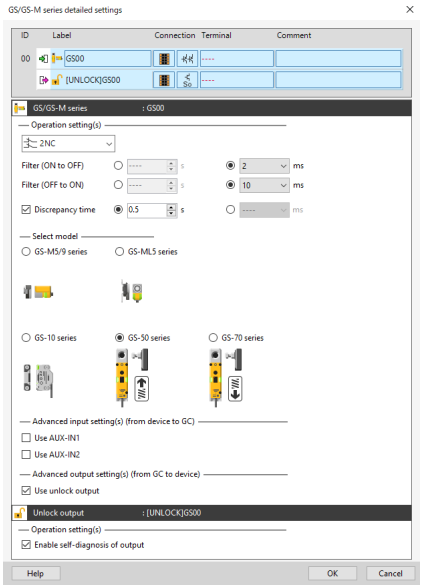
2 Input device basic settings



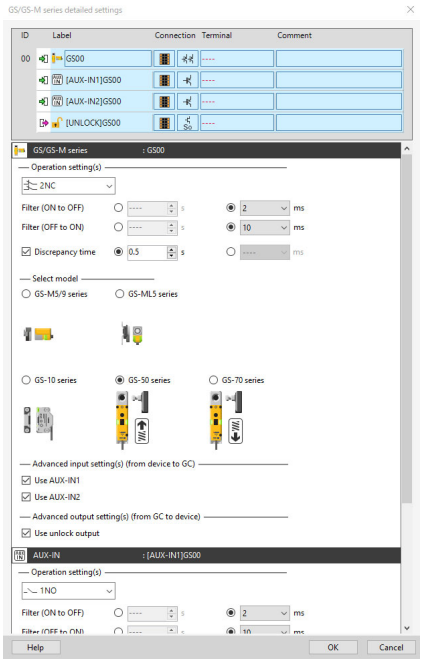
Item		Settings
GS Series	Connection destinations	Select [Terminal block].
	Connection type	Fixed to [PNP 2 inputs].
	Connection unit/terminal	Assign the unit to be connected and the terminal.
Unlock output	Connection type	Select [Safety output x 1], [Safety output x 2] or [AUX output].

3 GS Series detailed settings

[Initial setting]



[Setting advanced input/output]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [GS-50 series] or [GS-70 series].
Advanced input setting(s)	Use AUX-IN1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the GS Series can be used in a program.
	Use AUX-IN2	With the check box checked, the input block of "AUX-IN2" is added. The AUX output of the GS Series can be used in a program.

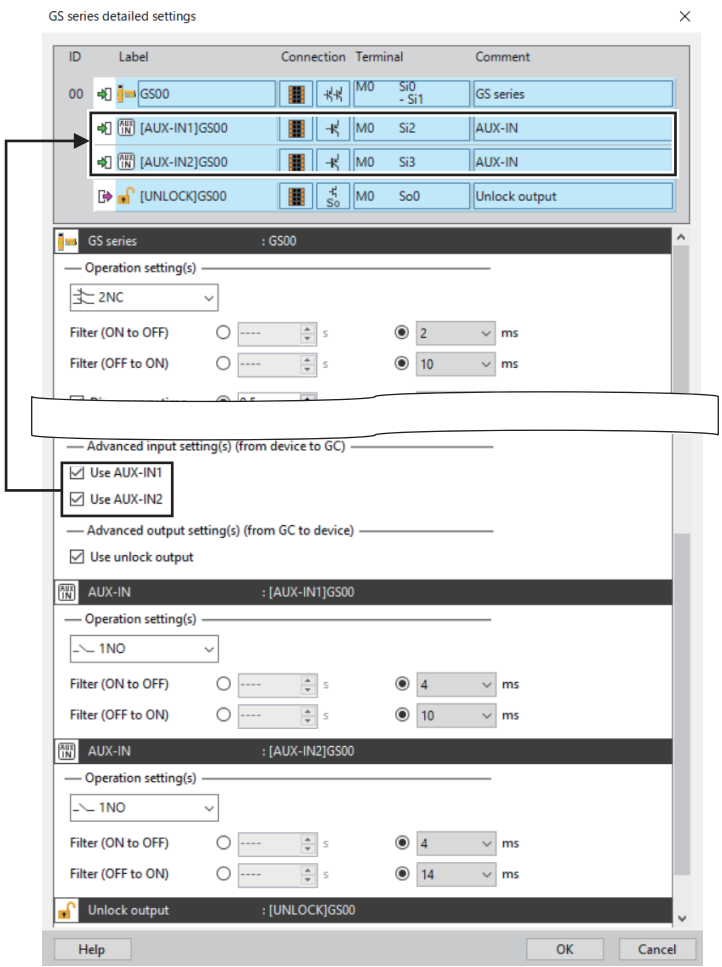
Item		Details
Advanced output setting(s)	Use unlock output	With the check box checked, the "unlock output" block is added.
AUX-IN1/AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
Unlock output	Enable self-diagnosis of output*1	Check this check box to enable the self-diagnosis function for the unlock output.

*1 This is available only when [Safety output x 1] or [Safety output x 2] is selected for the connection type.

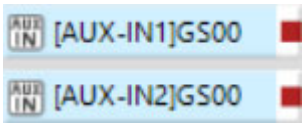
■ AUX-IN

The AUX output of the GS Series can be used in a program.

[GS series detailed settings]



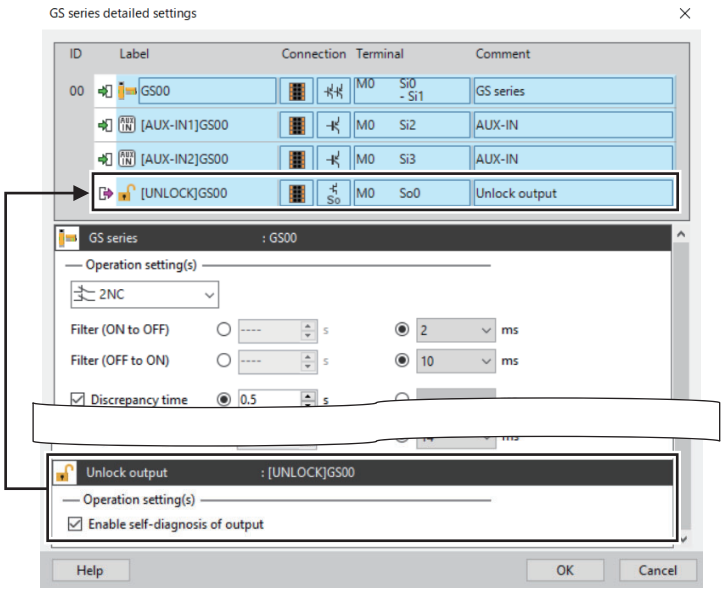
AUX-IN input block



■ Unlock output

You can unlock the GS Series through a program.

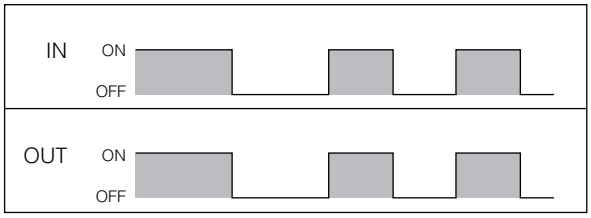
[GS series detailed settings]



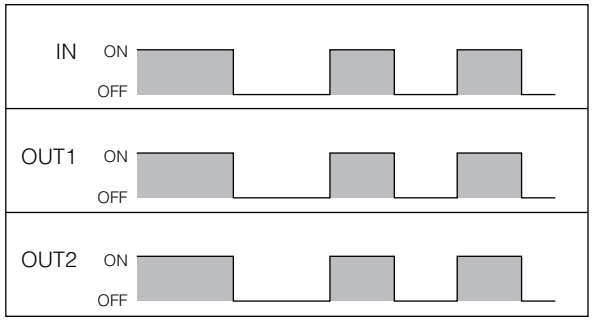
Unlock output block

Unlock output operation: Power-to-release (GS-50 Series)

"Safety output x 1"

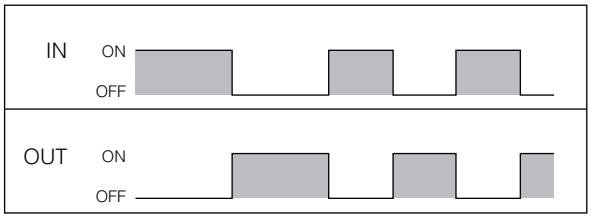


"Safety output x 2"



Unlock output operation: Power-to-lock (GS-70 Series)

"Safety output x 1"



Safety Interlock Switch GS-M Series

The following describes how to connect the Safety Interlock Switch GS-M Series to the terminal block and the settings.

Reference For the installation method and usage of the GS-M Series, refer to the following manual.
"Safety Interlock Switch GS-M Series User's Manual"

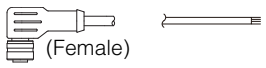
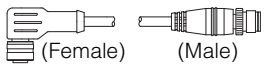
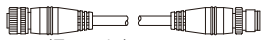
Compatible models and applicable cables

Point **Only the GS-M Series PNP output types can be used.**

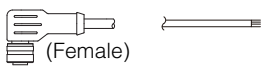
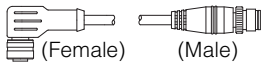
Type		Model
Terminal		GS-M50P
M12 connector	Standard	GS-M51P/M91P/ ML51P
	Advanced function	GS-M53P/M93P/ ML53P

■ Cables for M12 connector type

Standard (8-pin)

Model	Shape	Length (m)
GS-P8L3	 (Female)	3
GS-P8C3	(Female)	3
GS-P8C5		5
GS-P8C10		10
GS-P8LC1	 (Female) (Male)	1
GS-P8CC1	 (Female) (Male)	1
GS-P8CC3		3
GS-P8CC5		5
GS-P8CC10		10

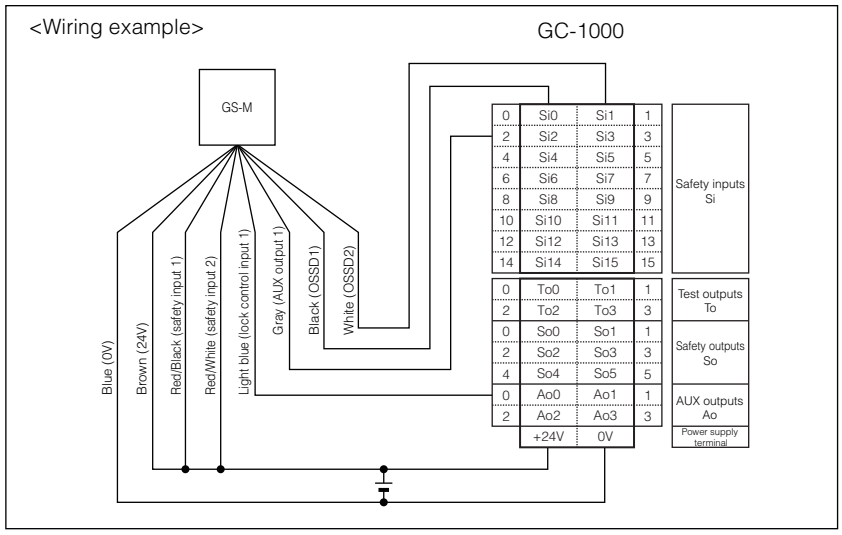
Advanced function (12-pin)

Model	Shape	Length (m)
GS-P12L3	 (Female)	3
GS-P12C3	(Female)	3
GS-P12C5		5
GS-P12C10		10
GS-P12C20		20
GS-P12LC1	 (Female) (Male)	1

Wiring examples

■ Standard type

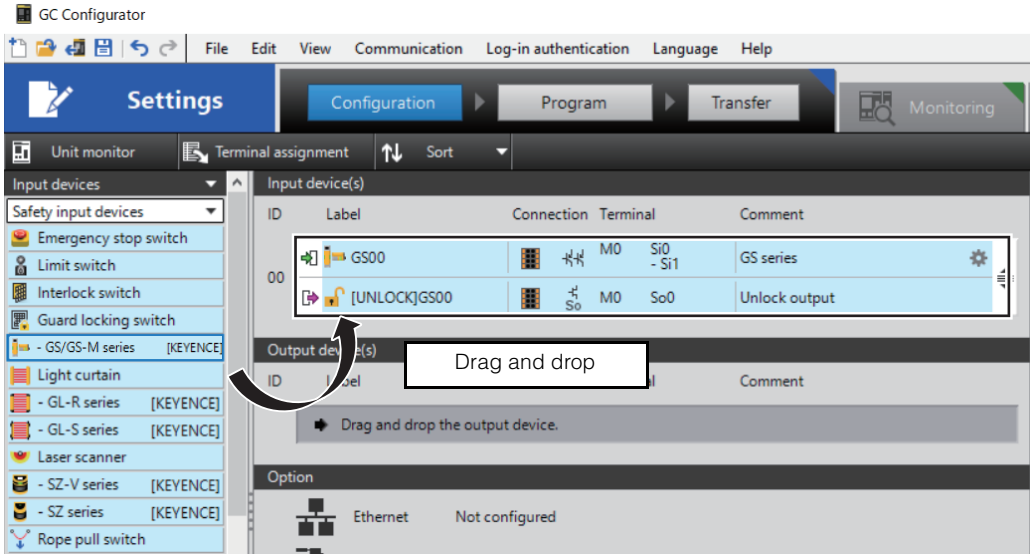
PNP output
Cascade connection: None



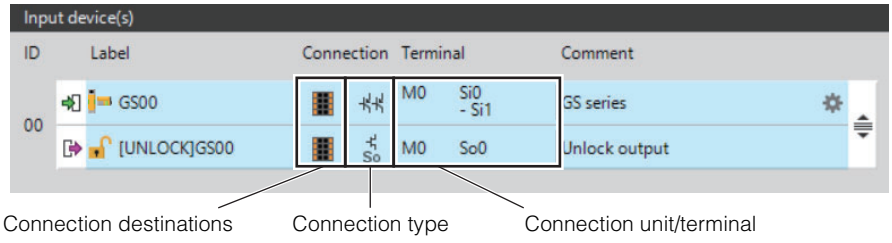
GC Configurator settings

1 Registering input devices

Select [GS/GS-M series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



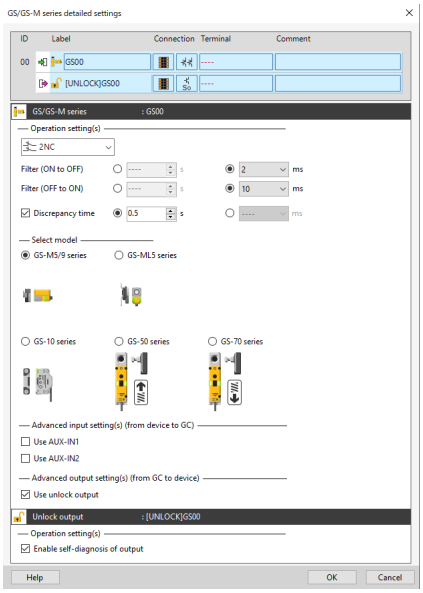
2 Input device basic settings



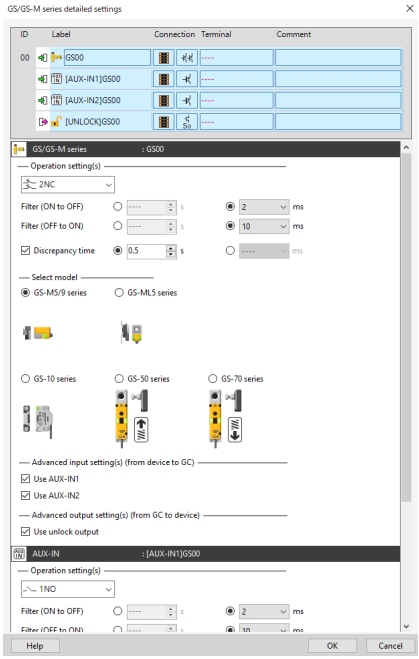
Item		Settings
GS-M Series	Connection destinations	Select [Terminal block].
	Connection type	Fixed to [PNP 2 inputs].
	Connection unit/terminal	Assign the unit to be connected and the terminal.
Unlock output	Connection type	Select [Safety output x 1] or [AUX output].

3 GS-M Series detailed settings

[Initial setting]



[Setting advanced input/output]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [GS-M5/9 series] or [GS-ML5 series]

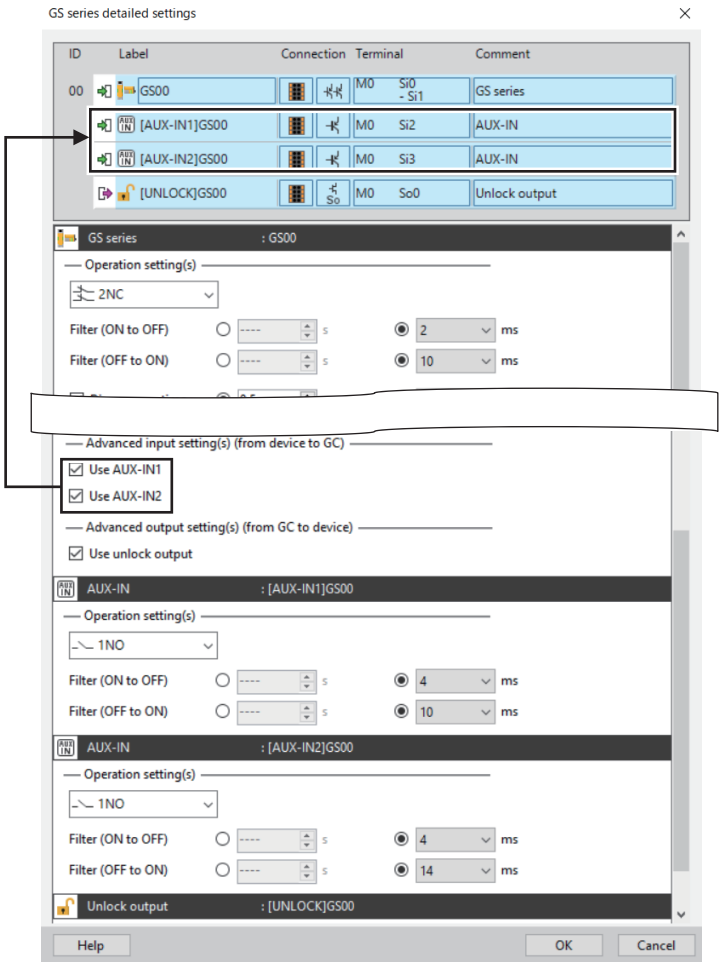
Item		Details
Advanced input setting(s)	Use AUX-IN1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the GS Series can be used in a program.
	Use AUX-IN2	With the check box checked, the input block of "AUX-IN2" is added. The AUX output of the GS Series can be used in a program.
Advanced output setting(s)	Use unlock output	With the check box checked, the "unlock output" block is added.
AUX-IN1/AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
Unlock output	Enable self-diagnosis of output*1	Check this check box to enable the self-diagnosis function for the unlock output.

*1 This is available only when [Safety output x 1] is selected for the connection type.

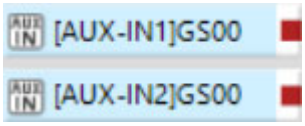
■ AUX-IN

The AUX output of the GS-M Series can be used in a program.

[GS-M series detailed settings]



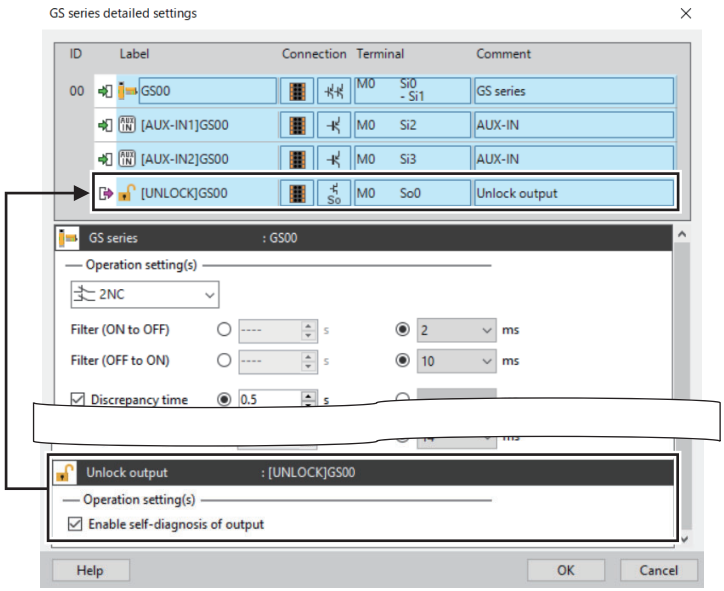
AUX-IN input block



■ Unlock output

You can unlock the GS-M Series through a program.

[GS-M series detailed settings]



Unlock output block

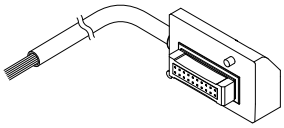
Safety Laser Scanner SZ-V Series

The following describes how to connect the Safety Laser Scanner SZ-V Series to the terminal block and the settings.

Reference For the installation method and usage of the SZ-V Series, refer to the following manual.
"Safety Laser Scanner SZ-V Series User's Manual"

Point **To use the SZ-V Series, you need to set the SZ-V Series main controller using the SZ-V Configurator. Configure the settings according to the functions you will use.**

Applicable cables

Type	Shape	Length (m)	Model
Power cable (18-core, loose wires)		5	SZ-VP5
		10	SZ-VP10
		20	SZ-VP20
		30	SZ-VP30

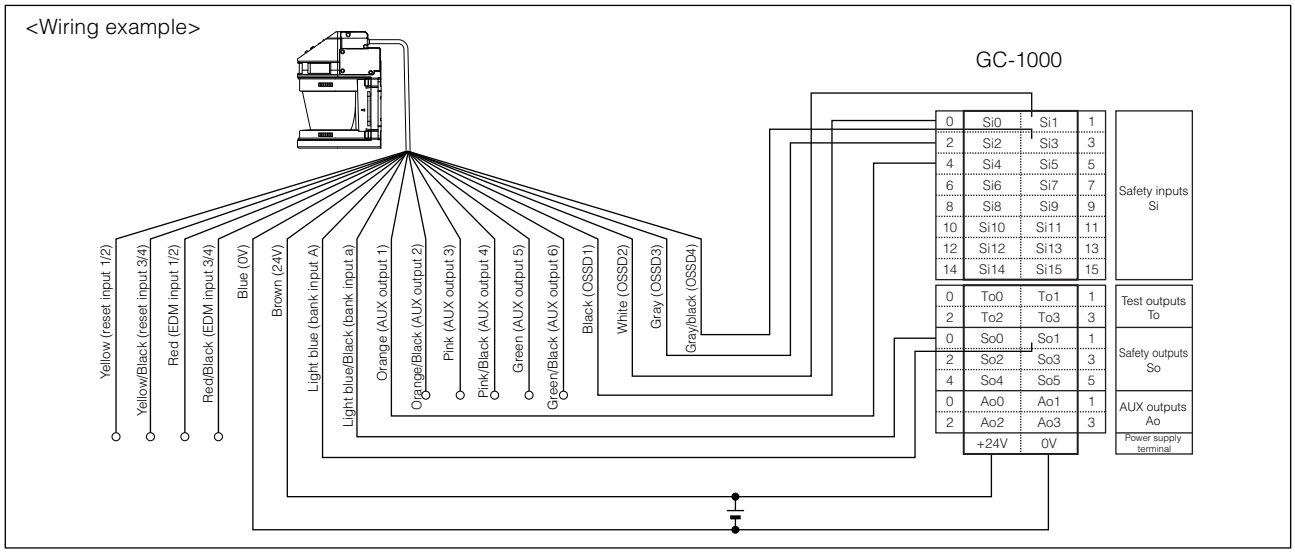
Wiring examples

Reference For the installation method and usage of the SZ-V Series, refer to the following manual.
"Safety Laser Scanner SZ-V Series User's Manual"

■ SZ-V04 wiring examples

Multi-OSSD	Used
Bank switching	Used
Bank switching method	Single/Binary, 2-bank switching
Interlock	Not used
EDM	Not used

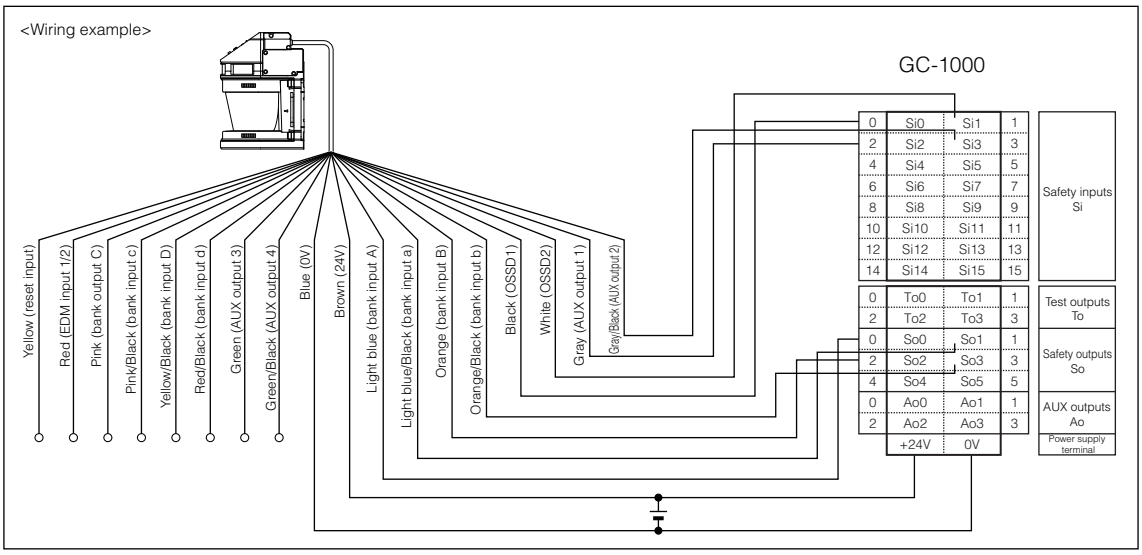
Point **When using multi-OSSD, register two items of [SZ-V series [KEYENCE]] as part of the input device registration on the [Configuration] screen and assign the respective OSSDs.**



* Perform wiring of each AUX output as needed.

■ SZ-V32 wiring examples

Bank switching	Used
Bank switching method	Single/Binary, 4-bank switching
Interlock	Not used
EDM	Not used

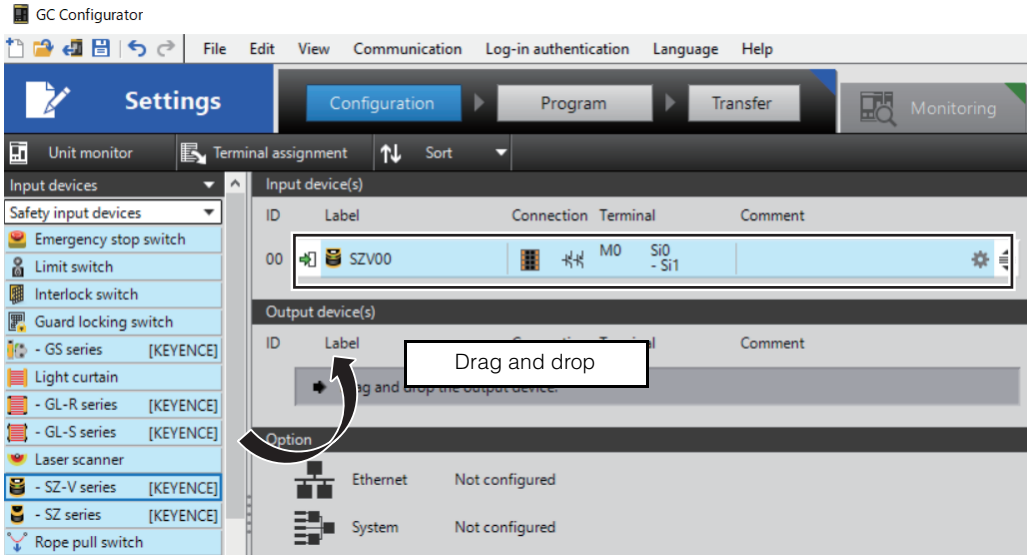


* Perform wiring of each AUX output as needed.

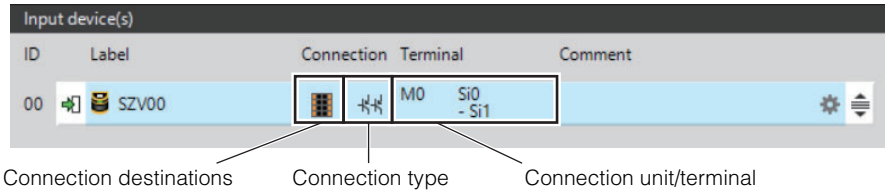
GC Configurator settings

1 Registering input devices

Select [SZ-V series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



2 Input device basic settings

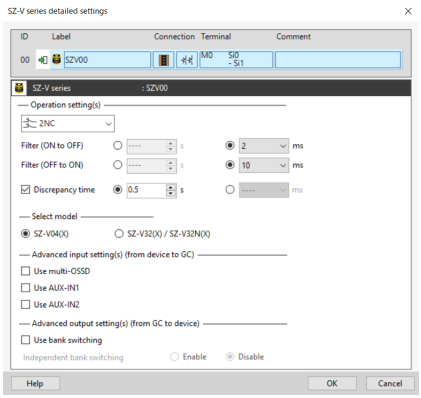


Item	Settings
Connection destinations	Select [Terminal block].
Connection type	Fixed to [PNP 2 inputs].
Connection unit/terminal	Assign the unit to be connected and the terminal.

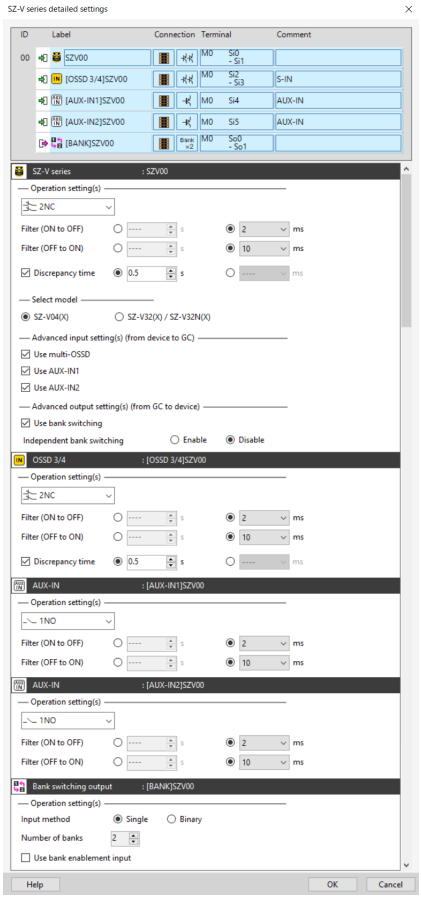
3 SZ-V Series detailed settings

■ SZ-V04(X)

[Initial setting]



[Setting advanced input/output]



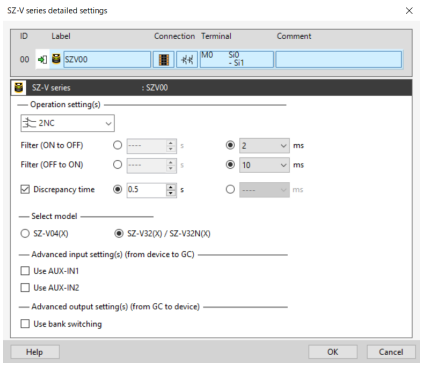
Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model		Select [SZ-V04 (X)].

Item		Details
Advanced input setting(s)	Use multi-OSSD	With the check box checked, the input block of "OSSD 3/4" is added. This is used when the multi-OSSD function is enabled by the SZ-V04 (X).
	Use AUX-IN1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.* 1
	Use AUX-IN2	With the check box checked, the input block of "AUX-IN2" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.* 1
Advanced output setting(s)	Use bank switching*1	With the check box checked, the "bank switching output" block is added. Bank switching can be performed from the GC Series.
	Independent bank switching	Select [Enable] or [Disable].
OSSD 3/4	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
	Discrepancy time	Same as the above [Discrepancy time].
AUX-IN1/AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
Bank output	Input method*1	Select [Single] or [Binary] when [Independent bank switching] is set to [Disable].
	Number of banks	Set the number of switching banks when [Independent bank switching] is set to [Disable] (Max. four banks). This is fixed to "2" when [Independent bank switching] is set to [Enable].
	Use bank enablement input	With the check box checked, the bank enablement input can be used. The "EN (Enable)" port is added to the output block of "BANK".

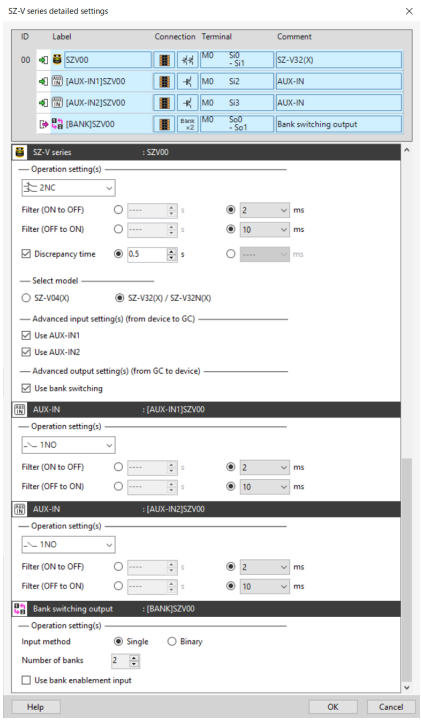
*1 For the SZ-V Series functions and settings, refer to "Safety Laser Scanner SZ-V Series User's Manual".

■ SZ-V32(X)/SZ-V32N(X)

[Initial setting]



[Setting advanced input/output]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [SZ-V32(X)/SZ-V32N(X)].
Advanced input setting(s)	Use AUX-IN1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*1
	Use AUX-IN2	With the check box checked, the input block of "AUX-IN2" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*1
Advanced output setting(s)	Use bank switching*1	With the check box checked, the output block of "BANK" is added. Bank switching can be performed from the GC Series.

Item		Details
AUX-IN1/AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
Bank output	Input method*1	Select [Single] or [Binary].
	Number of banks	Set the number of switching banks (Max. 32 banks).
	Use bank enablement input	With the check box checked, the bank enablement input can be used. The "EN (Enable)" port is added to the output block of "BANK".

*1 For the SZ-V Series functions and settings, refer to "Safety Laser Scanner SZ-V Series User's Manual".

Bank switching

The bank switching function is used to switch a combination of protection zones, warning zones and reference points of the SZ-V Series.
You can switch the bank of the SZ-V Series connected to the terminal using the "bank switching output" block.

Reference For more information about the SZ-V Series functions and settings, refer to the "Safety Laser Scanner SZ-V Series User's Manual".

Settable bank switching method and number of banks

■ SZ-V04(X)

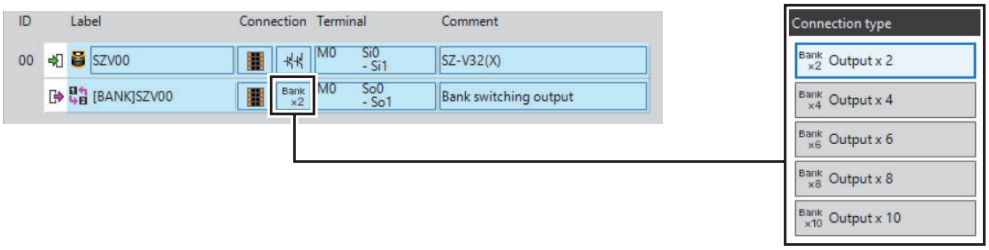
Item	Settings		
Multi-OSSD	Not used	Used	Used
Independent bank switching	-	Disabled	Enabled
(Operation settings)			
Input method	Single/Binary	Single/Binary	-
Number of banks	2 to 4	2 to 4	2 (Fixed)

■ SZ-V32(X)/SZ-V32N(X)

Item	Settings
(Operation settings)	
Input method	Single/Binary
Number of banks	2 to 32

Connection type

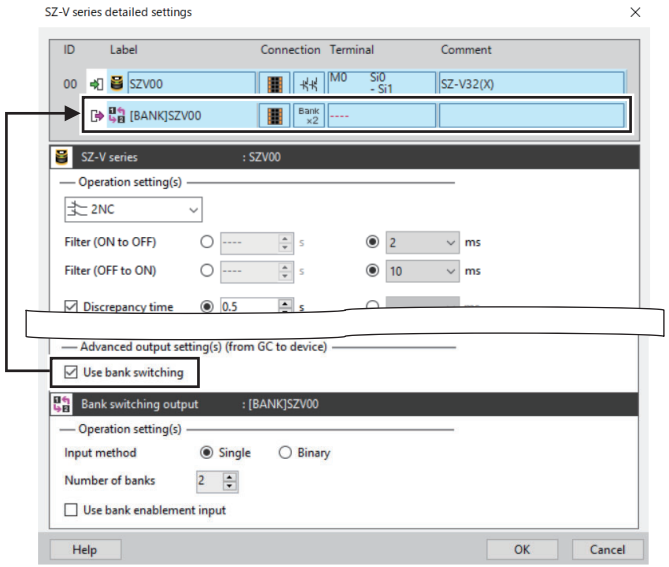
Select the bank output point according to the number of banks used.



<Number of bank switching outputs and maximum number of banks>

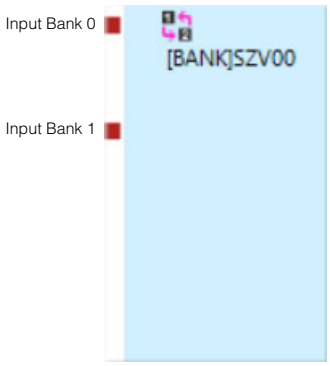
Model	Connection type	Number of outputs	Number of banks	
			Single	Binary
SZ-V04(X)	Bank switching output x 2	2	Fixed to 2	Fixed to 2
	Bank switching output x 4	4	Max. 4	Max. 4
Independent bank switching: Enabled	Bank switching output x 2	2	Fixed to 2	
SZ-V32(X)/SZ-V32N(X)	Bank switching output x 2	2	Fixed to 2	Fixed to 2
	Bank switching output x 4	4	Max. 4	Max. 4
	Bank switching output x 6	6	Max. 8	Max. 8
	Bank switching output x 8	8	--	Max. 16
	Bank switching output x 10	10	--	Max. 32

[SZ-V series detailed settings]

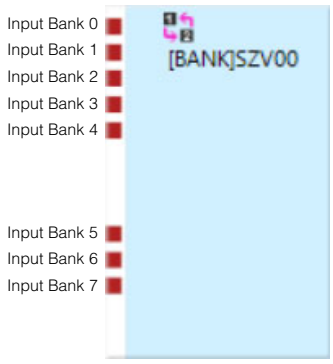


● Input method - Single

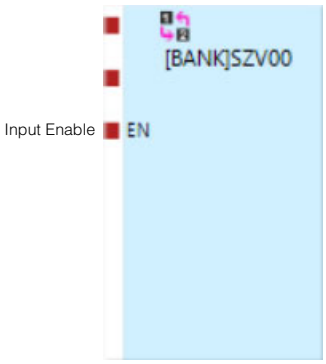
[Number of banks: 2]



[Number of banks: 8]



[Bank enablement input]



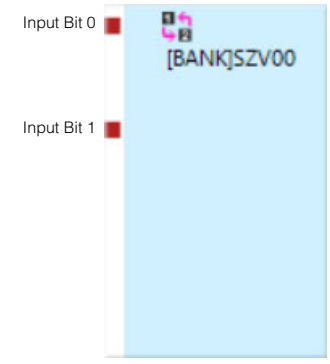
	Bank number							
	0	1	2	3	4	5	6	7
Input Bank 0	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Input Bank 1	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
Input Bank 2	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
Input Bank 3	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
Input Bank 4	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
Input Bank 5	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
Input Bank 6	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
Input Bank 7	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON

Point

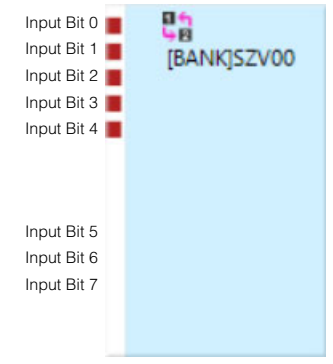
An error occurs if a bank is not specified or multiple banks are specified.

● Input method - Binary

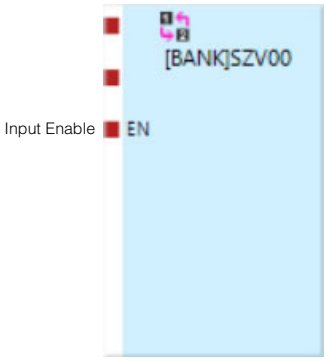
[Number of banks: 2 to 4]



[Number of banks: 2 to 32]



[Bank enablement input]



	Bank number															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Input bit 0	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
Input bit 1	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
Input bit 2	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
Input bit 3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
Input bit 4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

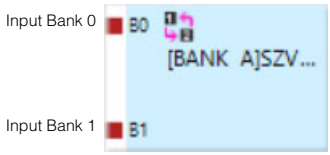
	Bank number															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Input bit 0	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
Input bit 1	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
Input bit 2	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
Input bit 3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
Input bit 4	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

Point

An error occurs if the bank input signal state differs from the specified state.

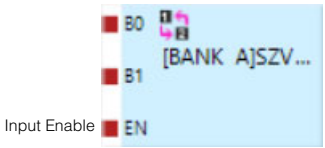
● Independent bank switching

[Protection zone A]



[Protection zone B]

[Bank enablement input]



	Bank number	
	0	1
Input Bank 0	ON	OFF
Input Bank 1	OFF	ON

Point

An error occurs if the bank input signal state differs from the specified state.

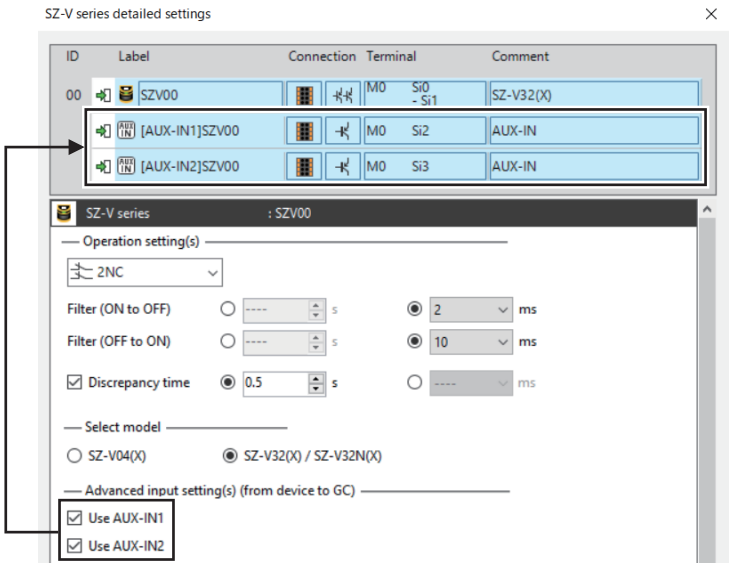
Reference

The independent bank switching function is used to perform switching of two zones independently when using the multi-OSSD function by the SZ-V04(X). Normally, when using the bank switching function, the protection zone of OSSD1/2 (protection zone A) and the protection zone of OSSD3/4 (protection zone B) are switched at the same timie. When the independent bank switching function is used, you can switch protection zone A and protection zone B at different times.

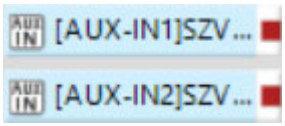
AUX-IN

You can use the AUX output of the SZ-V Series connected to the terminal in a program.
Set the function assigned to the AUX output using the SZ-V Configurator.

[SZ-V series detailed settings]



AUX-IN input block



<Functions assigned to AUX>

	SZ-V04 type	SZ-V32 type	SZ-V32N type
Error output	O	O	O
Alert output	O	O	O
Alert or error output	O	O	O
Muted or override state output	O	--	O
Muting lamp output	O	--	O
OSSD status output	O	O	O
Protection zone detection output	O	O	O
Warning zone detection output	O	O	O
Interlock-reset-ready output	O	O	O
Encoder error output	--	O	O
Normal operation transition output	O	O	O

Reference

- For more information about the SZ-V Series functions and settings, refer to the "Safety Laser Scanner SZ-V Series User's Manual".
- When using three or more AUX output points, place the "Other input" block separately.

Safety Laser Scanner SZ Series

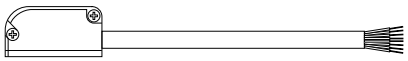
The following describes how to connect the Safety Laser Scanner SZ Series to the terminal block and the settings.

Reference For the installation method and usage of the SZ Series, refer to the following manual.
"Safety Laser Scanner SZ Series User's Manual"

Point **To use the SZ Series, you need to set the SZ Series main controller using the SZ Configurator. Configure the settings according to the functions you will use.**

Applicable cables

Point **Only the PNP output type cable can be used.**

Type	Shape	Length (m)	Model
SZ-01S		5	SZ-P5PS
		10	SZ-P10PS
		20	SZ-P20PS
		30	SZ-P30PS
SZ-04M/SZ-16V/SZ-16D		5	SZ-P5PM
		10	SZ-P10PM
		20	SZ-P20PM
		30	SZ-P30PM

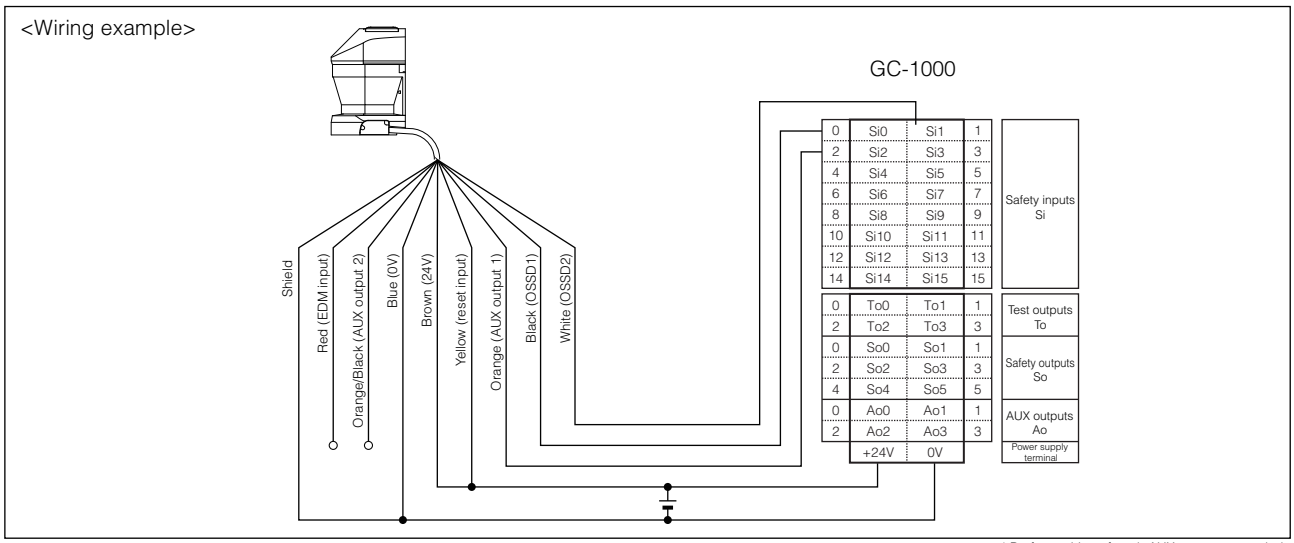
Wiring examples

Reference For the wiring method of the SZ Series, refer to the following manual.
"Safety Laser Scanner SZ Series User's Manual"

■ SZ-01S (simple function type)

Start/Restart mode	Auto/Auto
EDM function	Not used

<Wiring example>



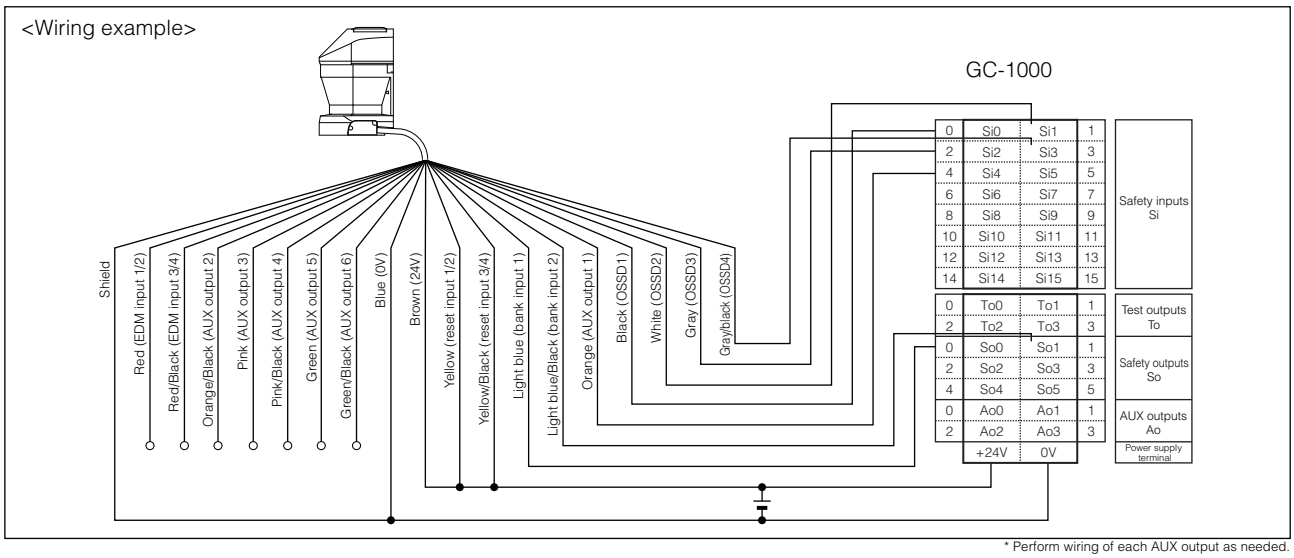
* Perform wiring of each AUX output as needed.

■ SZ-04M (multi-function type)

Multi-OSSD function	Mode D
Bank switching	Used
Number of banks	2-bank switching
Start/Restart mode	Auto/Auto
EDM function	Not used

Point **When using multi-OSSD, register two items of [SZ series [KEYENCE]] as part of input device registration on the [Configuration] screen and assign respective OSSDs.**

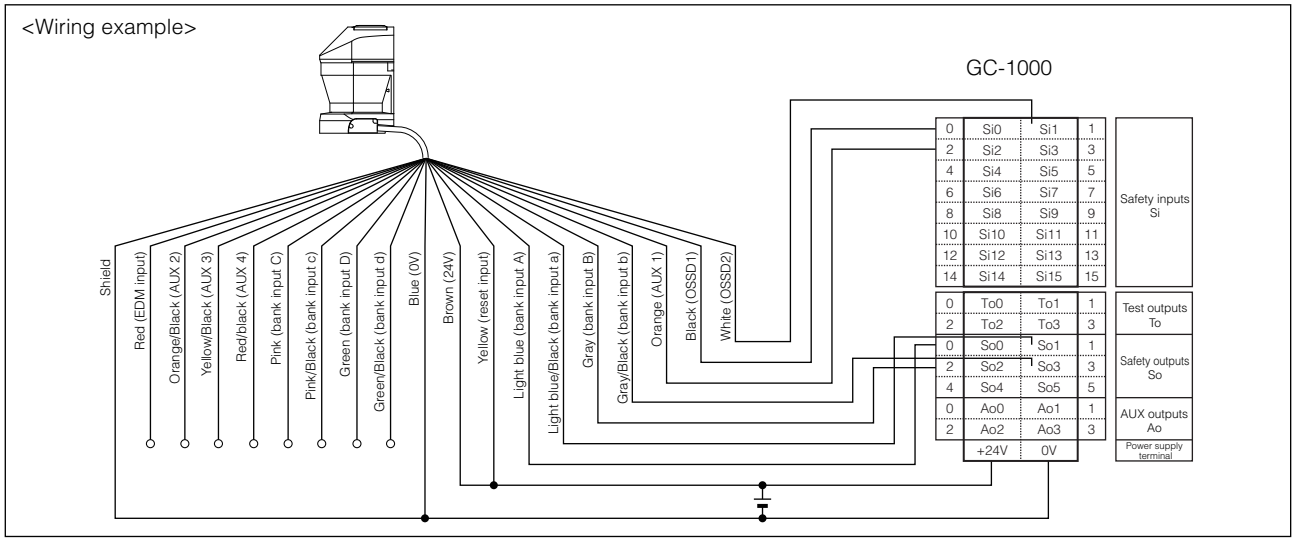
<Wiring example>



* Perform wiring of each AUX output as needed.

■ SZ-16V (multi-bank type)/SZ-16D (communication type)

Bank switching	Used
Number of banks	4-bank switching
Start/Restart mode	Auto/Auto
EDM function	Not used

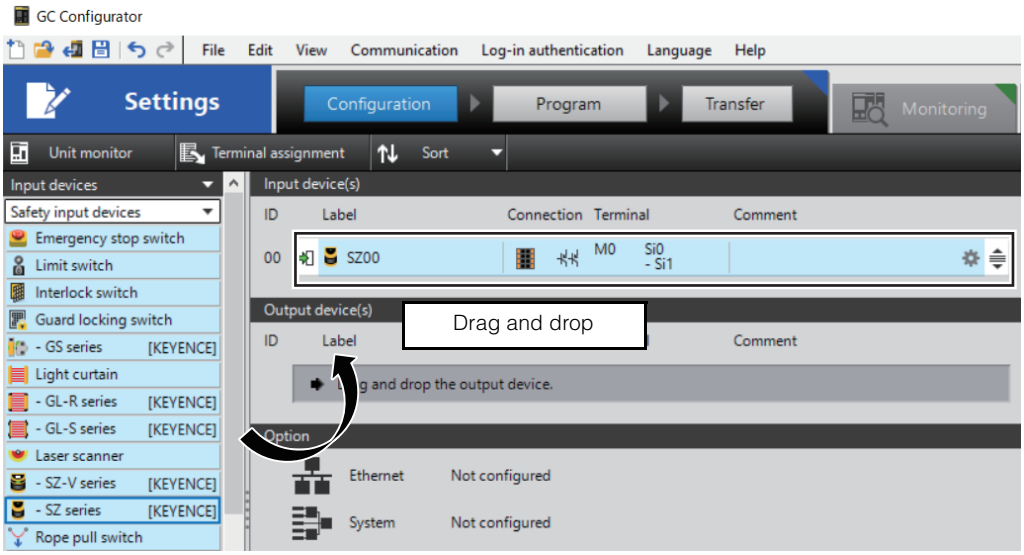


* Perform wiring of each AUX output as needed.

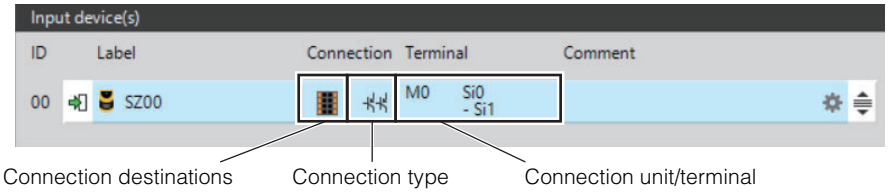
GC Configurator settings

1 Registering input devices

Select [SZ series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



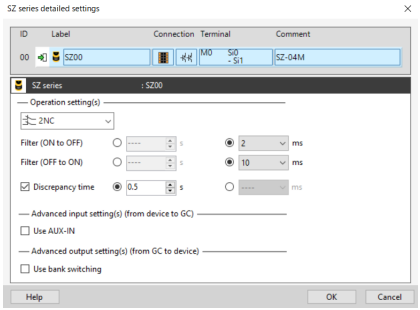
2 Input device basic settings



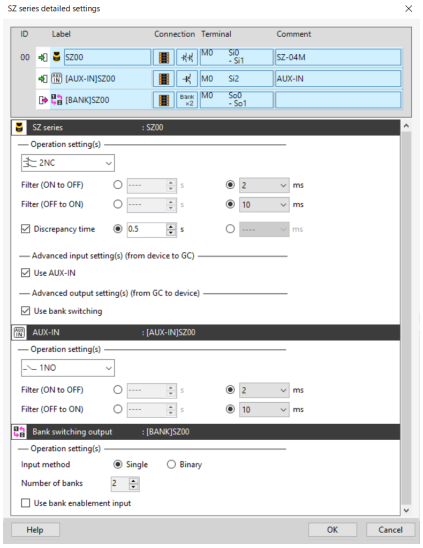
Item	Settings
Connection destinations	Select [Terminal block].
Connection type	Fixed to [PNP 2 inputs].
Connection unit/terminal	Assign the unit to be connected and the terminal.

3 SZ Series detailed settings

[Initial setting]



[Setting advanced input/output]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced input setting(s)	Use AUX-IN	With the check box checked, the input block of "AUX-IN" is added. The AUX output of the SZ Series can be used in a program. Set the function assigned to the AUX output using the SZ Configurator.* 1

Item		Details
Advanced output setting(s)	Use bank switching*1	With the check box checked, the output block of "BANK" is added. Bank switching can be performed from the GC Series.
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
Bank output	Input method*1	Select [Single] or [Binary].
	Number of banks	Set the number of switching banks (Max. 16 banks).
	Use bank enablement input	With the check box checked, the bank enablement input can be used. The "EN (Enable)" port is added to the output block of "BANK".

*1 For the SZ Series functions and settings, refer to "Safety Laser Scanner SZ Series User's Manual".

Bank switching

The bank switching function is used to switch a combination of protection zones, warning zones, and reference points of the SZ Series.
You can switch the bank of the SZ Series connected to the terminal using the output block of BANK.

Reference For more information about the SZ Series functions and settings, refer to the "Safety Laser Scanner SZ Series User's Manual".

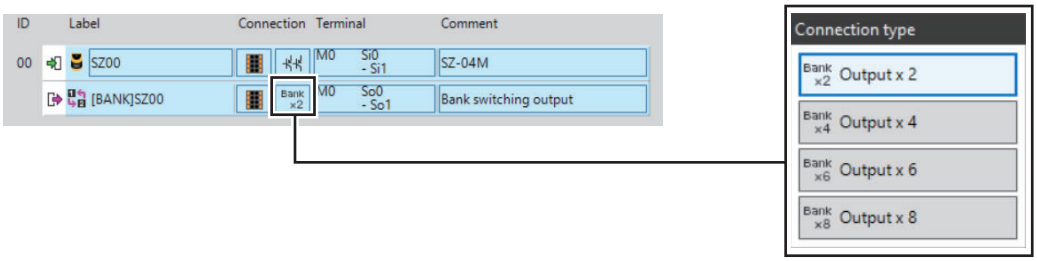
Point **The bank switching function is not available for SZ-01S (simple function type).**

Settable bank switching method and number of banks

Model	Number of banks
SZ-04M (multi-function type)	Max. 4 banks
SZ-16V (multi-bank type)/SZ-16V (communication type)	Max. 16 banks

Connection type

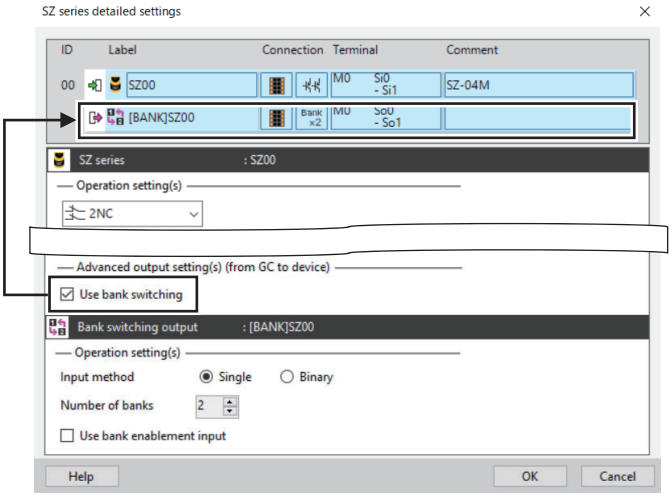
Select the bank output point according to the number of banks used.



<Number of bank outputs and maximum number of banks>

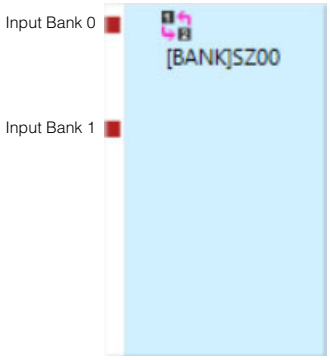
Connection type	Number of outputs	Input method	
		Single	Binary
Bank output x 2	2	Fixed to 2	Fixed to 2
Bank output x 4	4	Max. 4	Max. 4
Bank output x 6	6	Max. 8	Max. 8
Bank output x 8	8	--	Max. 16

[SZ series detailed settings]

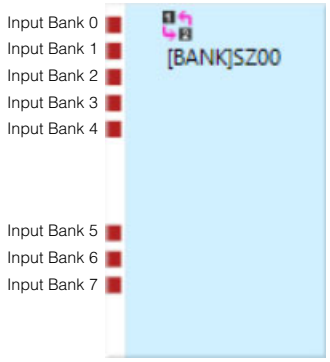


● Input method - Single

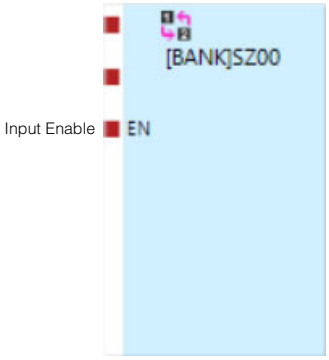
[Number of banks: 2]



[Number of banks: 8]



[Bank enablement input]



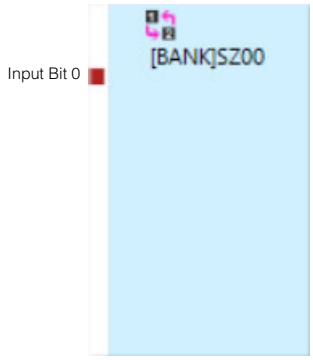
	Bank number							
	0	1	2	3	4	5	6	7
Input Bank 0	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Input Bank 1	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
Input Bank 2	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
Input Bank 3	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
Input Bank 4	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
Input Bank 5	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
Input Bank 6	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
Input Bank 7	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON

Point

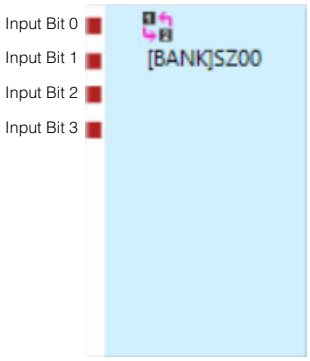
An error occurs if a bank is not specified or multiple banks are specified.

● Input method - Binary

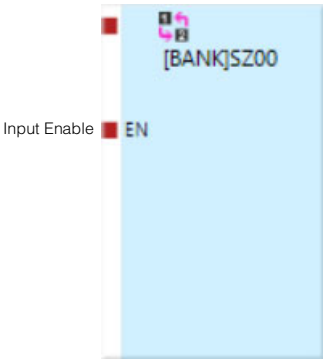
[Number of banks: 2]



[Number of banks: 8]



[Bank enablement input]



	Bank number															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Input bit 0	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
Input bit 1	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
Input bit 2	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
Input bit 3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON

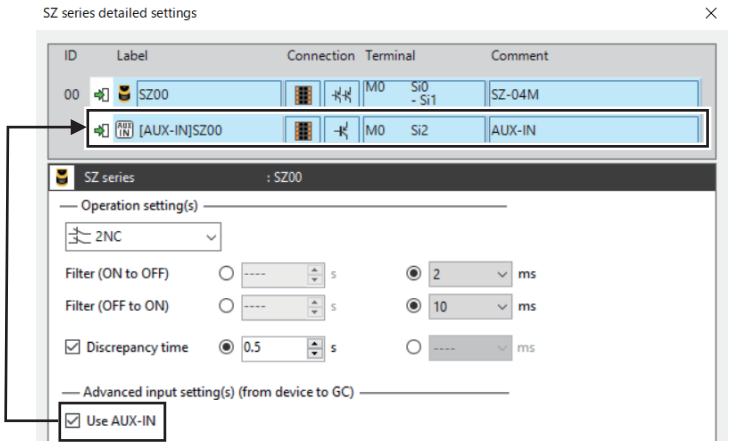
Point

An error occurs if the bank input signal state differs from the specified state.

AUX-IN

You can use the AUX output of the SZ Series connected to the terminal in a program.
Set the function assigned to the AUX output using the SZ Configurator.

[SZ series detailed settings]



AUX-IN input block

<Functions assigned to AUX>

	SZ-01S	SZ-04M	SZ-16V/16D
Error output	O	O	O
Alert output	O	O	O
Alert or error output	O	O	O
OSSD status output	O	O	O
Protection zone detection output	O	O	O
Warning zone detection output	O	O	O
Interlock-reset-ready output	O	O	O
Muted or override state output	--	O	--
Muting lamp output	--	O	--

Reference

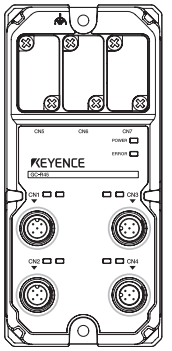
- For more information about the SZ Series functions and settings, refer to the "Safety Laser Scanner SZ Series User's Manual".
- When using three or more AUX output points, place the "Other input" block separately.

Connecting to Remote I/O Modules

Connecting to remote I/O modules

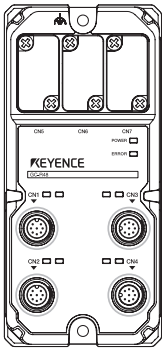
KEYENCE safety sensors can be connected to the remote I/O modules "GC-R45" and "GC-R48".

GC-R45 (M12 5 pins)



Pin arrangement

GC-R48 (M12 8 pins)



Pin arrangement

<Compatible destinations>

		GC-R45 (M12 5 pins)	GC-R48 (M12 8 pins)
Safety Light Curtains	GL-R Series	O	--
	GL-S Series	O	--
Safety Interlock Switches	GS Series (Non-contact)	O	O
	GS Series (Lock)	--	O
	GS-M Series	--	O
Safety Laser Scanners	SZ-V Series	O	--
	SZ Series	O	--

For the wiring and settings of each series of KEYENCE safety sensors, refer to the following pages.

"GL-R Series"(page 6-158)
"GL-S Series"(page 6-162)
"GS Series (Non-contact Type)"(page 6-166)
"GS Series (Lock Type)"(page 6-170)
"GS-M Series"(page 6-175)
"SZ-V Series"(page 6-179)
"SZ Series"(page 6-183)

Safety Light Curtain GL-R Series

The following describes how to connect the Safety Light Curtain GL-R Series to the remote I/O module and the settings.

Reference For the installation method and usage of the GL-R Series, refer to the following manual.
"Safety Light Curtain GL-R Series User's Manual"

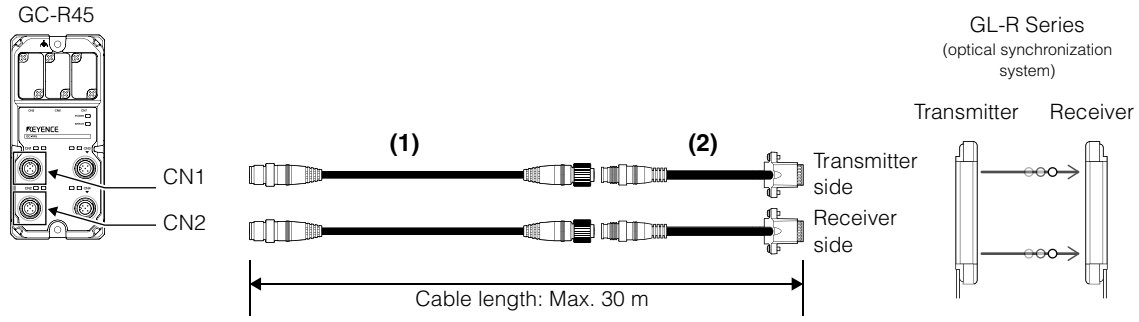
Connection cables

Use the following cables to connect the GL-R Series to the GC-R45.

Point **When the GL-R Series is used with the "wire synchronization system" (wiring system), it cannot be connected to the GC-R45.**

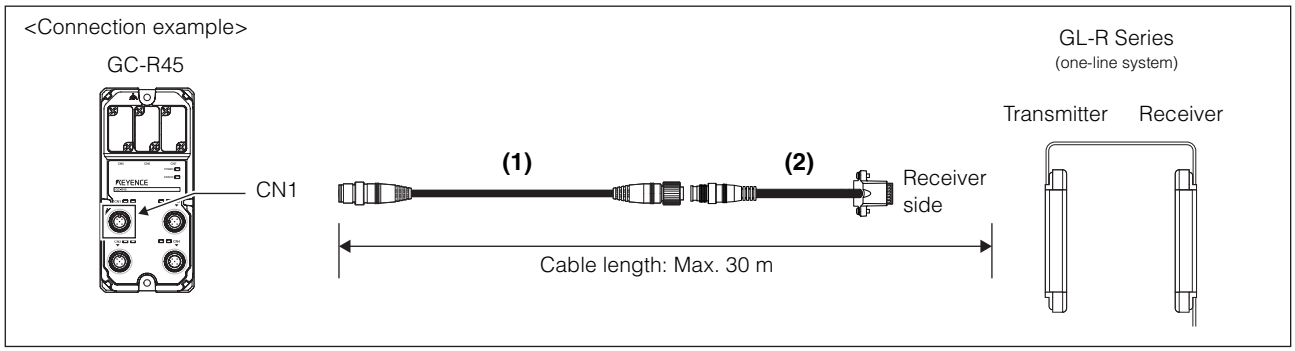
■ Optical synchronization system

<Connection example>



	Name	Model	Quantity	Length (m)
(1)	Extension cable: M12 5-pin cable	GS-P5CC1	1	1
		GS-P5CC3	1	3
		GS-P5CC5	1	5
		GS-P5CC10	1	10
(2)	Main controller connection cable	OP-88300	1	0.3

■ One-line system



	Name	Model	Quantity	Length (m)
(1)	Extension cable: M12 5-pin cable	GS-P5CC1	1	1
		GS-P5CC3	1	3
		GS-P5CC5	1	5
		GS-P5CC10	1	10
(2)	Main controller connection cable	OP-88300	1	0.3

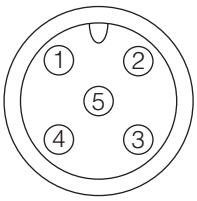
■ Cable length

For the case of the optical synchronization system, prevent the cable length between the GC-R45 and the GL-R Series from exceeding 30 m on both the transmitter and receiver sides. For the case of the one-line system, prevent the total length of M12 5-pin cable, main controller connection cable, extension cable and connection cable from exceeding 30 m.

DANGER	**All of the cables must be used within the specified length range. Otherwise, the safety functions may not work properly, allowing a dangerous situation to exist.**

■ Pin arrangement

The following shows the GC-R45 pins and the assignment of the GL-R Series signals.

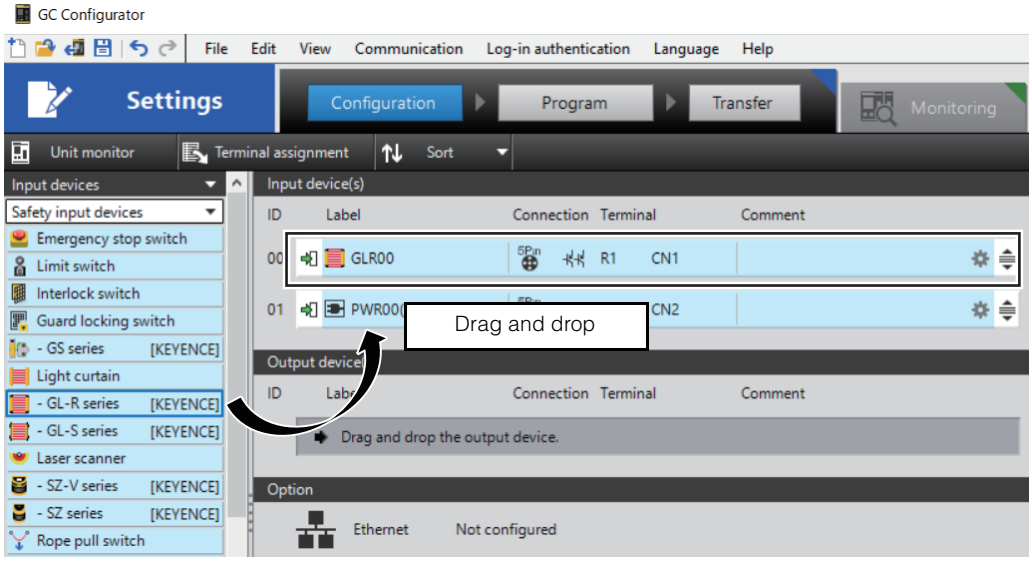


Pin number	Transmitter side	Receiver side
Pin 1	+24 V	+24 V
Pin 2	Not used	OSSD2
Pin 3	0 V	0 V
Pin 4	Not used	OSSD1
Pin 5	Not used	Not used

GC Configurator settings

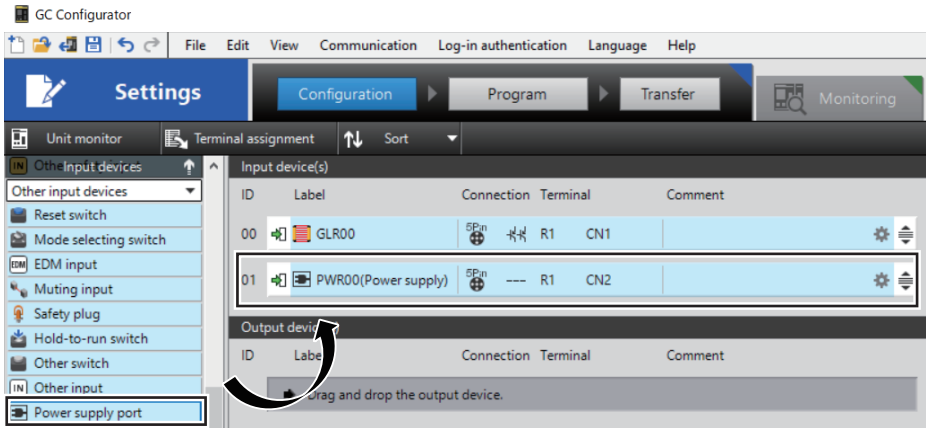
1 Registering input devices

Select [GL-R series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.

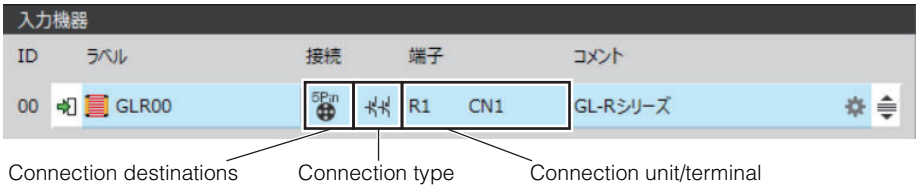


Reference

When using the optical synchronization system, select [Power supply only] from the input device list on the transmitter side. Only power supply can be performed for the GL-R.

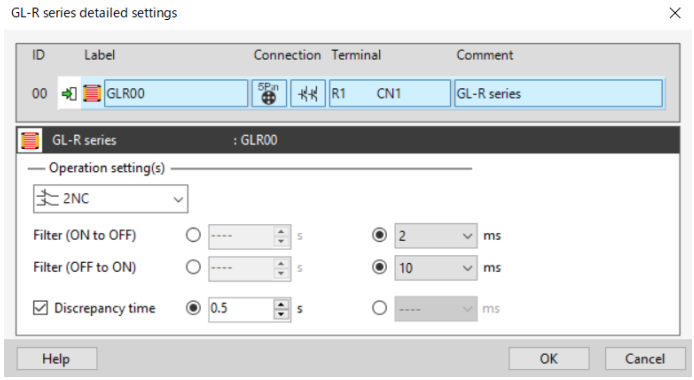


2 Input device basic settings



Item	Settings
Connection destinations	Select [Remote I/O M12 5-pin].
Connection type	Fixed to [PNP 2 inputs].
Connection unit/terminal	Select the remote I/O module and port (CN1 to CN4) to be connected.

3 GL-R Series detailed settings



Item	Details
Input logic	Fixed to [2NC].
Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Safety Light Curtain GL-S Series

The following describes how to connect the Safety Light Curtain GL-S Series to the remote I/O module and the settings.

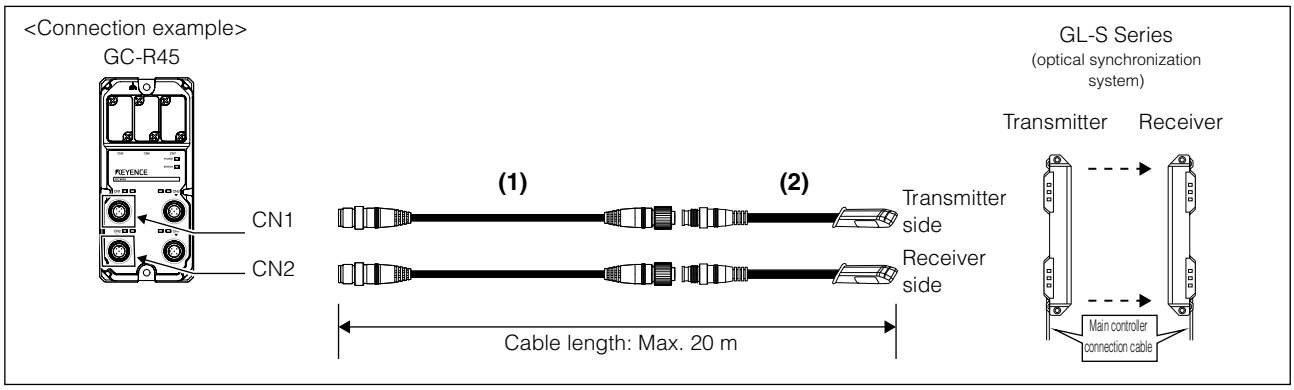
Reference For the installation method and usage of the GL-S Series, refer to the following manual.
"Safety Light Curtain GL-S Series User's Manual"

Connection cables

Use the following cables to connect the GL-S Series to the GC-R45.

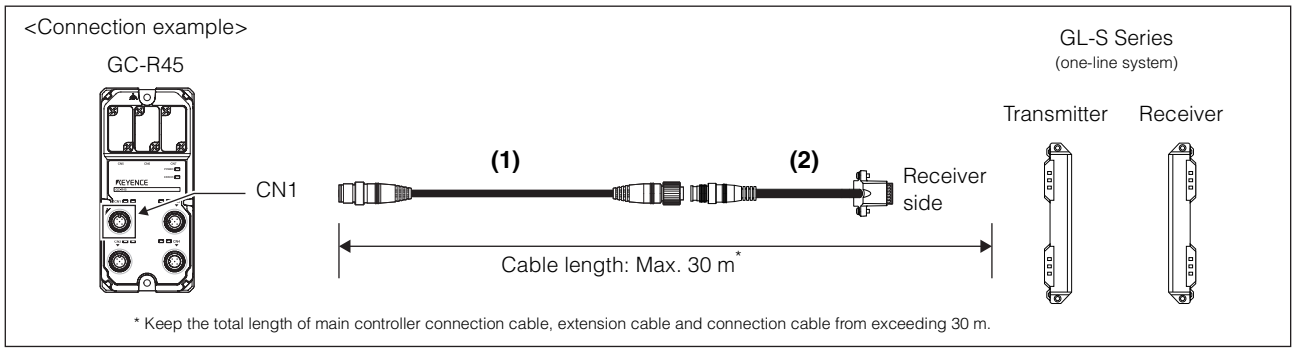
Point **When the GL-S Series is used with the "wire synchronization system" (wiring system), it cannot be connected to the GC-R45.**

■ Optical synchronization system



	Name	Model	Quantity	Length (m)
(1)	M12 5-pin cable	OP-85503	1	2
		OP-85504	1	5
(2)	Main controller connection cable	GL-SPC03PS	1	0.3

■ One-line system



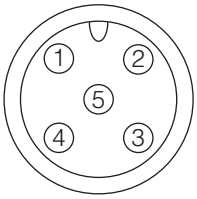
	Name	Model	Quantity	Length (m)
(1)	M12 5-pin cable	OP-85503	1	2
		OP-85504	1	5
(2)	Main controller connection cable	GL-SPC03PS	1	0.3

■ Cable length

For the case of the optical synchronization system, prevent the cable length between the GC-R45 and the GL-S Series from exceeding 30 m on both the transmitter and receiver sides. For the case of the one-line system, prevent the total length of M12 5-pin cable, main controller connection cable, extension cable and connection cable from exceeding 30 m.

■ Pin arrangement

The following shows the GC-R45 pins and the assignment of the GL-S Series signals.



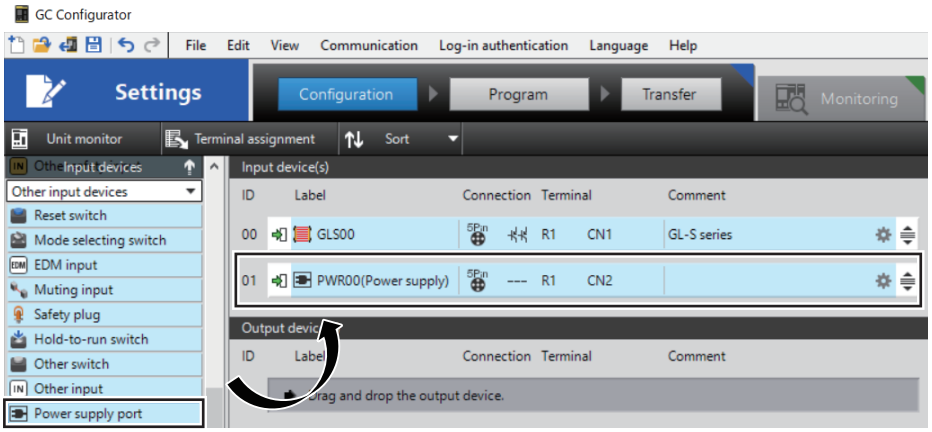
Pin number	Transmitter side	Receiver side
Pin 1	+24 V	+24 V
Pin 2	Not used	OSSD2
Pin 3	0 V	0 V
Pin 4	Not used	OSSD1
Pin 5	Not used	Not used

GC Configurator settings

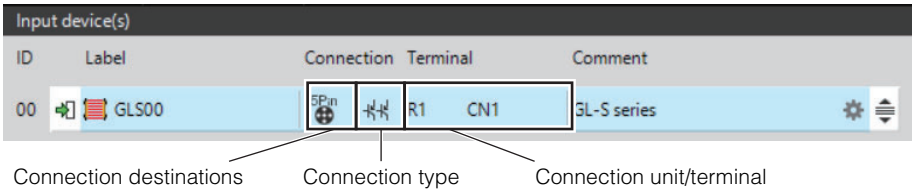
1 Registering input devices

Select [GL-S series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.

Reference When using the optical synchronization system, select [Power supply only] from the input device list on the transmitter side. Only power supply can be performed for the GL-S.

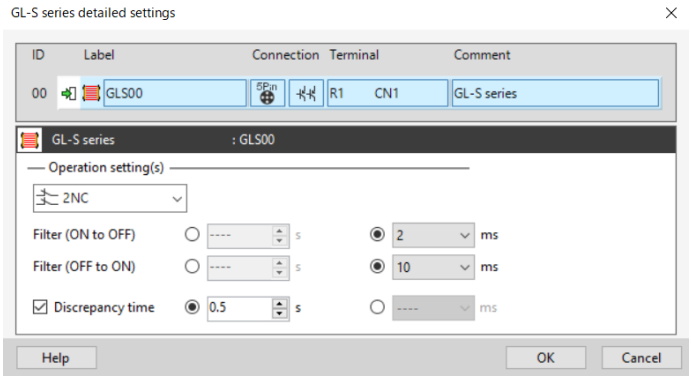


2 Input device basic settings



Item	Settings
Connection destinations	Select [Remote I/O M12 5-pin].
Connection type	Fixed to [PNP 2 inputs].
Connection unit/terminal	Select the remote I/O module and port (CN1 to CN4) to be connected.

3 GL-S Series detailed settings



Item	Details
Input logic	Fixed to [2NC].
Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Safety Interlock Switch GS Series (Non-contact)

The following describes how to connect the Safety Interlock Switch GS Series (Non-contact) to the remote I/O module and the settings.

Reference

For the installation method and usage of the GS Series (Non-contact), refer to the following manual.
"Safety Interlock Switch GS Series (Non-contact) User's Manual"

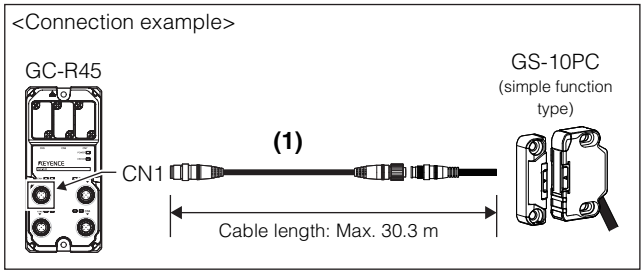
Point

- **Only the GS-10PC (simple function type) can be connected to the GC-R45 (M12 5 pins).**
- **Only the GS-11PC (standard type) can be connected to the GC-R48 (M12 8 pins).**

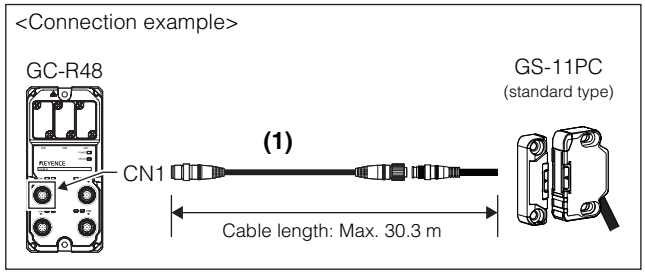
Connection cables

Use the following cables to connect the GS Series (Non-contact) to the GC-R45.

[GC-R45 - GS-10PC]



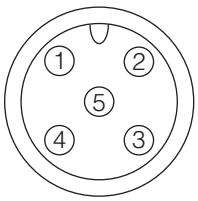
[GC-R48 - GS-11PC]



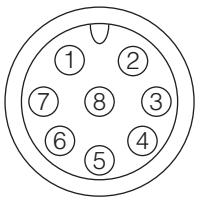
	Name		Supported model	Model	Quantity	Length (m)
(1)	Extension cables	Simple function type (5 pins)	GS-10PC	GS-P5CC1	1	1
				GS-P5CC3	1	3
				GS-P5CC5	1	5
				GS-P5CC10	1	10
		Standard type (8 pins)	GS-11PC	GS-P8CC1	1	1
				GS-P8CC3	1	3
				GS-P8CC5	1	5
				GS-P8CC10	1	10

■ Pin arrangement

The following shows the GC-R45/R48 pins and the assignment of the GS Series (Non-contact) signals.



Pin number	GC-R45
Pin 1	+24 V
Pin 2	OSSD2
Pin 3	0 V
Pin 4	OSSD1
Pin 5	AUX1

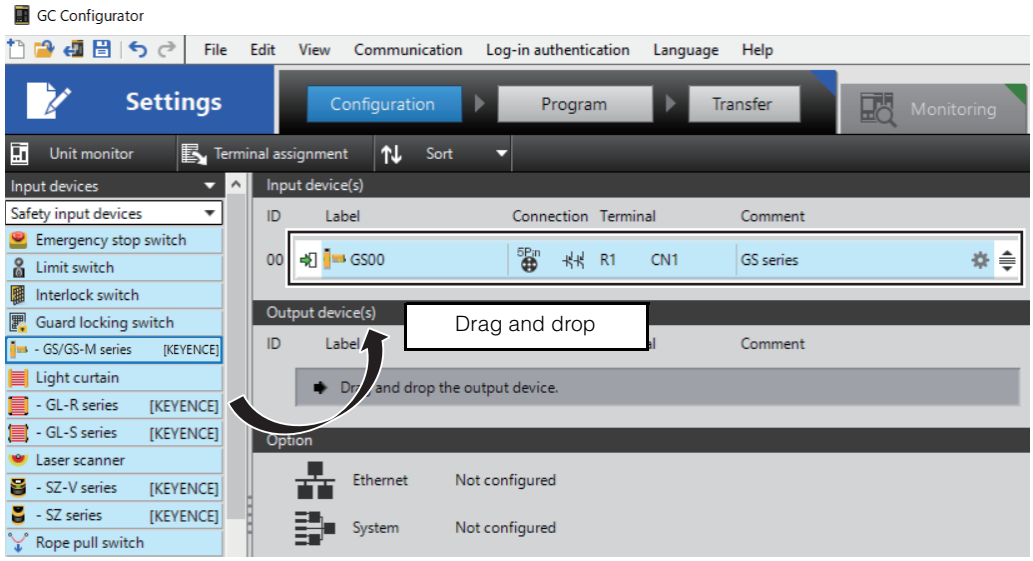


Pin number	GC-R48
Pin 1	AUX
Pin 2	+24 V
Pin 3	Not used
Pin 4	Safety input 2
Pin 5	OSSD1
Pin 6	OSSD2
Pin 7	0 V
Pin 8	Safety input 1

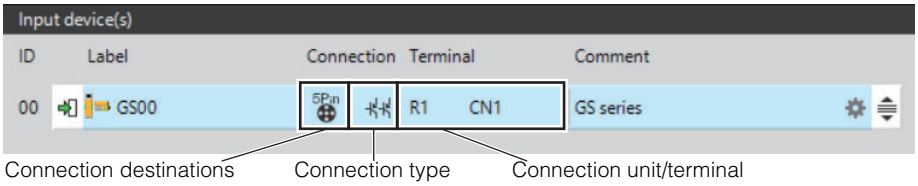
GC Configurator settings

1 Registering input devices

Select [GS/GS-M series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



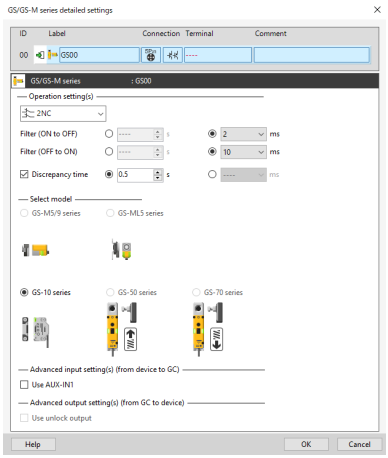
2 Input device basic settings



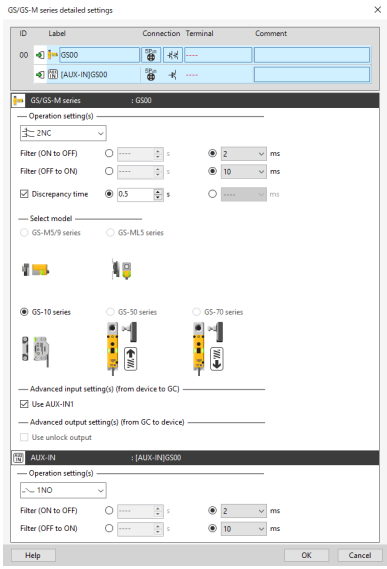
Item	Settings
Connection destinations	GS-10PC: Select [Remote I/O M12 5-pin]. GS-11PC: Select [Remote I/O M12 8-pin].
Connection type	Fixed to [PNP 2 inputs].
Connection unit/terminal	Select the remote I/O module and port (CN1 to CN4) to be connected.

3 GS Series detailed settings

[Initial setting]



[Setting advanced input/output]

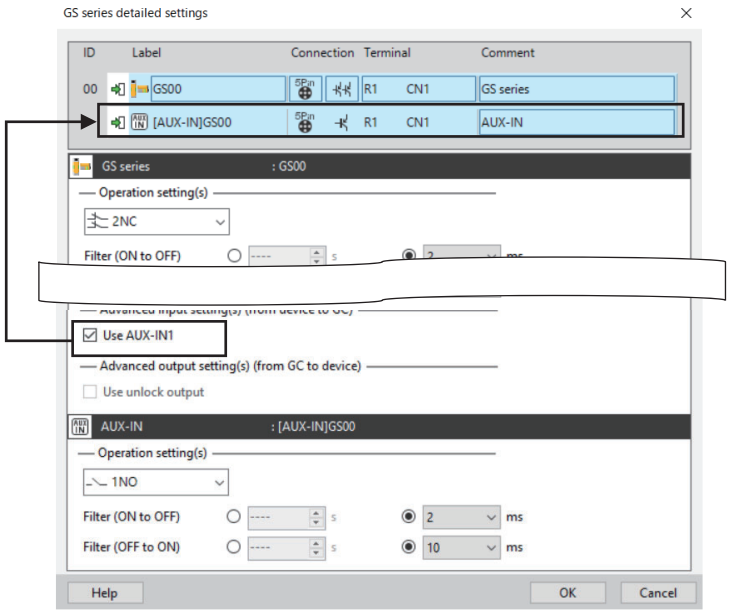


Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [GS-10 series].
Advanced input setting(s)	Use AUX-IN1	With the check box checked, the input block of "AUX-IN" is added. The AUX output of the GS Series can be used in a program.
Advanced output setting(s)	Use unlock output	This cannot be selected by the GS-10 Series.
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].

■ AUX-IN

The AUX output of the GS Series can be used in a program.

[GS series detailed settings]



AUX-IN input block

Safety Interlock Switch GS Series (Lock)

The following describes how to connect the Safety Interlock Switch GS Series (Lock) to the remote I/O module and the settings.

Reference

For the installation method and usage of the GS Series (Lock), refer to the following manual.
"Safety Interlock Switch GS Series (Lock) User's Manual"

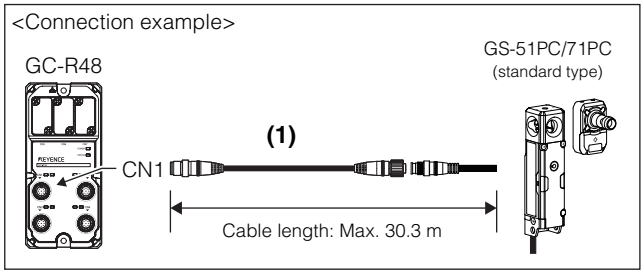
Point

- **The GS Series (Lock) cannot be connected to the GC-R45 (M12 5 pins).**
- **Only the following models can be connected to the GC-R48 (M12 8 pins).**
  - **GS-51PC (power-to-release)**
  - **GS-71PC (power-to-lock)**

Connection cables

Use the following cables to connect the GS Series (Lock) to the GC-R48.

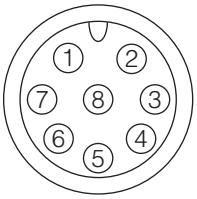
[GC-R48 - GS-51PC/GS-71PC]



	Name		Supported model	Model	Quantity	Length (m)
(1)	Extension cables	Standard type (8 pins)	GS-51PC GS-71PC	GS-P8CC1	1	1
				GS-P8CC3	1	3
				GS-P8CC5	1	5
				GS-P8CC10	1	10

■ Pin arrangement

The following shows the GC-R48 pins and the assignment of the GS Series (Lock) signals.

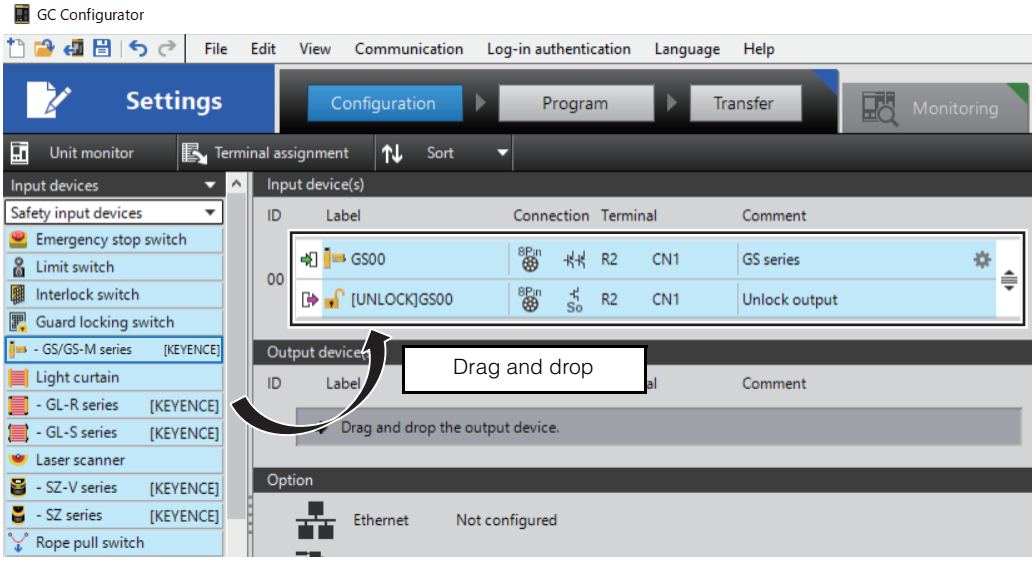


Pin number	GS Series
Pin 1	AUX output
Pin 2	+24 V
Pin 3	Lock control input
Pin 4	Safety input 2
Pin 5	OSSD1
Pin 6	OSSD2
Pin 7	0 V
Pin 8	Safety input 1

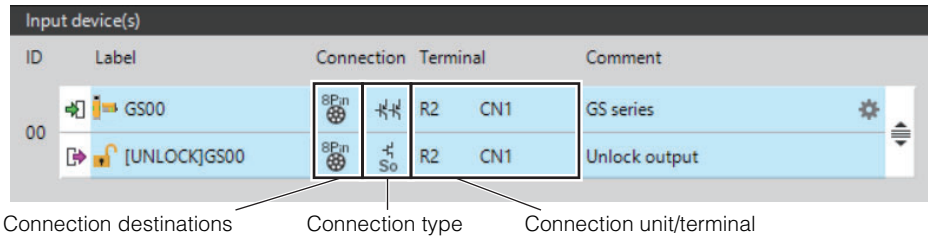
GC Configurator settings

1 Registering input devices

Select [GS/GS-M series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



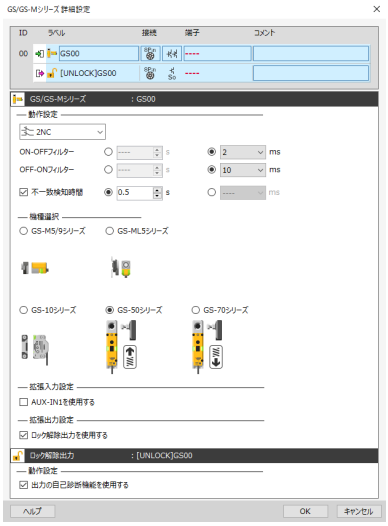
2 Input device basic settings



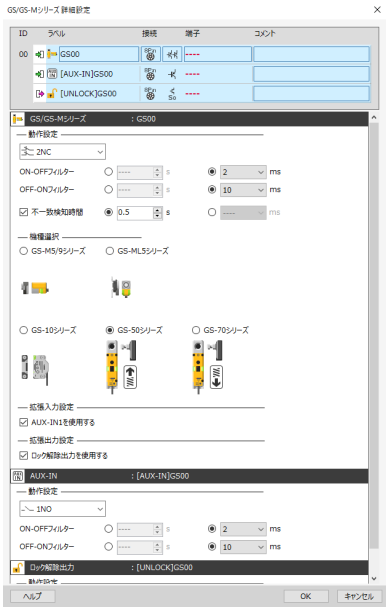
Item		Settings
GS Series	Connection destinations	Select [Remote I/O M12 8-pin].
	Connection type	Fixed to [PNP 2 inputs].
	Connection unit/terminal	Select the remote I/O module and port (CN1 to CN4) to be connected.
Unlock output	Connection type	Fixed to [Safety output x 1].

3 GS Series detailed settings

[Initial setting]



[Setting advanced input/output]

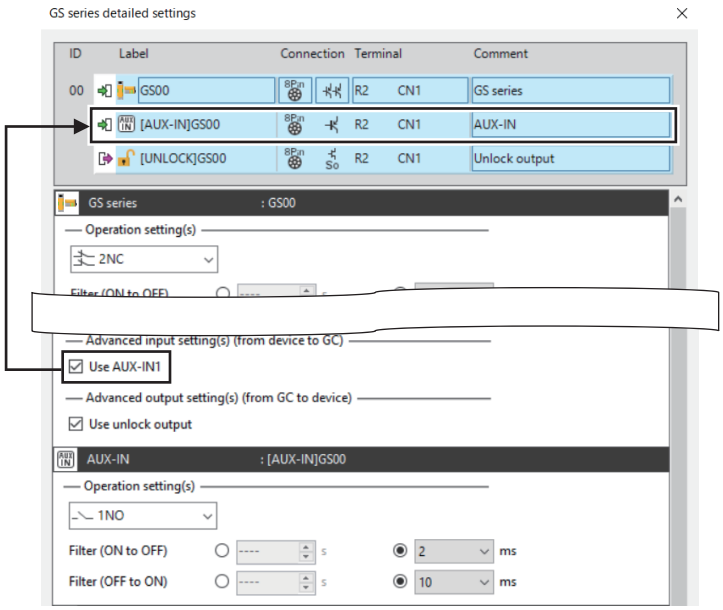


Item		Settings
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [GS-50 series] or [GS-70 series].
Advanced input setting(s)	Use AUX-IN1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the GS Series can be used in a program.
Advanced output setting(s)	Use unlock output	With the check box checked, the "unlock output" block is added.
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
Unlock output	Enable self-diagnosis of output	Check this check box to enable the self-diagnosis function for the unlock output.

■ AUX-IN

The AUX output of the GS Series can be used in a program.

[GS series detailed settings]

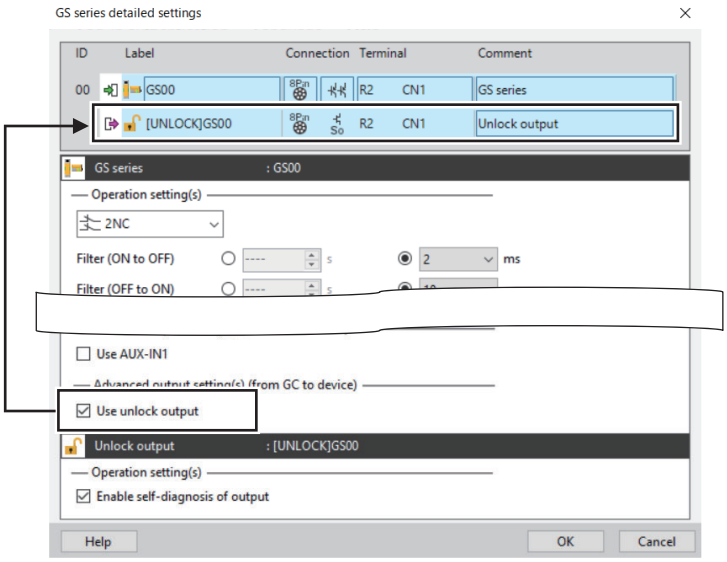


AUX-IN input block

■ Unlock output

You can unlock the GS Series through a program.

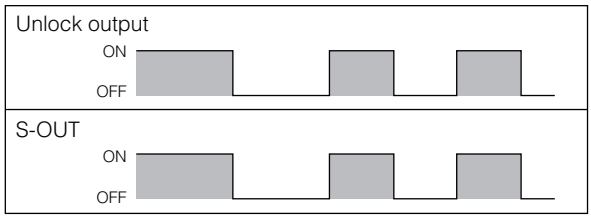
[GS series detailed settings]



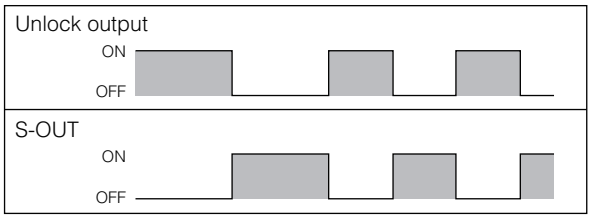
Unlock output block

Unlock output operation

Power-to-release (GS-51PC)



Power-to-lock (GS-71PC)



Point

Unlocking occurs when the unlock output block is ON in both cases of power-to-release and power-to-lock.

Safety Interlock Switch GS-M Series

The following describes how to connect the Safety Interlock Switch GS-M Series to the remote I/O module and the settings.

Reference

For the installation method and usage of the GS-M Series, refer to the following manual.
"Safety Interlock Switch GS-M Series User's Manual"

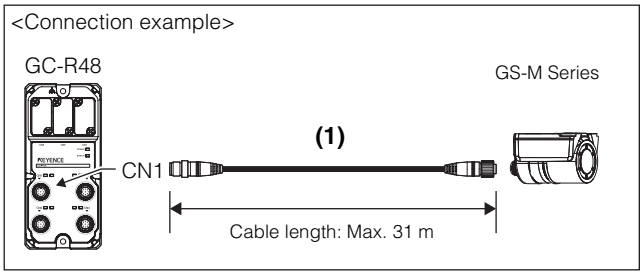
Point

- **The GS-M Series cannot be connected to the GC-R45 (M12 5 pins).**
- **Only the following models can be connected to the GC-R48 (M12 8 pins).**
  - **GS-M51P**
  - **GS-M91P**
  - **GS-ML51P**

Connection cables

Use the following cables to connect the GS-M to the GC-R48.

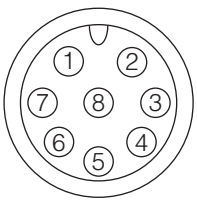
<Connection example>



	Name		Supported model	Model	Quantity	Length (m)
(1)	Extension cables	Standard type (8 pins)	GS-M51P GS-M91P GS-ML51P	GS-P8LC1	1	1
				GS-P8CC1	1	1
				GS-P8CC3	1	3
				GS-P8CC5	1	5
				GS-P8CC10	1	10

■ Pin arrangement

The following shows the GC-R48 pins and the assignment of the GS-M Series signals.

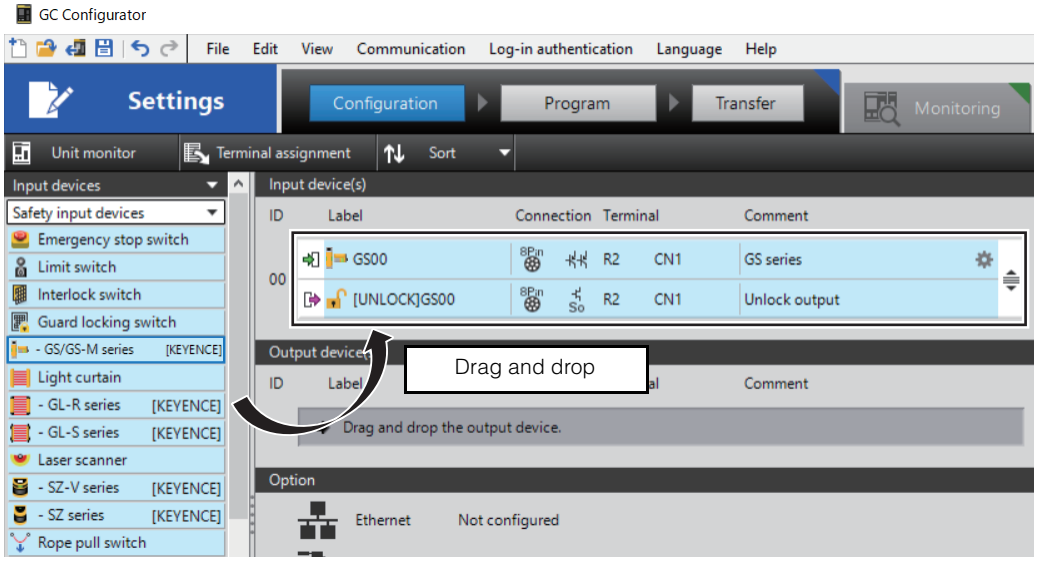


Pin number	GS Series
Pin 1	AUX output
Pin 2	+24 V
Pin 3	Lock control input
Pin 4	Safety input 2
Pin 5	OSSD1
Pin 6	OSSD2
Pin 7	0 V
Pin 8	Safety input 1

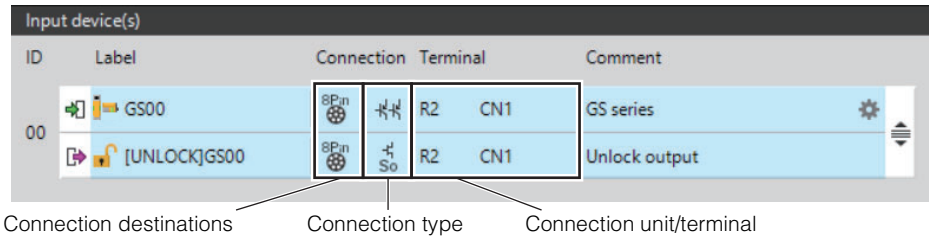
GC Configurator settings

1 Registering input devices

Select [GS/GS-M series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



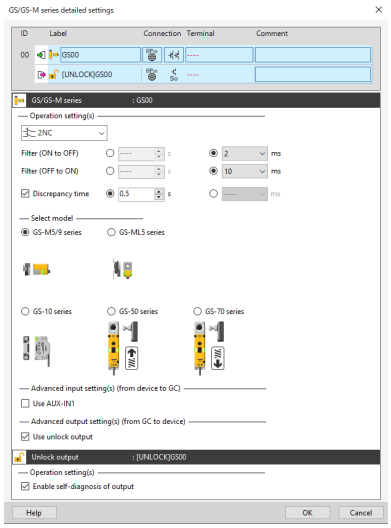
2 Input device basic settings



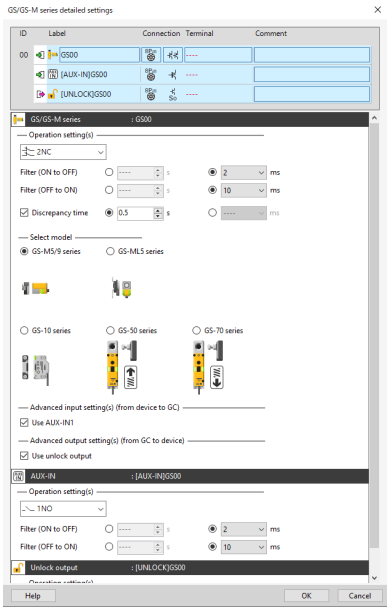
Item		Settings
GS-M Series	Connection destinations	Select [Remote I/O M12 8-pin].
	Connection type	Fixed to [PNP 2 inputs].
	Connection unit/terminal	Select the remote I/O module and port (CN1 to CN4) to be connected.
Unlock output	Connection type	Fixed to [Safety output x 1].

3 GS-M Series detailed settings

[Initial setting]



[Setting advanced input/output]

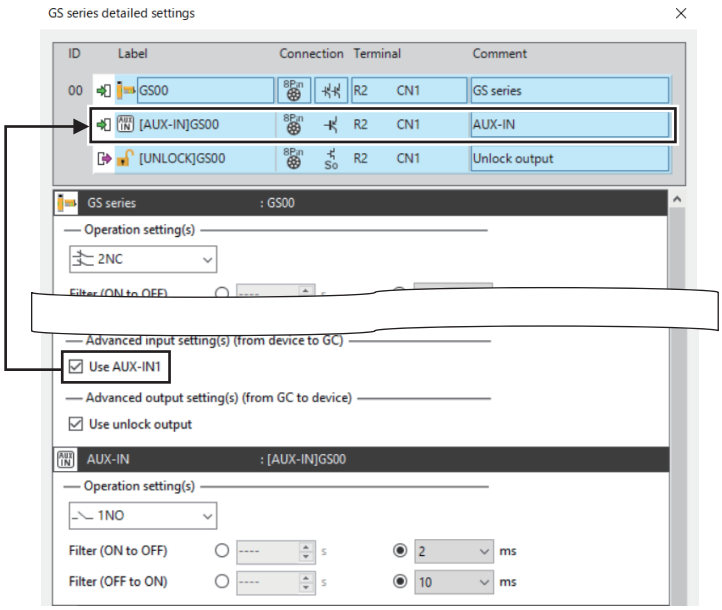


Item		Settings
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [GS-M5/9 series] or [GS-ML5 series]
Advanced input setting(s)	Use AUX-IN1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the GS Series can be used in a program.
Advanced output setting(s)	Use unlock output	With the check box checked, the "unlock output" block is added.
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].
Unlock output	Enable self-diagnosis of output	Check this check box to enable the self-diagnosis function for the unlock output.

■ AUX-IN

The AUX output of the GS-M Series can be used in a program.

[GS-M series detailed settings]

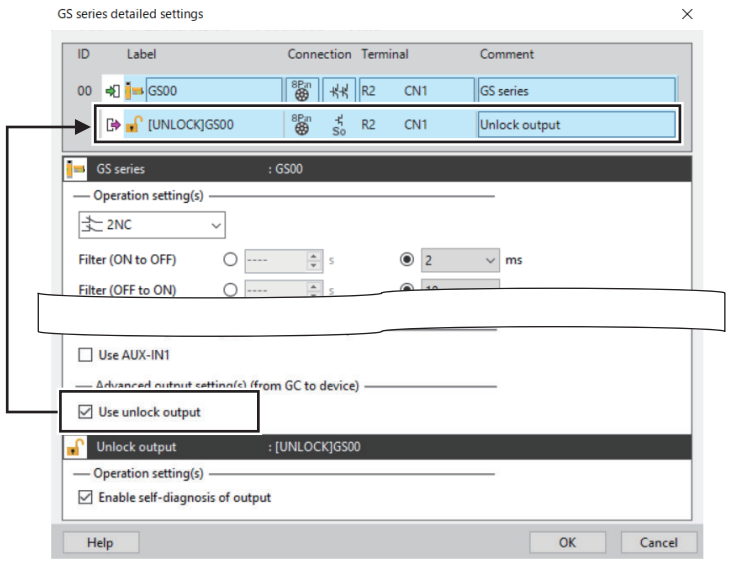


AUX-IN input block

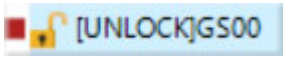
■ Unlock output

You can unlock the GS-M Series through a program.

[GS-M series detailed settings]



Unlock output block



Safety Laser Scanner SZ-V Series

The following describes how to connect the Safety Laser Scanner SZ-V Series to the remote I/O module and the settings.

Reference

For the installation method and usage of the SZ-V Series, refer to the following manual.
"Safety Laser Scanner SZ-V Series User's Manual"

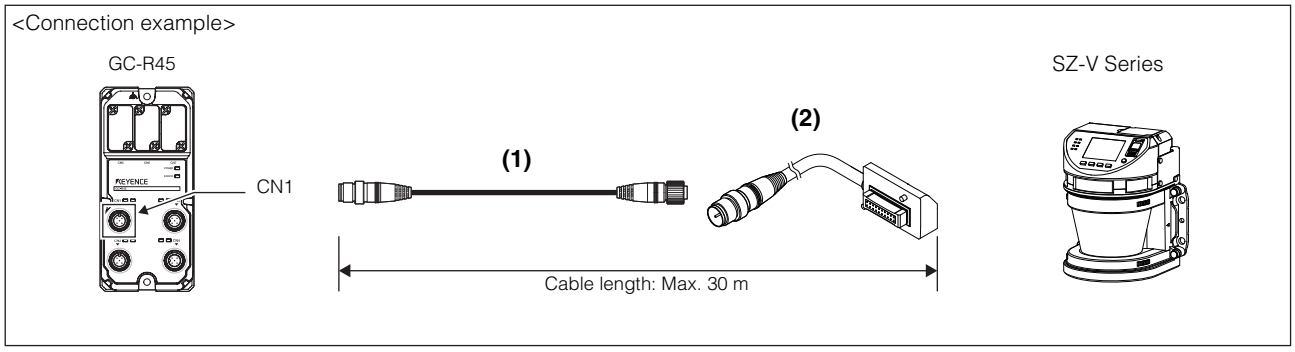
Point

To use the SZ-V Series, you need to set the SZ-V Series main controller using the SZ-V Configurator. Configure the settings according to the functions you will use.

Connection cables

Use the following cables to connect the SZ-V Series to the GC-R45.

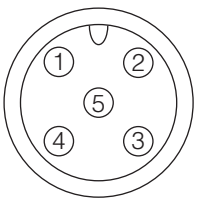
<Connection example>



	Name	Model	Quantity	Length (m)
(1)	Extension cable (5 pins), 7 m	SZ-VCC7	1	7
(2)	SZ-V04 power cable (5 pins), 0.3 m	SZ-VPC03S	1	0.3

■ Pin arrangement

The following shows the GC-R45 pins and the assignment of the SZ-V Series signals.

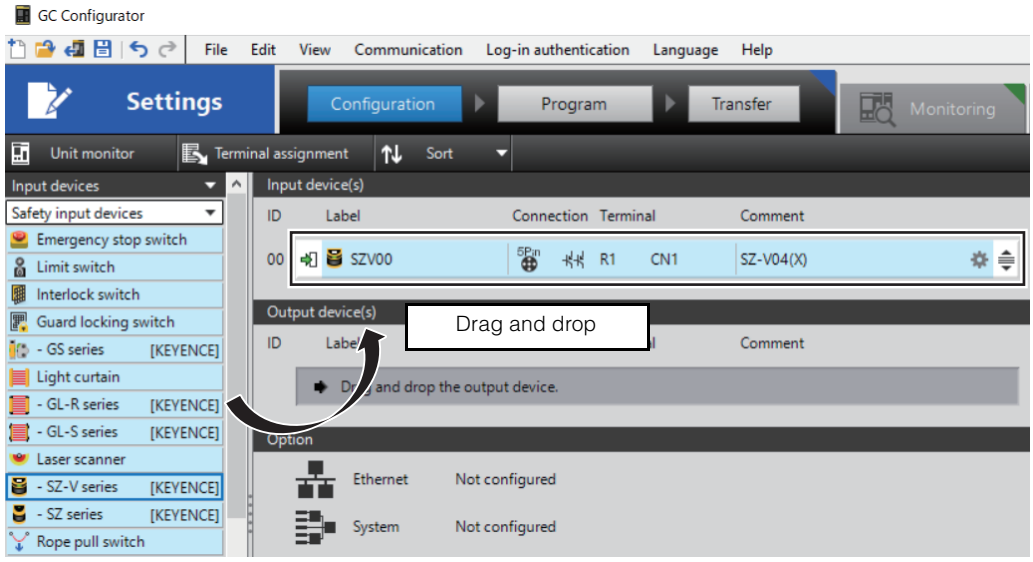


Pin number	SZ-V Series
Pin 1	+24 V
Pin 2	OSSD2
Pin 3	0 V
Pin 4	OSSD1
Pin 5	AUX outputs

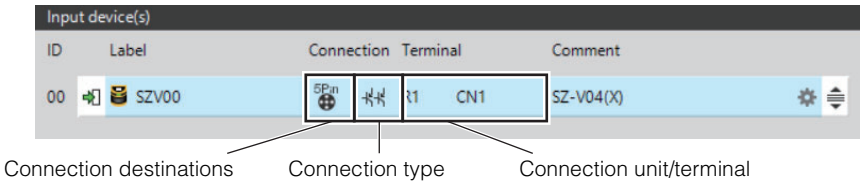
GC Configurator settings

1 Registering input devices

Select [SZ-V series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



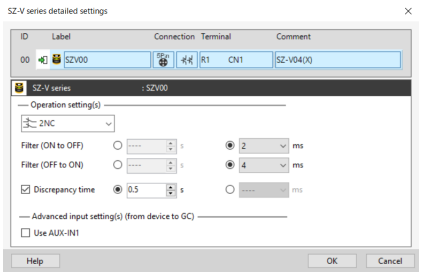
2 Input device basic settings



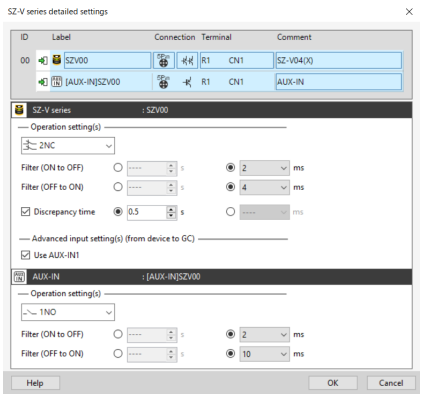
Item	Settings
Connection destinations	Select [Remote I/O M12 5-pin].
Connection type	Fixed to [PNP 2 inputs].
Connection unit/terminal	Select the remote I/O module and port (CN1 to CN4) to be connected.

3 SZ-V Series detailed settings

[Initial setting]



[Setting advanced input/output]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced input setting(s)	Use AUX-IN1*1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*2
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].

*1 This is available only when connecting the SZ-V04(X).

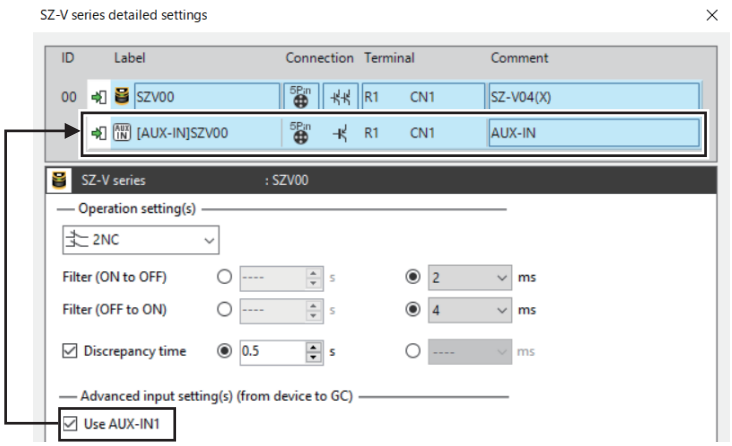
*2 For the SZ-V Series functions and settings, refer to "Safety Laser Scanner SZ-V Series User's Manual".

■ AUX-IN

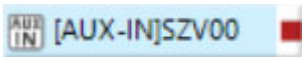
You can use the AUX output of the SZ-V Series connected to the terminal in a program.

Set the function assigned to the AUX output using the SZ-V Configurator.

[SZ-V series detailed settings]



AUX-IN input block



<Functions assigned to AUX>

	SZ-V04 type
Error output	○
Alert output	○
Alert or error output	○
Muted or override state output	○
Muting lamp output	○
OSSD status output	○
Protection zone detection output	○
Warning zone detection output	○
Interlock-reset-ready output	○
Normal operation transition output	○

Reference For more information about the SZ-V Series functions and settings, refer to the "Safety Laser Scanner SZ-V Series User's Manual".

Safety Laser Scanner SZ Series

The following describes how to connect the Safety Laser Scanner SZ Series to the remote I/O module and the settings.

Reference

For the installation method and usage of the SZ Series, refer to the following manual.
"Safety Laser Scanner SZ Series User's Manual"

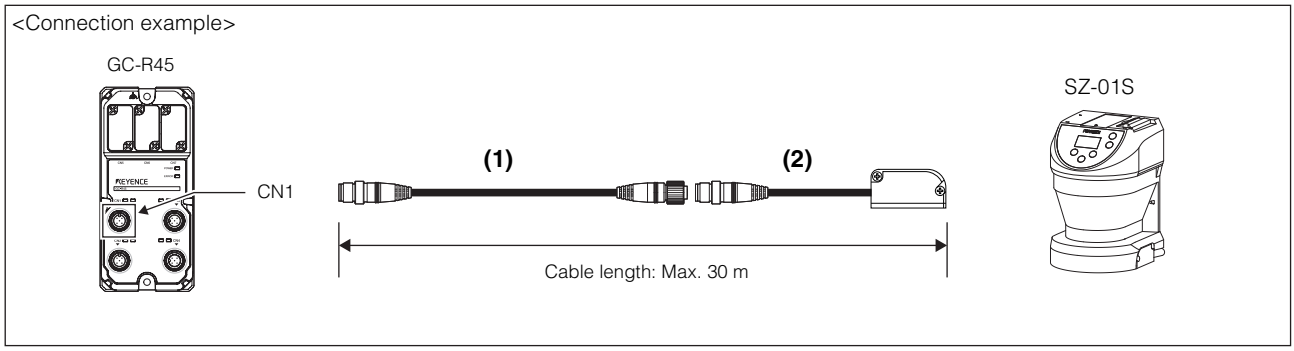
Point

- **Only the SZ-01S (simple function type) can be connected to the GC-R45.**
- **To use the SZ Series, you need to set the SZ Series main controller using the SZ Configurator. Configure the settings according to the functions you will use.**

Connection cables

Use the following cables to connect the SZ Series to the GC-R45.

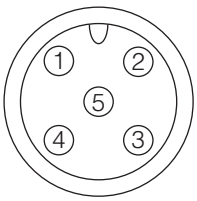
<Connection example>



	Name	Model	Quantity	Length (m)
(1)	Extension cable (5 pins)	SZ-CC7PS	1	7
(2)	SZ-01S output cable (5 pins)	SZ-PC03PS	1	0.3

■ Pin arrangement

The following shows the GC-R45 pins and the assignment of the SZ Series signals.

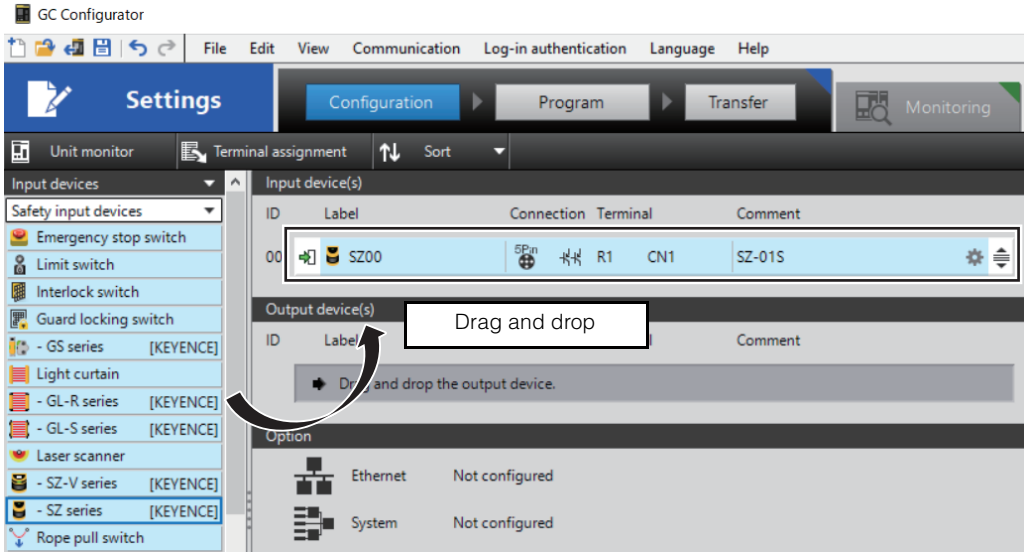


Pin number	SZ Series
Pin 1	+24 V
Pin 2	OSSD2
Pin 3	0 V
Pin 4	OSSD1
Pin 5	AUX outputs

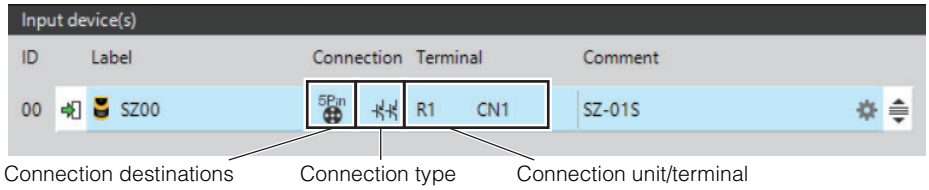
GC Configurator settings

1 Registering input devices

Select [SZ series [KEYENCE]] from the input device list on the GC Configurator [Settings] > [Configuration] screen and register it by the drag-and-drop operation.



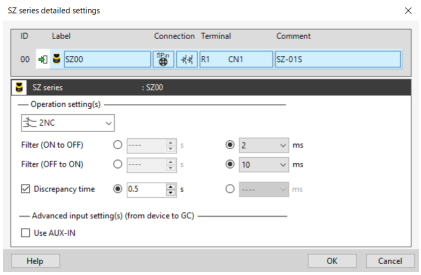
2 Input device basic settings



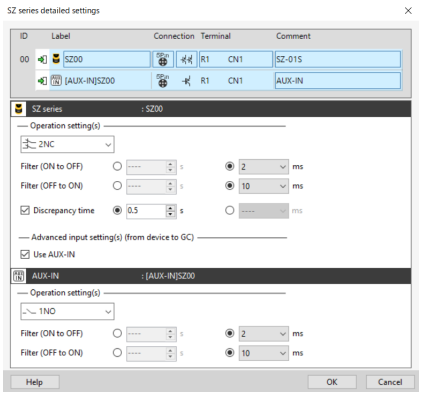
Item	Settings
Connection destinations	Select [Remote I/O M12 5-pin].
Connection type	Fixed to [PNP 2 inputs].
Connection unit/terminal	Select the remote I/O module and port (CN1 to CN4) to be connected.

3 SZ Series detailed settings

[Initial setting]



[Setting advanced input/output]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	With the check box checked, the discrepancy detection function is enabled. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced input setting(s)	Use AUX-IN1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the SZ Series can be used in a program. Set the function assigned to the AUX output using the SZ Configurator.* 1
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)].
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)].

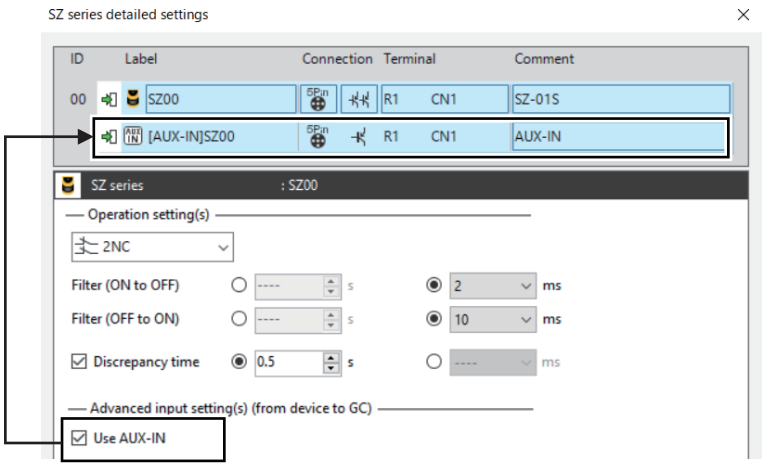
*1 For the SZ Series functions and settings, refer to "Safety Laser Scanner SZ Series User's Manual".

■ AUX-IN

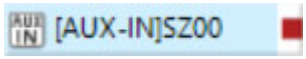
You can use the AUX output of the SZ Series connected to the GC-Link port in a program.

Set the function assigned to the AUX output using the SZ Configurator.

[SZ series detailed settings]



AUX-IN input block



<Functions assigned to AUX>

	SZ-01S
Error output	○
Alert output	○
Alert or error output	○
OSSD status output	○
Protection zone detection output	○
Warning zone detection output	○
Interlock-reset-ready output	○

Reference For the SZ Series functions and settings, refer to "Safety Laser Scanner SZ Series User's Manual".

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7

Before Using the GC Configurator

This chapter provides the information you should know before using the GC Configurator.

7-1 GC Configurator Functions ..... page 7-2
7-2 Operating Environment..... page 7-4
7-3 Installing GC Configurator..... page 7-5
7-4 Program Creation Procedure ..... page 7-6

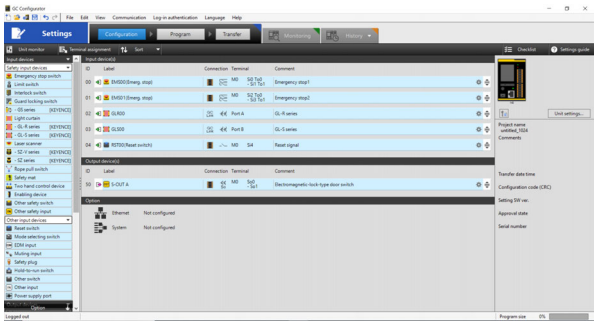
7-1 GC Configurator Functions

GC Configurator Functions

The GC Configurator is the software used to configure settings and perform programming of the GC Series.

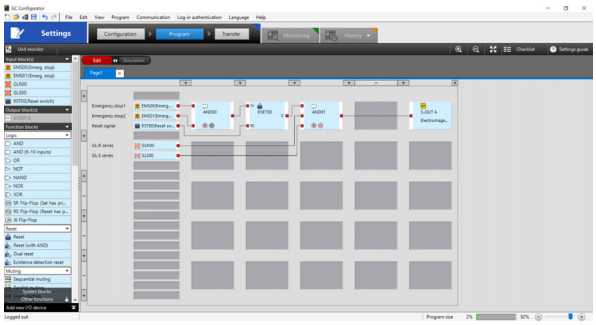
Configuration setting

- Set the GC Series unit configuration.
- Register the input and output devices.
- Set functions such as Ethernet communications.



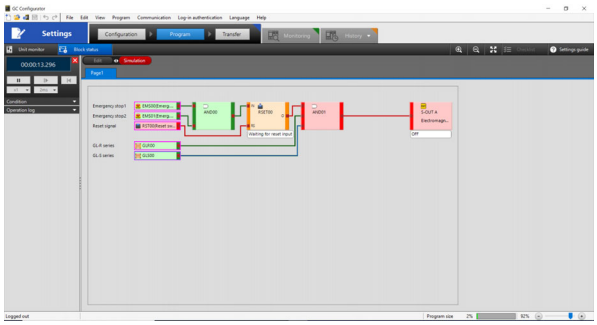
Programming function

- You can create a program using function blocks.
- There are two types of programming modes: "EASY mode" that enables easy programming by just selecting an application and registering input device(s), and "Standard mode" that supports various types of applications.



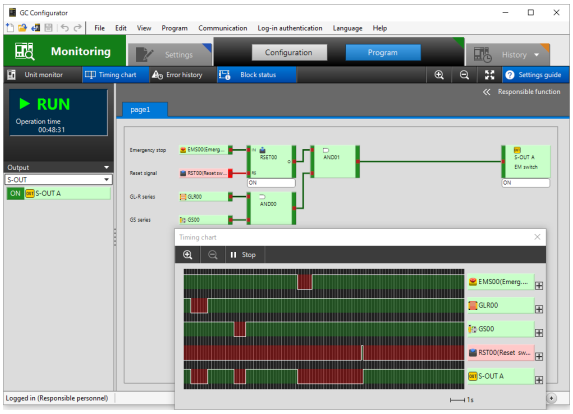
Simulation function

- The operation of a created program can be simulated without connecting to the GC Series, which allows you to preliminarily debug a created program.
- You can select continuous scanning, one-step execution, etc. as the execution mode. This feature helps to easily identify a defective component.



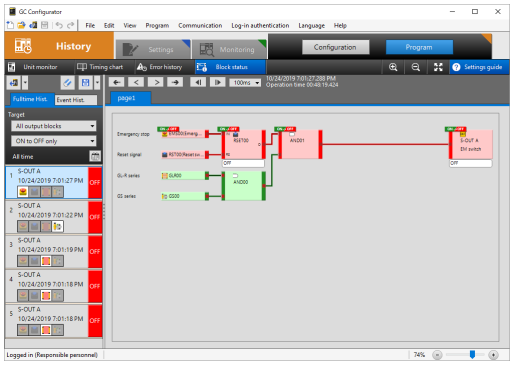
Monitoring function

- Real-time monitoring of the GC Series program execution and input/output device ON/OFF states can be performed.
- A timing chart can be displayed.
- You can monitor the function block and input/output block statuses.
- The unit monitor allows you to monitor the expansion unit and remote I/O module statuses. Additionally, you can monitor the received light amount of the GL-R Series and the door open/close state of the GS Series.



History function

- The GC Series stores a history of the input/output block statuses each time a change occurs. This helps you confirm the status and investigate the cause promptly after an incident occurs.
- There are two types of history data: "Full-time history" that stores changes of all the blocks in a volatile memory without the need of configuration, and "Event history" that stores changes in a non-volatile memory at an arbitrary timing using the event history function block.



7-2 Operating Environment

Operating Environment

Item	Operating environment
Supported OS*1	Windows 10 Windows 8.1 Windows 7 SP1 or later version
CPU	OS system requirements must be satisfied.
Free space on hard disk	Min. 5 GB
Required memory size	1 GB (32-bit OS)/2 GB (64-bit OS)
Display	Min. 1024 x 768
Interface	Ethernet port*2, USB 2.0
Others	.NET Framework 4.6*3

*1 Both 32-bit and 64-bit supported.

*2 GC-1000 only. Not available on GC-1000R.

*3 When not installed, .NET Framework 4.6 will be installed automatically when installing the GC Configurator.

7-3 Installing GC Configurator

Preparation for Installation

Free space on hard disk

The GC Configurator is installed on the system drive on which the OS has been installed. The following free space is required in the drive of the installation destination (hard disk, etc.).

- GC Configurator: Min. 5 GB

Windows environment and installation destination

The GC Configurator is the software that runs on Windows. The installation is also executed on Windows.
Check that Windows 7 SP1/8.1/10 has been installed and is operating properly on the PC you use.

Communication interface

The PC on which the GC Configurator is installed communicates with the GC Series main controller via USB or Ethernet.
Confirm that the communication via USB or Ethernet adapter of the PC on which the GC Configurator is installed is available. For the configuration method, refer to the manual of the PC.

Help file

The help file in the GC Configurator is publish in a PDF format. To view a PDF file, you need to install the PDF browsing software provided by Adobe Systems on the PC. The PDF browsing software is distributed free of charge on the Adobe Systems website (http://www.adobe.co.jp/).

Downloading GC Configurator

You can download the GC Configurator from the KEYENCE website.
www.keyence.com/glb
In a situation where the software cannot be downloaded via Internet, contact the nearest KEYENCE office.

Executing Installation

Execute the downloaded file "setup.exe".
After that, follow the instructions given by the installation program.
Note that the driver required to connect the PC on which the GC Configurator is installed with the GC Series main controller via USB is installed automatically when installing the GC Configurator.
In a situation where it needs to be installed manually, use the driver stored in "C:\Program Files (x86)\KEYENCE\GC Configurator\driver".

Point **To install, log on to the PC as a user with administrator privileges.**

Uninstalling GC Configurator

Uninstall the GC Configurator when it becomes no longer needed.
Uninstall the GC Configurator via [Programs and Features] from [Control Panel] of Windows.

Point **To uninstall, log on to the PC as a user with administrator privileges.**

Precautions for Uninstallation

When uninstalling the GC Configurator, a dialog box prompting you to select whether or not to delete the files (*dll) used by the GC Configurator may be displayed. Check [Do not show this again.] and click the [Yes] button. Deleting these files does not affect the Windows operations.

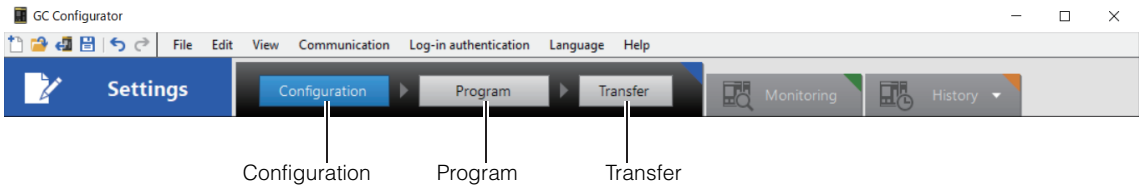
7-4 Program Creation Procedure

The following describes the procedure for programming with the GC Configurator and the information which you should know before performing programming.

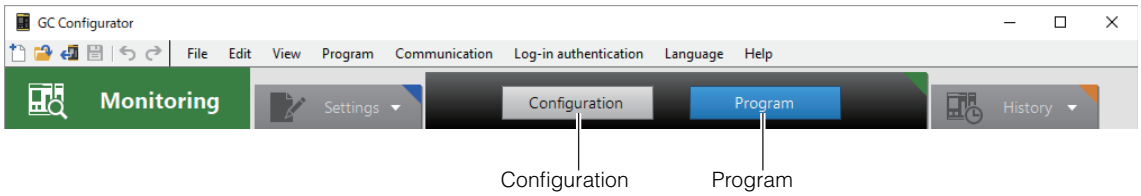
GC Configurator Operations and Screens

Mode	Screen	Overview
Settings	Configuration	Set the GC Series unit configuration, register input/output devices and set options such as Ethernet communication function.
	Program	Perform the programming. "EASY mode" enabling easy programming and "Standard mode" supporting various types of applications are available.
	Transfer	Transfer a program to the GC Series. After log in authentication, a program is transferred to the GC Series main controller.
Monitoring	Configuration	Monitor the GC Series main controller operation status. The operation status by input/output device and the program execution status can be monitored on the [Configuration] screen and the [Program] screen, respectively. These screens are used to check the debugging operation at the start-up of the unit or the status
	Program	
History	Configuration	These screens allow you to review information such as the safety output OFF history stored in the GC Series main controller. You can check the input device status when the safety output turns OFF or the program execution status. These screens are used to check the debugging operation at the start-up of the unit or the status when an incident occurs.
	Program	

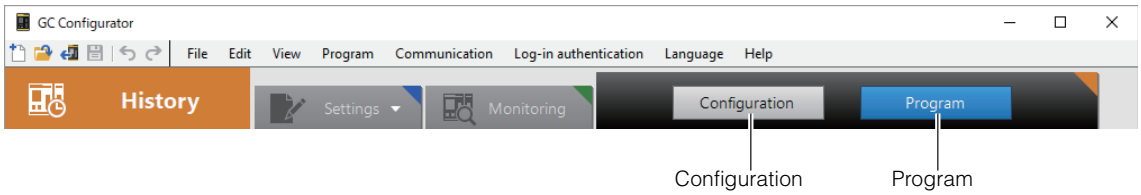
Settings mode



Monitoring mode



History mode



Program Creation Procedure

The following describes the steps for programming using the GC Configurator and the mode used in each step.

1. Create the system configuration.

Create the GC Series system configuration (main controller, expansion unit and remote I/O module).

2. Register input/output devices.

Register input/output devices, set the connection destinations and types, and allocate the terminals. Configure detailed settings related to the input/output device operations as needed.

3. Create a program.

Create a program according to the processing contents controlled by the GC Series.

Two programming modes (EASY and Standard) are available.

4. Transfer the program.

Transfer the created program to the GC Series main controller.

You need to log in to the GC Series before transferring the program.

5. Debug the program.

Check the operation status such as changes in the input/output devices.

- Use [Simulation] when debugging the program off-line.
- Use [Monitoring] when debugging the program on-line.
- Use [History] when actively operating the GC Series to check the history data.

Operation	Screen		
Settings	Configuration	Program	Transfer

Operation	Screen		
Settings	Configuration	Program	Transfer

Operation	Screen		
Settings	Configuration	Program	Transfer

Operation	Screen		
Settings	Configuration	Program	Transfer

Operation	Screen		
Settings	Configuration	Program	Transfer
Monitoring	Configuration	Program	
History	Configuration	Program	

MEMO

8

Basic Operations of GC Configurator

This chapter describes the basic operations of the GC Configurator.

8-1 Starting GC Configurator ..... page 8-2
8-2 Screen Configuration ..... page 8-5
8-3 Menu ..... page 8-6

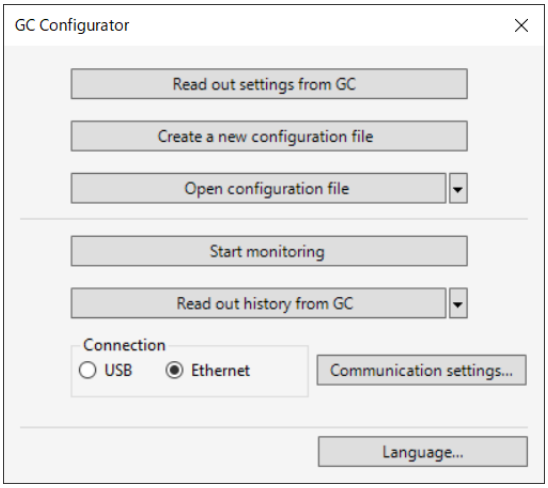
8-1 Starting GC Configurator

Starting GC Configurator

Start the GC Configurator by any of the following methods.

- From the start button of Windows, select [All Apps] (or [All programs]) > [KEYENCE Applications] > [GC Configurator].
- Double-click the GC Configurator icon on the desktop.
- Double-click the GC Configurator configuration file.

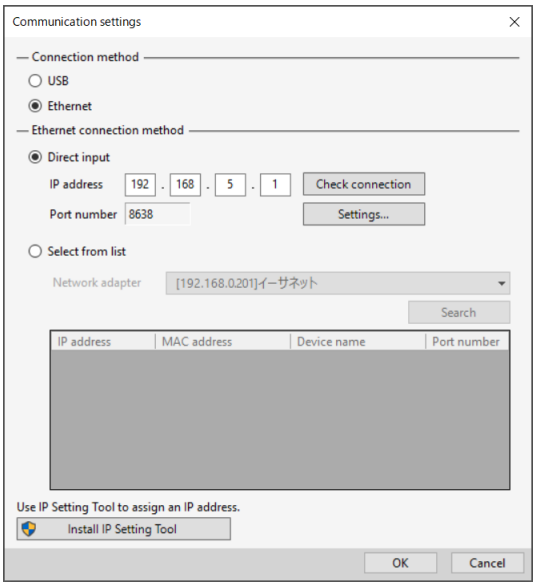
Initial Screen



Item	Details
Read out settings from GC*	Used to read the settings of the GC main controller connected to a PC via USB or Ethernet. After reading the settings, the configuration screen in the settings mode will be displayed.
Create a new configuration file	Used to create a new file and edit new settings. Clicking this button displays the [Create a new configuration file] dialog box.
Open configuration file	Used to open an already created file. Click the [▼] button and select a file type to open from the following options. • Configuration file • Sample file • Preset recipe • Registered recipe
Start monitoring*	Used to monitor the GC main controller status. The monitoring screen will be displayed.
Read out history from GC*	Used to read the GC main controller history. After reading the history, the history screen will be displayed. Click the [▼] button to display the [Open] window and then select a history file stored in the PC to display.
Connection	Select a connection method from [USB] and [Ethernet].
Communication settings	Clicking this button displays the [Communication settings] dialog box.
Language	Clicking this button displays the [Language Selection] dialog box.

* Before operating, connect the GC Series with a PC and put them in a communication enabled state.

Communication settings



Item	Details
Connection method	Select a connection method from [USB] and [Ethernet].
Ethernet connection method	Select either [Direct input] or [Select from list].
IP address	Enter an IP address when selecting [Direct input] for [Ethernet connection method].
Port number	Enter a port number when selecting [Direct input] for [Ethernet connection method]. Clicking the [Settings] button displays the port number setting dialog box. Setting range: 0 to 65535
Check connection	Click the [Check connection] button to check if connection can be established with the specified IP address and port number.
Network adapter	The network card used for the PC is displayed. When the PC is equipped with two or more network cards, select one to use.
Search	Click the [Search] button to search the network for the device. When the device was found after searching, the IP address, MAC address, device name and port number are displayed in the search result area.
Start IP Setting Tool	Displayed when the "IP Setting Tool" has been installed on the PC. Click this button to start the IP Setting Tool.
Install IP Setting Tool*	Displayed when the "IP Setting Tool" has not been installed on the PC. Click this button to start installation.

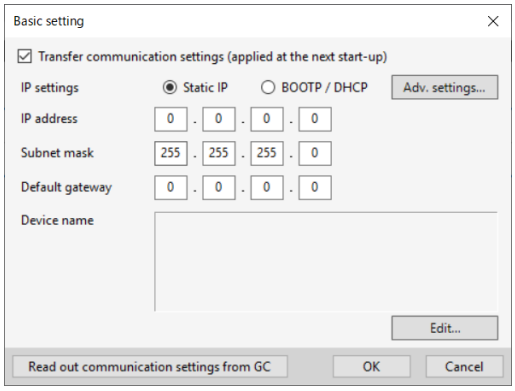
* The IP Setting Tool is stored in the GC Configurator installation folder.

Reference

The IP address of the GC-1000 is not assigned in the default state. Set the IP address by any of the following methods.

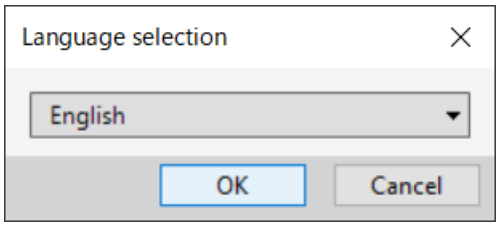
- Connecting via Ethernet
  - Set using the IP Setting Tool.
  - Set using the BOOTP server. (This needs to be prepared by the customer.)
- Connecting via USB
  - Write the communication settings when transferring a program.

Select [Option] on the [Configuration] screen, select [Basic setting] for Ethernet and then check [Transfer communication settings (applied at the next start-up)]. "Ethernet basic setting" (page 10-22)
* When the communication settings are transferred, the settings will be reflected at the next start-up.



Language selection

Clicking the [Language] button displays the language selection dialog box.
Select a language and click the [OK] button to change the language used for the GC Configurator.



Reference

The language can also be changed via [Language] on the menu bar.
"Language" (page 8-13)

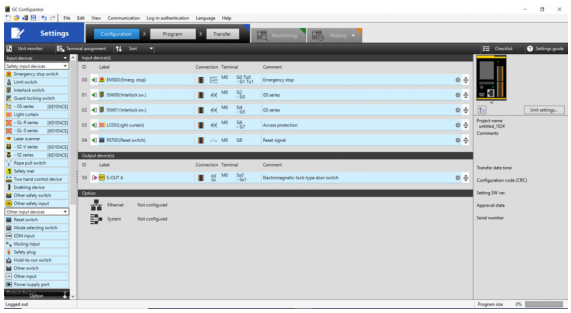
8-2 Screen Configuration

The GC Configurator provides three modes: "Settings", "Monitoring" and "History". Each mode has the [Configuration] screen that allows you to edit/confirm the input/output devices and the [Program] screen that allows you to edit/confirm the programs.

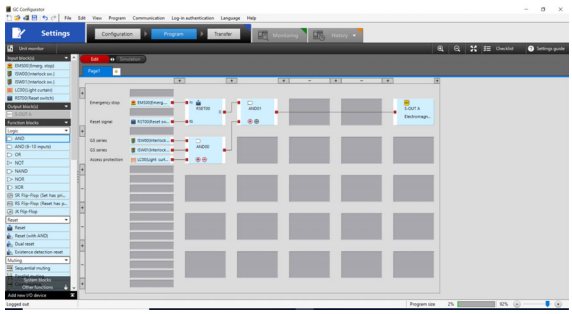
Settings

The settings mode is used to create new settings or edit/check settings, etc. off-line.

<Configuration>



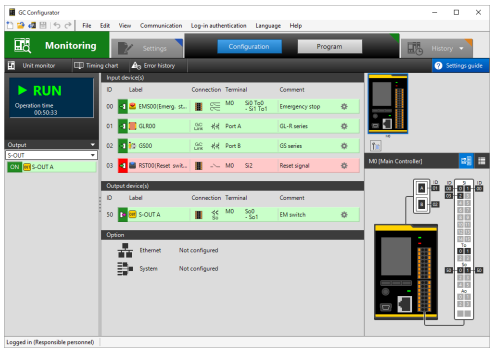
<Program>



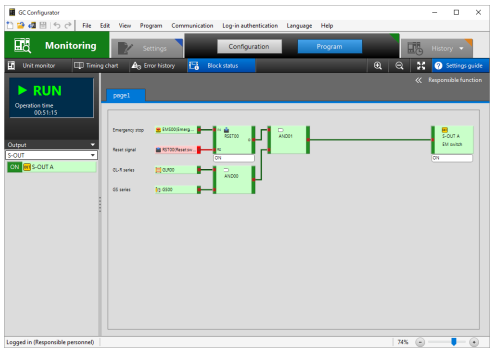
Monitoring

The monitoring mode is used to check the status at start-up, etc. on-line.

<Configuration>



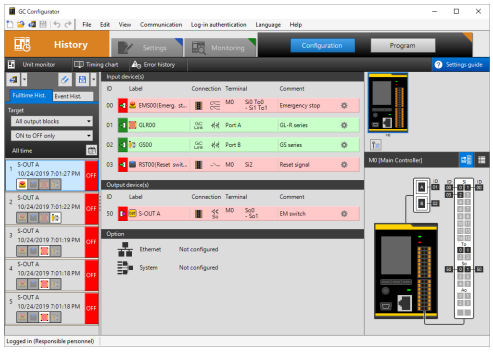
<Program>



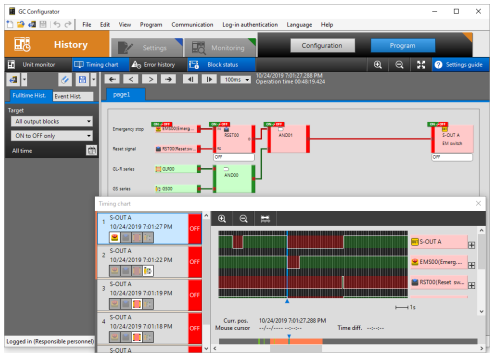
History

The history mode is used to review the past data such as the status at safety output OFF, which is useful when a incident occurs.

<Configuration>

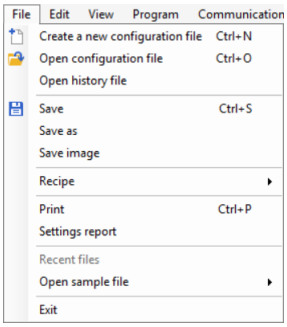


<Program>



8-3 Menu

File



Create a new configuration file

Create a new file and edit new settings.
Clicking this item displays the [Create a new configuration file] screen.
"9 Creating New Project with GC Configurator" (page 9-1)

Open configuration file

Read an edit target file when editing an already created file.
Clicking this item displays the [Open] window.

Open history file

Read a saved history file.
Clicking this item displays the [Open] window.

Save

Save an edited configuration file as the current file name in an overwriting manner.
If you want to keep the original file, select [Save as] described next.

Point

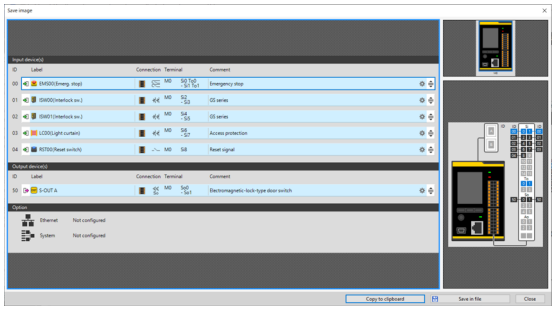
- **With [Save] selected, the previous data will be lost.**
- **A newly created file is named as "Untitled_****.**" by default.**
- **Even if [Save] is executed for a newly created file, [Save as] will be selected automatically.**

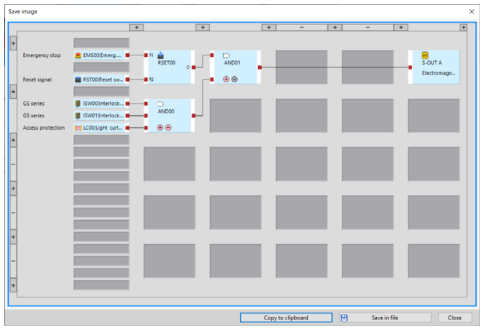
Save as

Save the file as a different name from the current file name. [Save as] is always selected for a newly created file. Enter a file name at [File name] in the [Save as] window.

Save image

Save the state currently displayed as an image. It can be saved as an image file (.png/.bmp/.jpg) or copied to the clipboard.
Clicking this item displays the [Save image] window.
[Copy to clipboard]: Copied to the clipboard.
[Save in file]: Saved as an image file in ".png", ".bmp", ".jpg" format.





Point

Images can be saved in units of the GC Configurator windows. Select a window and then save the image.

Recipe

Using the recipe function, a program can be saved as a recipe file in units of pages and it can be reused for another project.
There are two types of recipes: "Preset recipe" registered preliminarily in the GC Configurator, and "Registered recipe" that registers a program created by the customer.
For details, refer to "Recipe Function" (page 11-35).

- **Open**
  Read "Preset recipe" registered preliminarily in the GC Configurator or "Registered recipe".
- **Lift restrictions on edit**
  LLift the edit restriction on a recipe to enter it into the editable state.
- **Registration/management**
  Register a newly created recipe or delete a registered recipe.

Print

Print the contents of the currently edited configuration file.
The following setting contents are printed.

- **Setting properties**
  - Project name
  - Comment
  - Transfer date time
  - Configuration code (CRC)
  - Setting software version
  - Serial number
- **Unit configuration**
  - Unit number
  - Label
  - Unit name
  - Unit configuration diagram
- **Terminal table**
- **Option**
  - Ethernet basic setting
  - Register
  - System restart
  - Event history setting
  - Setting for start-up delay
- **Program chart**
  - Program
  - Page information
- **Settings of blocks**
- **Response time**
- **Precautions**

Report

Display the contents of the currently edited configuration file.
They can also be printed from the [Settings report] window.
The displayed setting contents are the same as those for [Print].

Recent files

Display up to five recently used files.

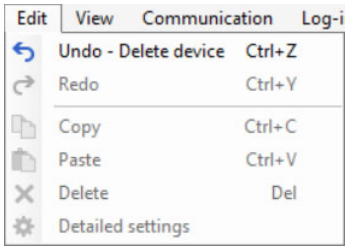
Open sample file

In the sample file, configuration files including programs which can be used for reference are saved.
The programs, which can be used as they are, when using KEYENCE safety sensors are pre-installed.

Exit

Save the currently edited configuration file and exit the GC Configurator.

Edit



Undo

Cancel the last operation and restore the previous state.

Redo

Execute the operation canceled by [Undo] again.

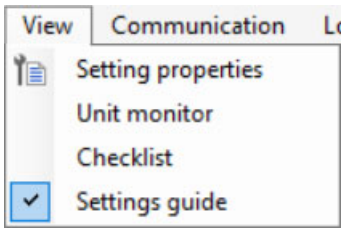
Copy/Paste/Delete

Copy, paste or delete the selected item.

Detailed settings

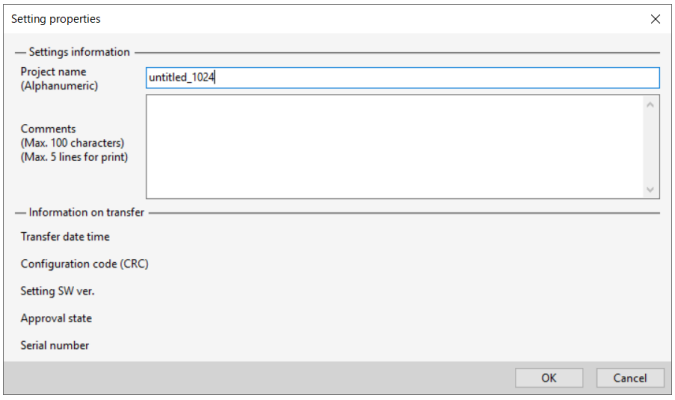
Display the detailed settings screen for the selected item.

View



Setting properties

Display the project information of the currently edited configuration file.



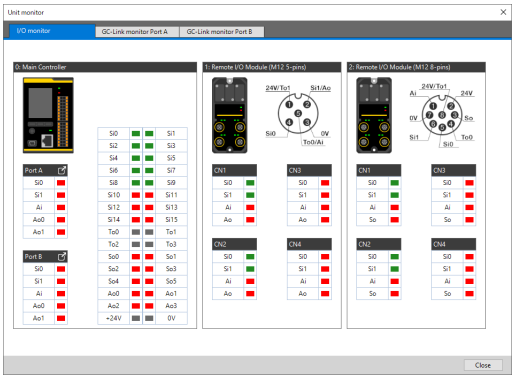
Item		Details
Settings information	Project name*1	Set a project name. (Up to 64 half-width alphanumeric characters)
	Comment*2	Set a comment for the project. (Up to 100 characters)
Information on transfer	Transfer date time	The date and time on which the transfer to the GC main controller is performed are displayed.
	Configuration code (CRC)	An eight digit code to identify the settings information is displayed.
	Setting software version	The GC Configurator version with which the settings were performed is displayed.
	Approval state	Whether this project was approved by the responsible personnel is displayed. The maintenance personnel as well as the responsible personnel can transfer the settings in the approved state to the GC Series.
	Serial number	The serial number of the main controller is displayed.

*1 Named as "Untitled_0101" by default. The numeric part indicates a month and day values.

*2 Up to five lines are printed. The sixth and subsequent lines will not be printed.

Unit monitor

Display the [I/O monitor] screen on which the input/output terminal status of each unit is displayed.



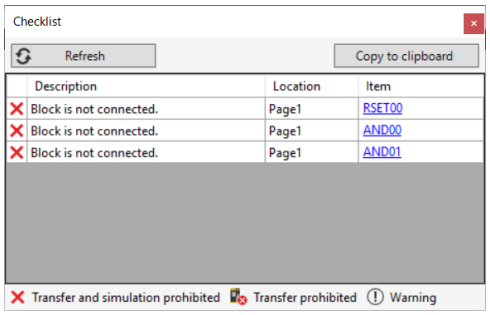
For details, refer to "Unit Monitor" (page 13-9).

Checklist

Display the checklist dialog box when it is not displayed.
Hide the checklist dialog box when it is displayed.

● What is the checklist?

The checklist window shows information about the currently edited configuration file which needs to be reviewed.
If the checklist contains items, there may be a problem with the settings. Review the contents and make a correction.
Depending on the contents, transfer to the GC Series main controller or execution of the simulation function may become unavailable.



Item	Details
Notification icon	Three types of icons are displayed according to the warning level. The following table shows the corresponding levels and the availability of transferto the GC main controller and the simulation function.
Description	Displays the description of a caution or error.
Location	Displays the location generating a caution or error.
Item	Displays the item generating a caution or error. Click an item to jump to the corresponding location.

Icon	Level	Transfer to main controller	Simulation
ⓘ	Caution	Available	Available
	Error (Transfer unavailable)	Unavailable	Available
✕	Error (Transfer/simulation unavailable)	Unavailable	Unavailable

- Checklist update timing
  The checklist is updated at the following timing:
  - When the [Refresh] button in the checklist dialog box is clicked.
  - When the checklist dialog box is displayed (changed from the hidden to shown state).
  - When the [Transfer] button is clicked.
  - When [Communication] > [Transfer settings to GC] is selected from the menu.
  - When the simulation mode is entered.
  - When the report screen is displayed.
  - When printing is executed.

- Notification contents

Level	Content	Cause
Caution	Not used in the program.	• The input/output device registered in the configuration is not used in the program. • Registration has been completed, but both of the load and store blocks are not used in the program window.
	Not used.	An expansion unit or remote I/O module has been registered, but no device is assigned to the terminal.
	Output port is unconnected.	Some block output port is unconnected.
	Corresponding register (load) is not used.	The register (load) that corresponds to the register (store) is not used in the program.
Error	Terminal is not assigned.	No terminal is assigned to the registered input/output device.
	Not configured.	There is a page where the application has not been set in the EASY mode.
	Offset: bit is not assigned.	Communication input/output offset: Bit is not assigned.
	Dummy input cannot be transferred.	A dummy input block exists in the program.
	Dummy output cannot be transferred.	A dummy output block exists in the program.
Error	Device has not been inserted.	There is a block where the input device has not been registered in the EASY mode.
	Block is not connected.	The block port is unconnected.
	Create a program.	A program has not been created.
	Program size is too large.	The program capacity is exceeded.
	Cannot add additional blocks.	The program capacity is exceeded.
	Select the model(s) in detailed settings.	The GS Series model with the GC-Link setting is not selected for the connection destination.
	Disablement target is not selected.	The maintenance function is enabled in the EASY mode, but the disabling target device is not selected.
	Reference is not configured.	The reference destination for block information, GS closed state, GS locked state, etc. is not assigned.
	Reference device is not used.	The reference destination of block information is not used in the program.
	Corresponding jump (load) is not used.	Not used by the jump - store block (load).
	Corresponding register (store) is not used.	The register (store) that corresponds to the register (load) is not used in the program.

Setting guide

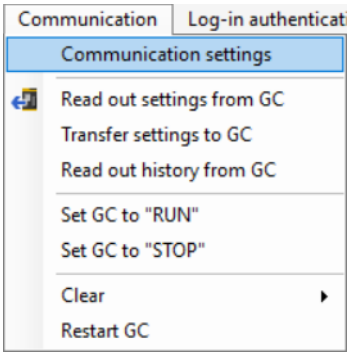
Clicking this item displays the setting guide dialog box when it is not displayed.
Hide the setting guide dialog box when it is displayed.

● What is the setting guide?

The setting guide window shows information such as the usage of the GC Configurator, selected devices, block setting contents, assigned terminals and

locations used in the program.

Communication



Communication settings

Clicking this item displays the communication settings dialog box.
For details, refer to "Communication settings" (page 8-3).

Read out settings from GC

Read the settings from the GC Series main controller into the GC Configurator.

Transfer settings to GC

Transfer the program set with the GC Configurator to the GC Series main controller. After transferring, the monitoring mode will be displayed.

Read out history from GC

Read the history data from the GC Series main controller into the GC Configurator.

Identification & Maintenance (M)

When only PROFINET communication is used, this is displayed.
The information about PROFINET communication can be checked. Also "TAG FUNCTION", "TAG LOCATION", "INSTALLATION DATE", and "DESCRIPTOR" can be set, transferred and read.

Set GC to "RUN"

Change the GC Series to RUN.

Set GC to "STOP"

Change the GC Series to STOP.

Clear

Clear history data

Clear the history data of the GC Series main controller.

Initialize GC

Initialize the GC Series main controller.

Clicking this item displays a confirmation message. Select from [Initialize all settings], [Except comm. settings] and [Cancel].

With [Initialize all settings] selected, the main controller settings, history data and communication settings will be initialized to recover the default settings.

With [Except comm. settings] selected, the main controller settings and history data will be deleted.

Select [Cancel] to cancel the process.

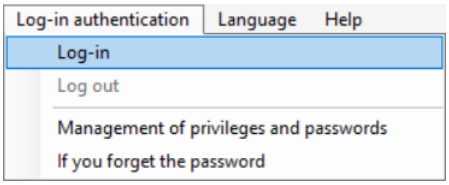
Reference

It takes a maximum of 20 seconds to complete the initialization.
After the initialization, the GC Series will restart automatically.

Restart GC

Restart the GC Series.

Log-in Authentication



Log-in

Clicking this item displays the log-in dialog box.
For details, refer to "12-1 Log-in Authentication" (page 12-2).

Log out

Clicking this item stops the communication with the GC Series main controller and logs the user out.

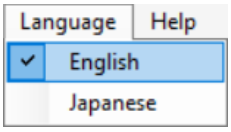
Management of privileges and passwords

Clicking this item displays the dialog box for management of privileges and passwords.
For details, refer to "12-1 Log-in Authentication" (page 12-2).

If you forget the password

Clicking this item displays the [If you forget the password] dialog box.
For details, refer to "12-1 Log-in Authentication" (page 12-2).

Language



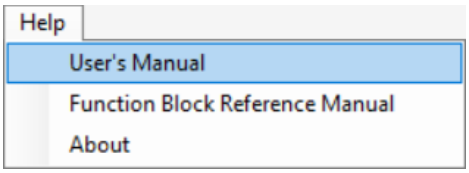
English/Japanese

Change the display language of the GC Configurator.

Reference

When the display language is changed, it will be reflected after restarting the GC Configurator.

Help



The GC Configurator provides the manual in a PDF format. If you are not sure about the operations, refer to the manual via the [Help] menu.

About

Clicking this item displays the GC Configurator version information dialog box.

MEMO

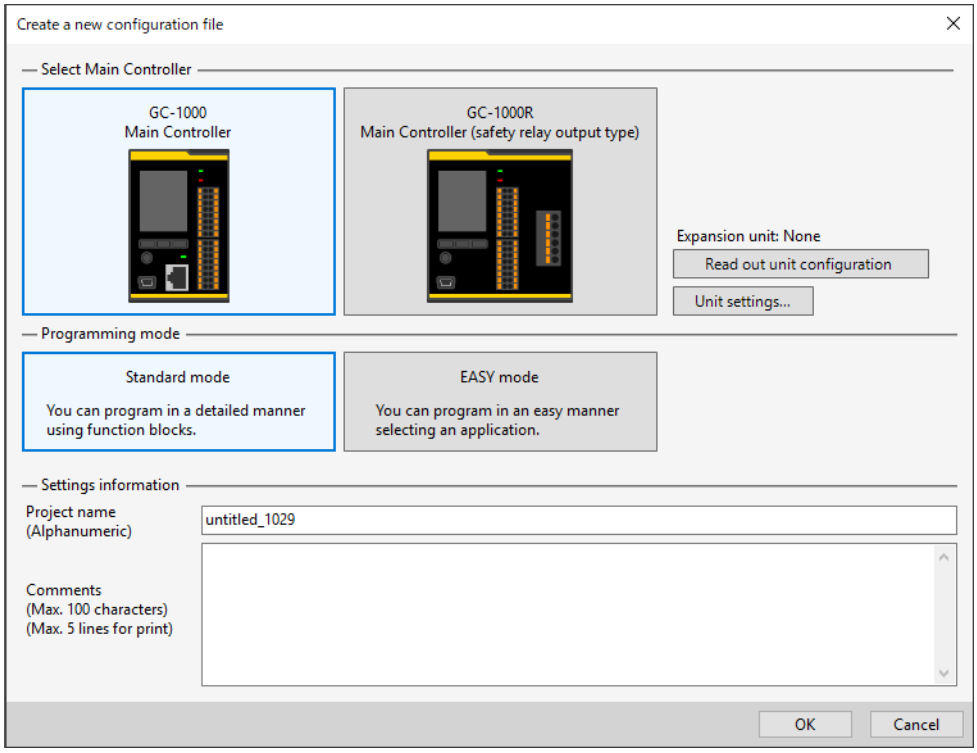
9

Creating New Project with GC Configurator

This chapter describes how to create a new project with the GC Configurator.

9-1 Create a new configuration file ..... page 9-2

9-1 Create a new configuration file



Item	Details
Select Main Controller	Select the main controller used for a project to be created from [GC-1000] and [GC-1000R].
Read out unit configuration*1	Read the unit configuration information from the GC Series connected to the PC.
Unit settings	Configure the unit settings. Clicking this button displays the [Unit settings] window.
Programming mode	Select the programming mode from [Standard mode] or [EASY mode].
Project name	Set a project name. (Up to 64 half-width alphanumeric characters)
Comment	Set a comment for the project. (Up to 100 characters)

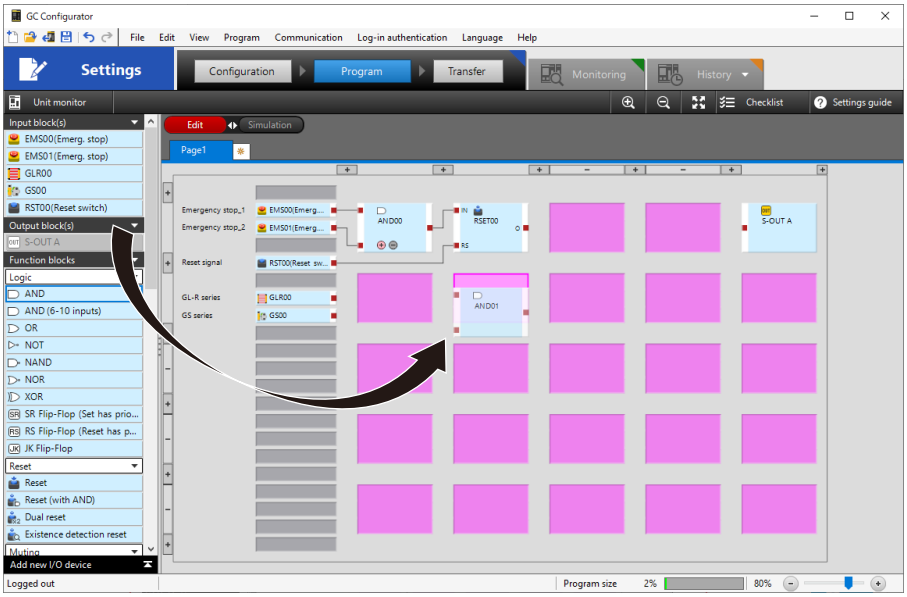
*1 Before operating, connect the GC Series with a PC and put them in a communication enabled state.

Programming Mode

The GC Configurator provides two programming modes: "Standard mode" and "EASY mode" for creating a safety control program.

Standard mode

The standard mode allows you to use all of the function blocks and create a safety control program supporting various types of applications with a high degree of freedom.

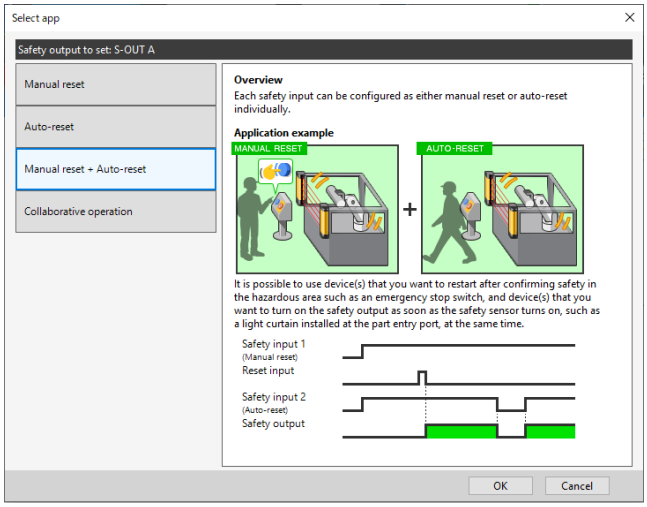


For details, refer to "11-2 Standard Mode" (page 11-25).

EASY mode

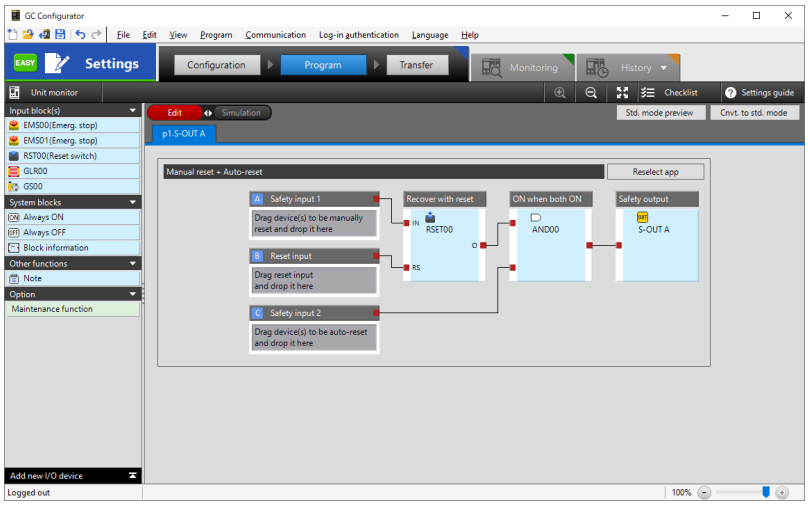
The EASY mode allows you to easily create a safety control program by simply selecting an application and registering input device(s). This is useful when performing a relatively simple safety control.

Step 1 Select an application.

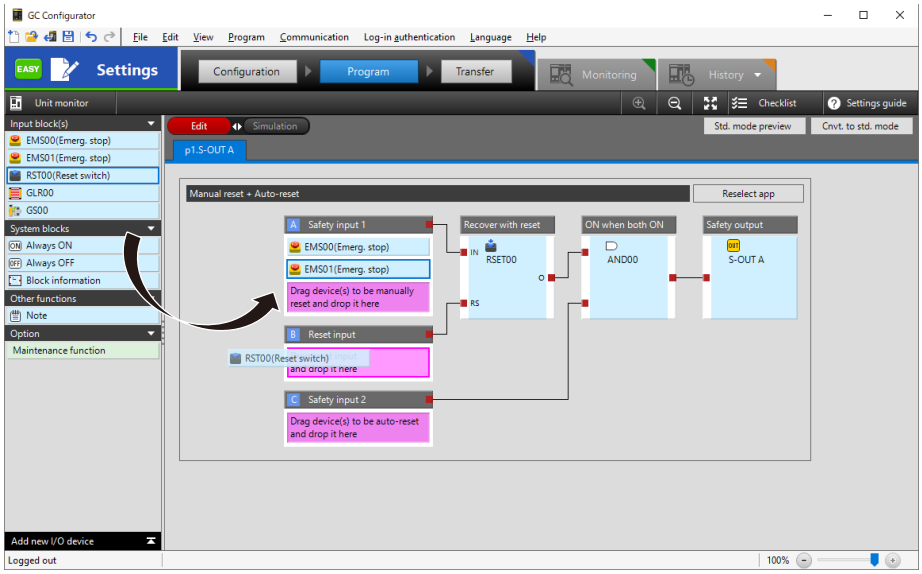


Select an application according to the control content.

Step 2 Register input device(s).



A program for the selected application has been prepared.



Register input device(s) by the drag-and-drop operation.

The program is now completed.

For details, refer to "11-1 EASY Mode" (page 11-2).

Unit Settings

You can expand the number of input/output points of the main controller "GC-1000" by connecting expansion units and remote I/O modules. To use expansion units or remote I/O modules, you need to register a unit to connect using [Unit settings].

Point **The GC-1000R cannot be connected to expansion units or remote I/O modules.**

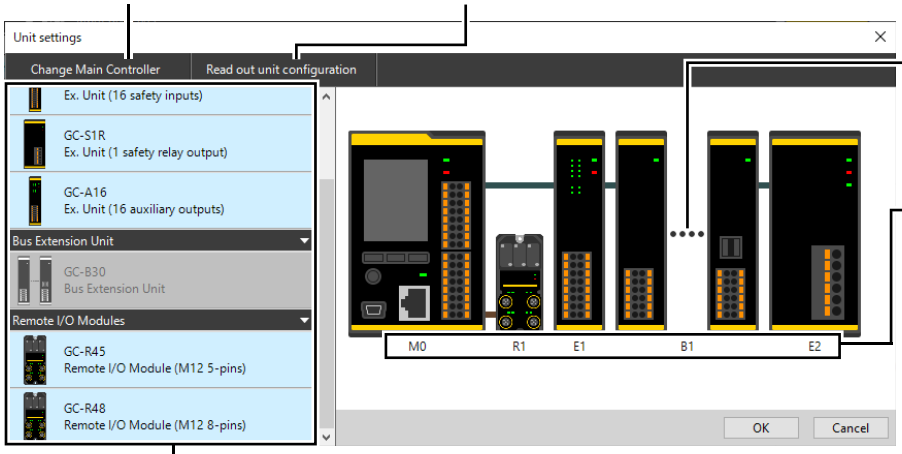
Name and function of each part on [Unit settings]

Change Main Controller

Change the main controller.

Read out unit configuration

Read the unit configuration from the GC Series.



Unit selection

Select the unit to place.

Extension cable

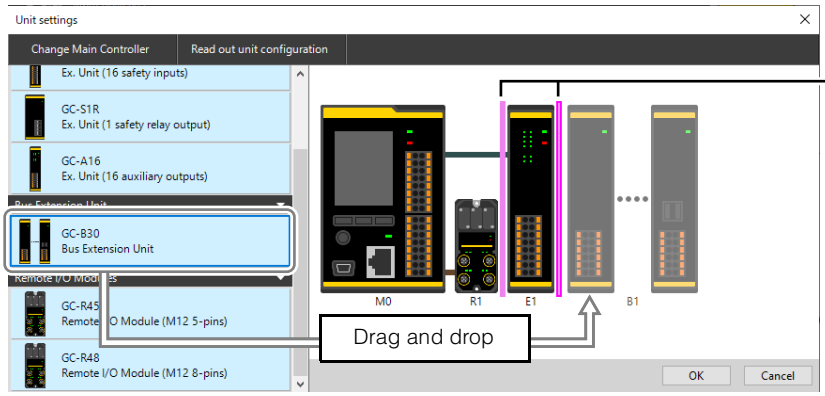
When a bus extension unit is used, the extension cable is indicated with a dotted line.

Unit label

[Meaning of alphabet]
M: Main controller
E: Expansion units
B: Bus extension unit
R: Remote I/O modules
[Meaning of number]
Numbers (1, 2, 3...) are assigned to expansion units and remote I/O modules in the order of placement.

Reference The unit label can be changed.

Registering expansion units and remote I/O modules



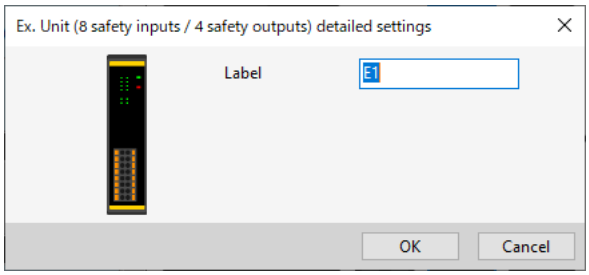
Placeable area

The placeable area for the unit is highlighted (pink).

Point **The unit settings can also be performed via the [Configuration] screen.**

Detailed unit settings dialog box

Right-click the unit placed and select [Detailed settings] to display the detailed settings dialog box.
The label of the unit can be changed in the detailed settings dialog box. (Up to four characters)



Point

- **Labels are limited to four half width alphanumeric characters.**
- **You cannot set the same name for multiple units.**

MEMO

10

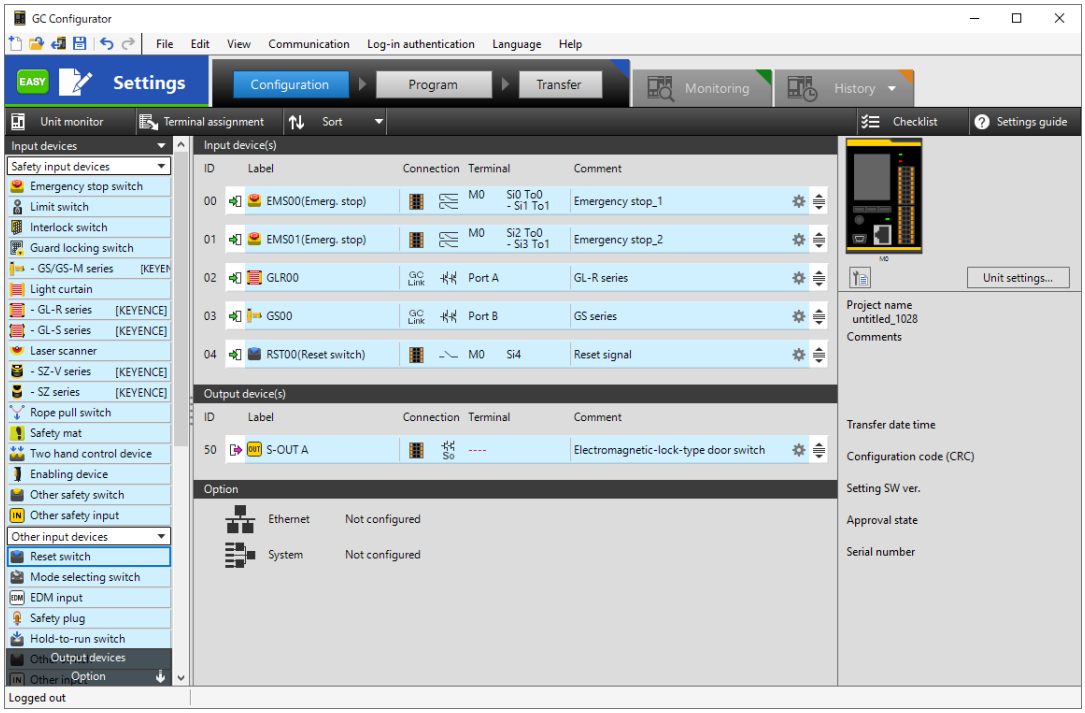
GC Configurator [Settings] - [Configuration]

This chapter describes how to set the device configuration with the GC Configurator.

10-1 Overview of [Configuration] Screen ..... page 10-2
10-2 Name and Function of Each Part ..... page 10-3
10-3 Device Configuration Registration and Setting Procedure ..... page 10-4
10-4 Registering Input Devices ..... page 10-5
10-5 Registering Output Devices ..... page 10-12
10-6 Assigning Terminals ..... page 10-17
10-7 Setting Options ..... page 10-22

10-1 Overview of [Configuration] Screen

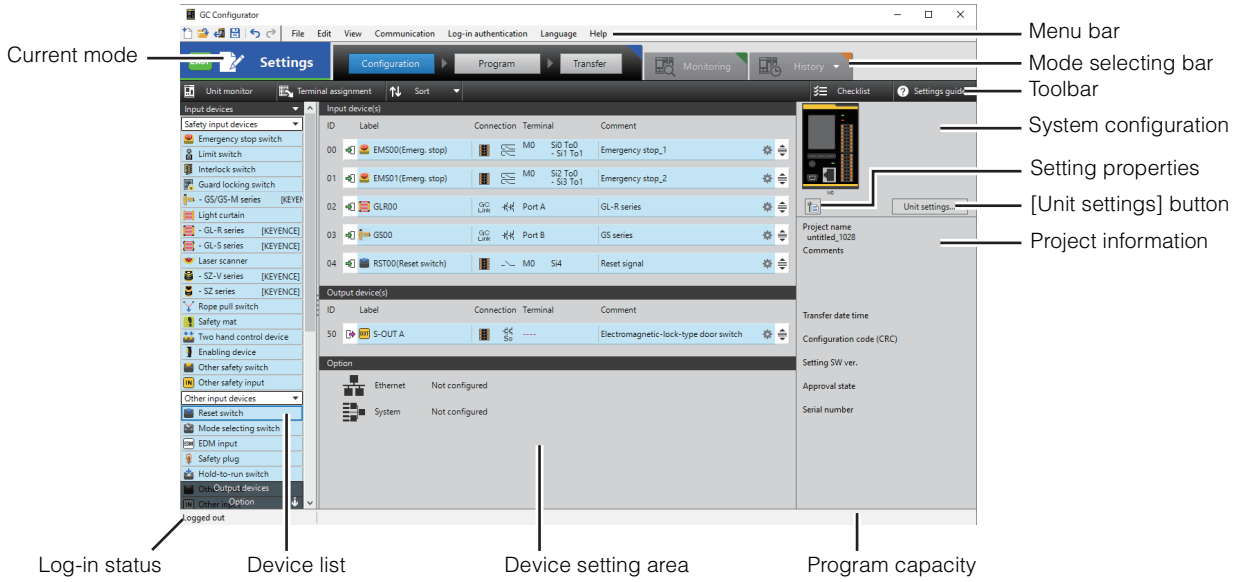
On the [Configuration] screen, configure the unit settings, input/output device registration and option settings such as Ethernet communication function used for a project.



■ System configuration	"Unit Settings" (page 9-6)
■ Input device registration • Connection destination setting • Connection type setting • Comment input • Input device detailed settings	"10-4 Registering Input Devices" (page 10-5)
■ Output device registration • Connection destination setting • Connection type setting • Comment input • Output device detailed settings	"10-5 Registering Output Devices" (page 10-12)
■ Terminal assignment	"10-6 Assigning Terminals" (page 10-17)
■ Option settings • Ethernet basic setting • Ethernet communication function setting • Program function setting	"10-7 Setting Options" (page 10-22)

10-2 Name and Function of Each Part

[Configuration] screen



Name	Details
Current mode	Displays the current operation mode. There are [Settings], [Monitoring] and [History] modes.
Menu bar	Menu items. Displays the menu to execute each function. "8-3 Menu" (page 8-6)
Mode selecting bar	Used to change the operation mode and screen.
Toolbar	Displays each function window.
System configuration	Displays the system configuration.
Setting properties	Displays the [Setting properties] window.
[Unit settings] button	Displays the [Unit settings] window. "Unit Settings" (page 9-6)
Project information	Displays the project information. "Setting properties" (page 8-8)
Program capacity	Displays the currently created program capacity. (Unit: %)
Device setting area	Used to display/edit the registered device settings.
Device list	Allows you to select an input device, output device and optional function.
Log-in status	Displays the current log-in status.

10-3 Device Configuration Registration and Setting Procedure

- Device configuration procedure -

Step 1-1 **Register input device(s).**

Register the input device to use by dragging and dropping from the device list to device setting area.
"10-4 Registering Input Devices" (page 10-5)

Step 1-2 **Configure the basic and detailed settings for the input device.**

Set the connection destination, connection type, etc. for the registered input device.
"10-4 Registering Input Devices" (page 10-5)

Step 2-1 **Register output device(s).**

Register the output device to use by dragging and dropping from the device list to device setting area.
"10-5 Registering Output Devices" (page 10-12)

Step 2-2 **Configure the basic and detailed settings for the output device.**

Set the connection destination, connection type, etc. for the registered output device.
"10-5 Registering Output Devices" (page 10-12)

Step 3 **Assign terminals.**

Assign the terminal numbers of the registered input/output devices.
"10-6 Assigning Terminals" (page 10-17)

Step 4 **Set options.**

Set options such as Ethernet communication function.
"10-7 Setting Options" (page 10-22)

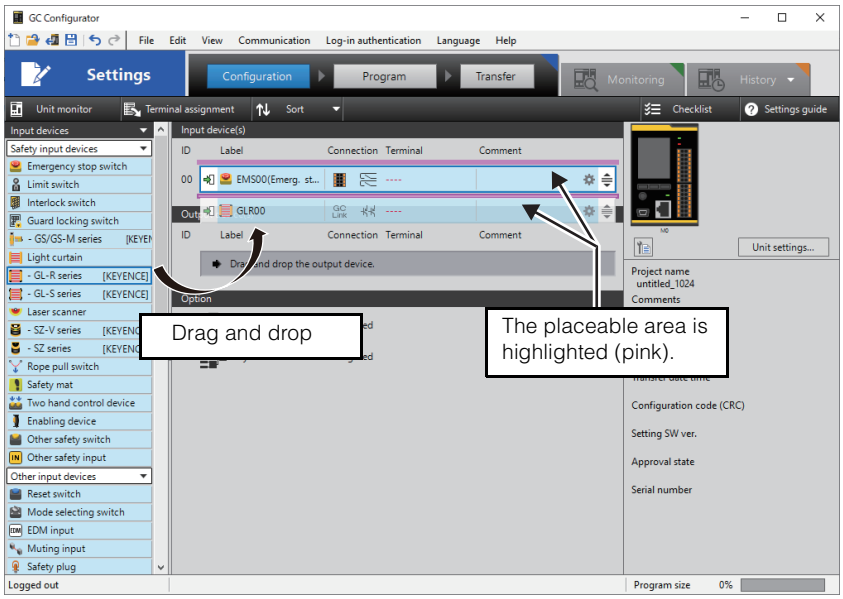
Reference

You can add a device from the [Program] screen as well.
"Input block(s)/Output block(s)" (page 11-26)

10-4 Registering Input Devices

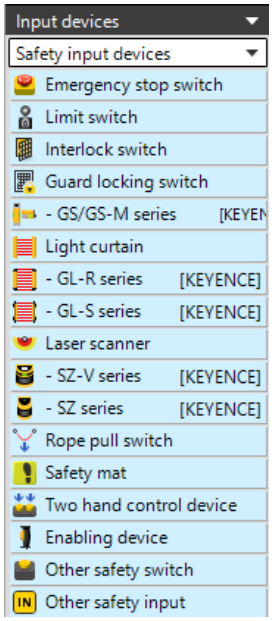
Registering Input Devices

Register input device(s) by dragging and dropping from the device list to device setting area.

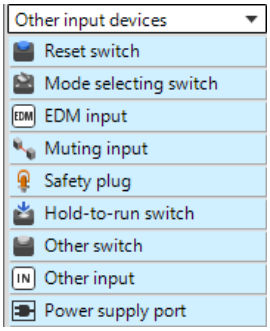


List of input devices

■ Safety input devices

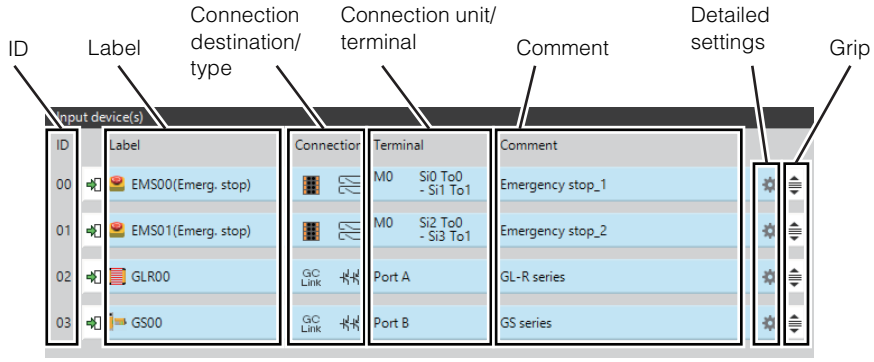


■ Other input devices



Reference For details about input devices, refer to "A-2 List of input devices" (page A-10).

Name and Function of Each Part in Device Setting Area (Input Device)

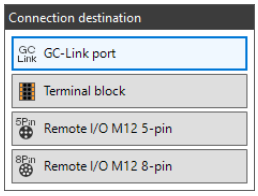


Name	Details
ID	An ID number assigned to each input device in order from 00.
Label	A label of the input device. This is used to represent an input device in a program. (Up to 22 characters)
Connection destination/type	Displays the destination and type of the input device to be connected.
Connection unit/terminal	Displays the unit and terminal to which the input device is connected.
Comment	You can enter a comment for the output device. (Up to 50 characters) You can also click [▼] on the right side of the comment field to select a pre-registered comment.
Detailed settings	Displays the detailed settings dialog box for the input device.
Grip	You can rearrange the order of the input devices by dragging the grip part.

Input Device Basic Settings

The following describes the basic settings of an input device.

Connection destinations



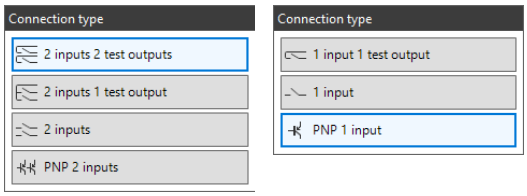
Reference

The selectable connection destinations vary by the input device.
For details, refer to "A-2 List of input devices" (page A-10).

Select a destination to connect the input device. One of the following four options can be selected.

Connection destinations	Description
GC-Link port	Select this when connecting to the GC-Link port of GC-1000/1000R.
Terminal blocks	Select this when connecting to the terminal block of the main controller or expansion unit.
Remote I/O M12 5-pin	Select this when connecting to the M12 connector (M12 5 pins) of GC-R45.
Remote I/O M12 8-pin	Select this when connecting to the M12 connector (M12 8 pins) of GC-R48.

Connection types



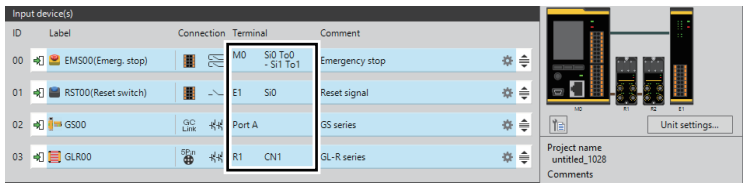
Select a connection type according to the output signal of the input device. The connection type can be selected from the following options.

Connection type	Contact/PNP	Duplicate/Single	Test output
2 inputs 2 test outputs	Contact	Duplicate signal	Used
2 inputs 1 test output			
2 inputs			Not used
1 input 1 test output		Single signal	Used
1 input			Not used
PNP 2 inputs	PNP	Duplicate signal	
PNP 1 input		Single signal	

Reference

The selectable connection types vary by the input device.
For details, refer to "A-2 List of input devices" (page A-10).

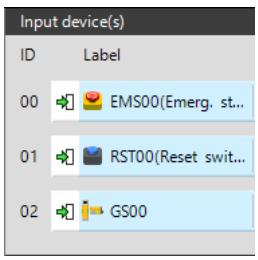
Connection units/terminals



Select the unit and terminal to which the input device is connected.
For the selection method, refer to "10-6 Assigning Terminals" (page 10-17).

Labels

A label of the input device. This is used to represent an input device in a program

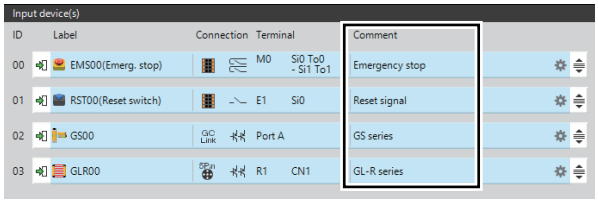


Reference

You can edit the existing label and use an arbitrary character string.
(Up to 22 characters)

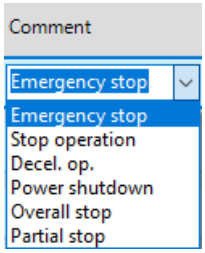
Comments

A comment for the input device. (Up to 50 characters)



Reference

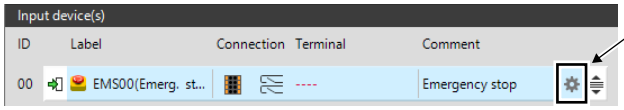
You can also click [▼] on the right side of the comment field to select a pre-registered comment.



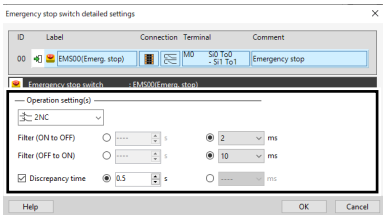
Input Device Detailed Settings

The following describes the detailed settings of an input device.

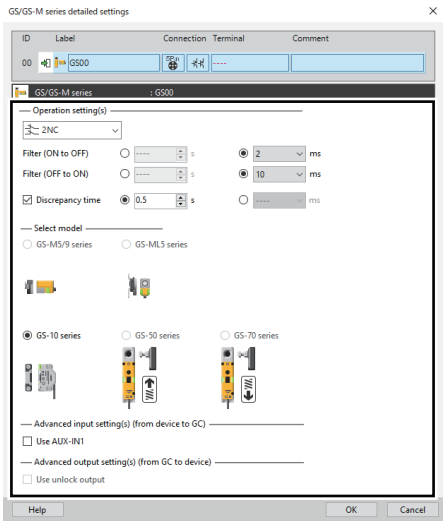
Displaying the detailed settings dialog box



Example: Detailed settings for an emergency stop switch



Example: Detailed settings for the GS Series

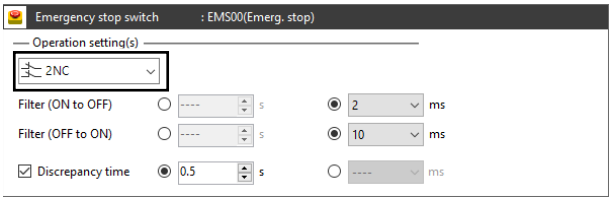


Items in the detailed settings dialog box

Reference The items displayed in the detailed settings dialog box vary by the input device.
For details, refer to "A-2 List of input devices" (page A-10).

■ NO/NC

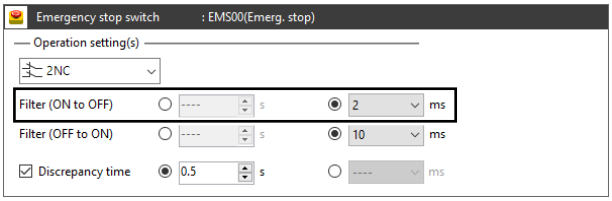
Set the input logic of the input device.



Item	Setting range	Default
NO/NC	1NO, 2NO, NONC, 1NC, 2NC, NCNO	Depends on the device.

■ ON-OFF filter

Set the filtering time for the event of the input signal ON -> OFF in seconds or milliseconds.

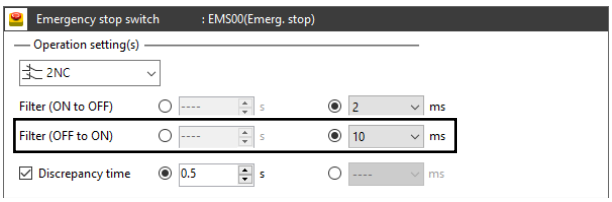


Reference "Safety Input Functions" (page 6-15)

Item	Setting range	Default
Filter (ON to OFF)	Set the filtering time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2 ms

■ OFF-ON filter

Set the filtering time for the event of the input signal OFF -> ON in seconds or milliseconds.

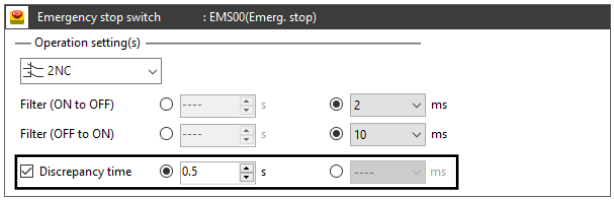


Reference "Safety Input Functions" (page 6-15)

Item	Setting range	Default
Filter (OFF to ON)	Set the filtering time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 1.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10 ms

■ Discrepancy detection time

Set the time for detecting a discrepancy when using a duplicate signal.



Reference "Safety Input Functions" (page 6-15)

Item	Setting range	Default
Discrepancy time	With the check box checked, the discrepancy detection function is enabled. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (second): 0.1 to 30.0 s, in increments of 0.1 s • Unit ms (millisecond): Options (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5 s

■ Advanced inputs

You can use Pin 2 and Pin 5 of the remote I/O module "GC-R45" and Pin 1 and Pin 6 of the "GC-R48" for advanced inputs.

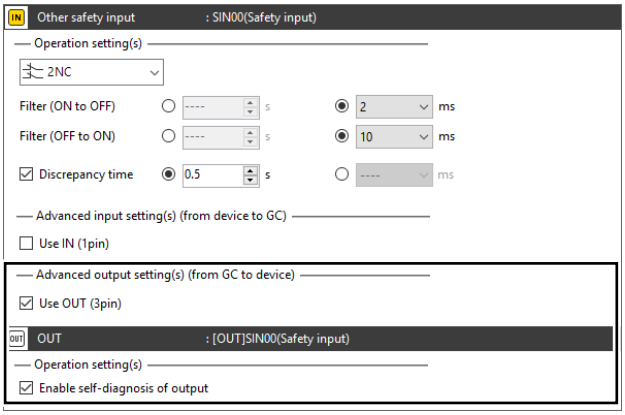
Reference The advanced inputs vary by the input device and connection type used.
For the input devices allowing the use of advanced inputs, refer to "A-2 List of input devices" (page A-10).

■ Advanced output

You can use Pin 2 of the remote I/O module "GC-R45" and Pin 3 of the "GC-R48" for advanced outputs.

Reference

The advanced output varies by the input device and connection type to use.
For the input devices allowing the use of an advanced output, refer to "A-2 List of input devices" (page A-10).

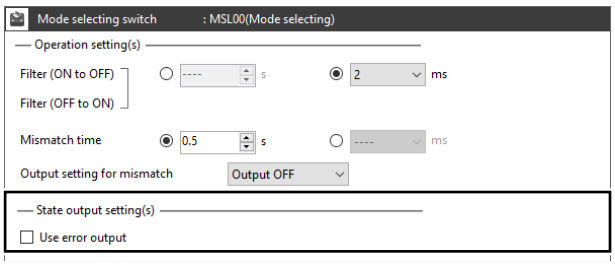


■ State output

"Error output" can be set as the state output of an input device.

Reference

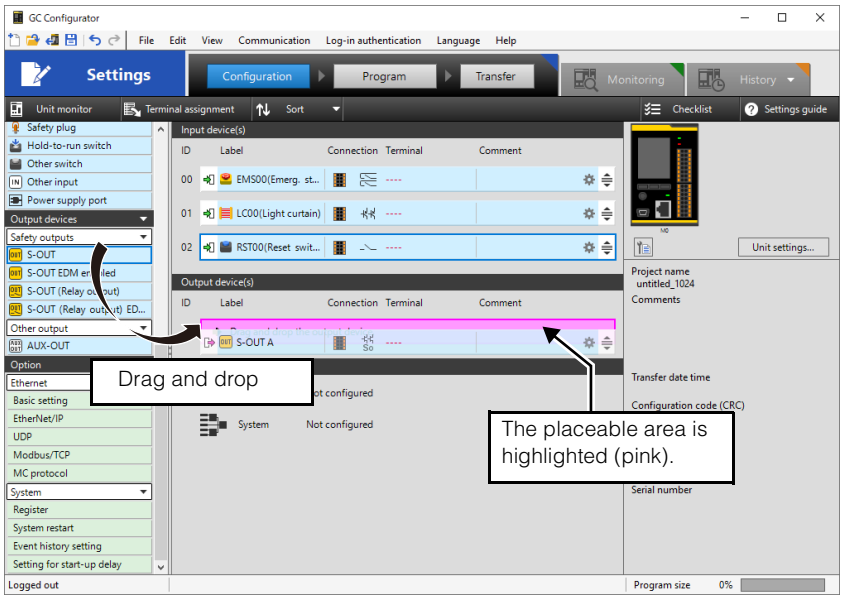
The state output varies by the input device used.
For the input devices allowing the state output, refer to "A-2 List of input devices" (page A-10).



10-5 Registering Output Devices

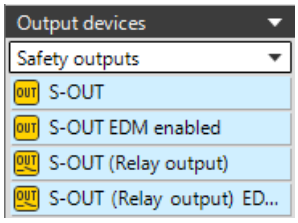
Registering Output Devices

Register an output device(s) by dragging and dropping from the device list to the device setting area.

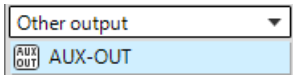


List of output devices

■ **Safety outputs**

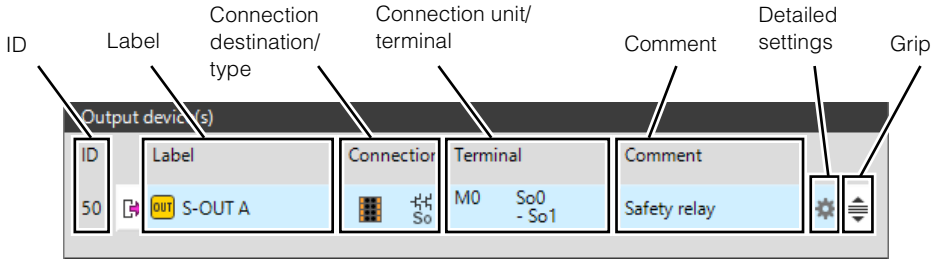


■ **Other outputs**



Reference For details about output devices, refer to "A-3 Output Device List" (page A-87).

Name and Function of Each Part in Device Setting Area (Output Device)



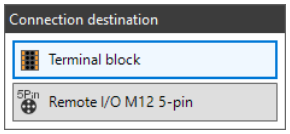
Name	Details
ID	An ID number assigned to each output device in order from 50.*
Label	A label of the output device. This is used to represent an output device in a program (editable, 1 to 22 characters).
Connection port/type	Displays the port type and connection type of the output device to be connected.
Connection unit/terminal	Displays the unit and terminal to which the output device is connected.
Comment	You can enter a comment for the output device. (Up to 50 characters) You can also click [▼] on the right side of the comment field to select a pre-registered comment.
Detailed settings	Displays the detailed settings dialog box for the output device.
Grip	You can rearrange the order of the output devices by dragging the grip part.

* When 50 or more input devices are registered, an ID number is assigned after the input devices in order.

Output Device Basic Settings

The following describes the basic settings of an output device.

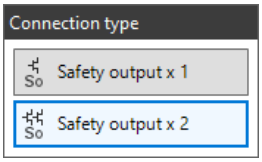
Connection destinations



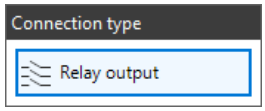
A safety output device can only be connected to the main controller or expansion unit.
Only the AUX output can select [Terminal block] and [Remote I/O M12 5-pin].

Connection types

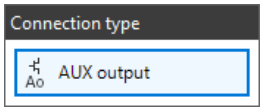
■ Safety output S-OUT



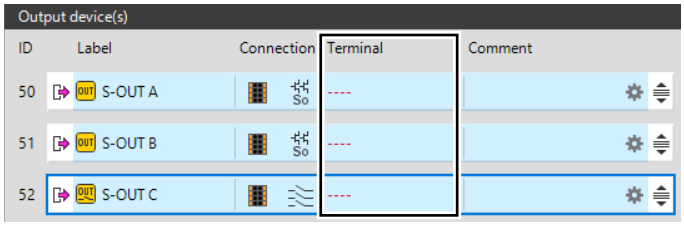
■ Safety output S-OUT (relay output)



■ Other outputs AUX-OUT



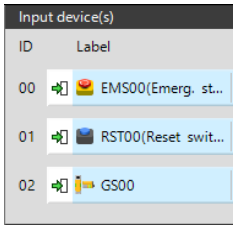
Connection units/terminals



Select the unit and terminal to which the output device is connected.
For the selection method, refer to "10-6 Assigning Terminals" (page 10-17).

Labels

A label of the output device. This is used to represent an output device in a program

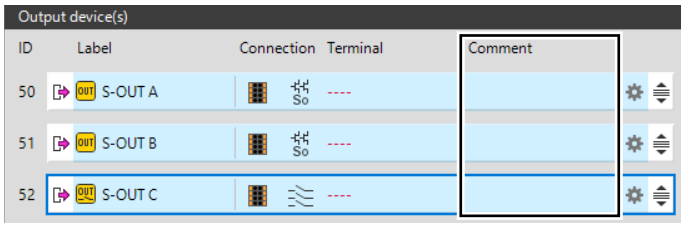


Reference

You can edit the existing label and use an arbitrary character string. (Up to 22 characters)

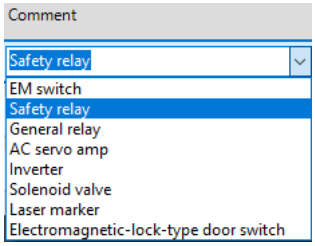
Comments

A comment for the output device. (Up to 50 characters)



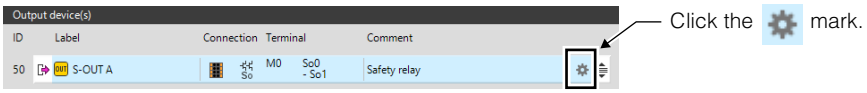
Reference

You can also click [▼] on the right side of the comment field to select a pre-registered comment.

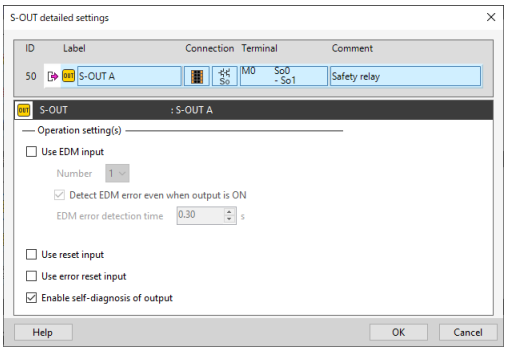


Output Device Detailed Settings

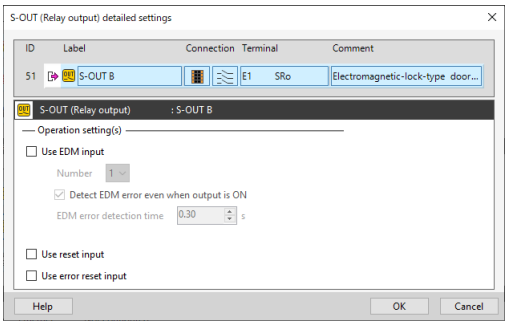
Displaying the detailed settings dialog box



■ Detailed settings for S-OUT

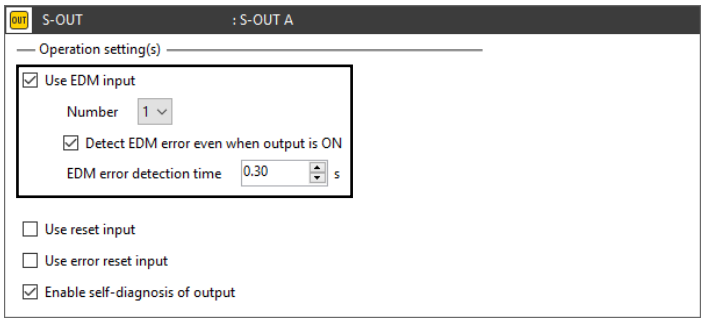


■ Detailed settings for S-OUT (Relay output)



Items in the detailed settings dialog box

■ EDM



Item	Details
Use EDM input	Check this check box to enable the EDM function.
Number	Select the number of EDM input signals. Setting range: 1 or 2
Detect EDM error even when output is ON	Check this check box to detect an EDM error even when the output is ON. (Default: Enabled)
EDM error detection time	Set the EDM error detection time. Setting range: 0.15 to 3.00 s

Reference

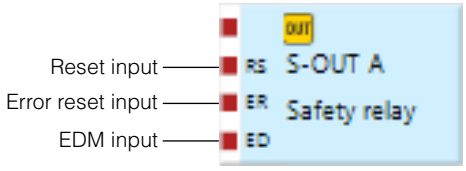
EDM (External Device Monitoring) is a function used to detect a failure of an external device (contact welding, etc.).
"Safety Output Functions" (page 6-18)

■ Use reset input

■ Use error reset input

Check these check boxes to use the reset input and error reset input.

When enabled, an input terminal is displayed in the output block in a program.

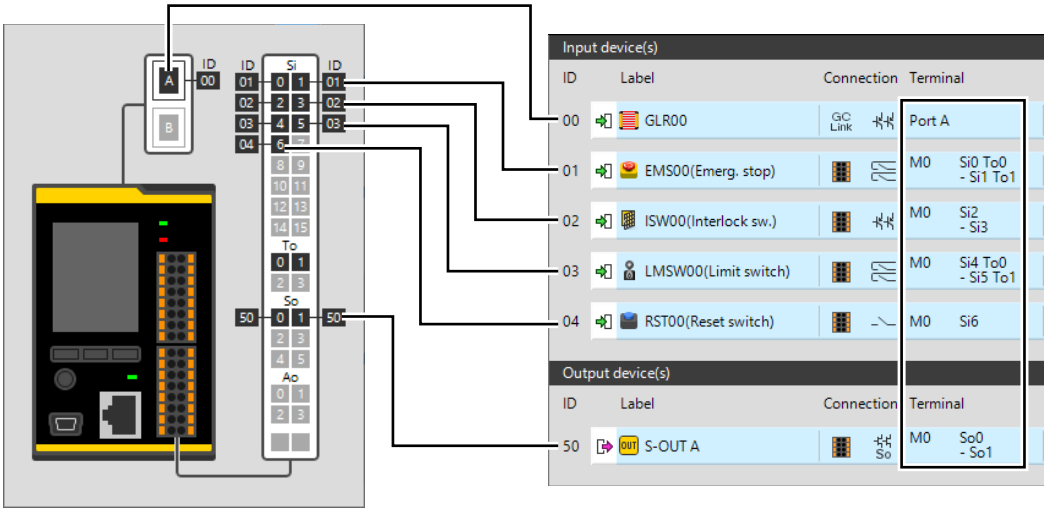


■ Enable self-diagnosis of output

Check this check box to enable the self-diagnosis function of output. (Default: Enabled)

10-6 Assigning Terminals

The terminal assignment process refers to assigning the input and output devices registered on the [Configuration] screen to the terminals of the main controller, expansion unit and remote I/O module.



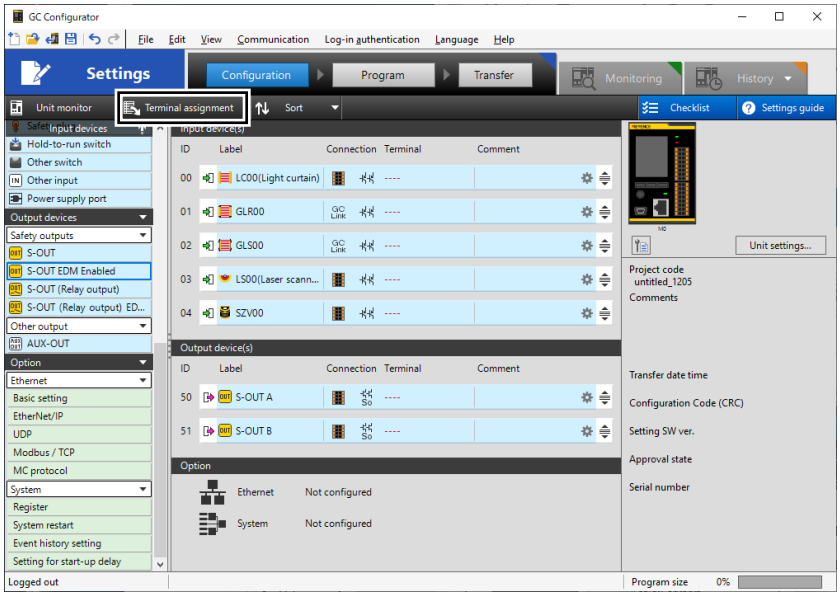
There are two methods for assigning terminals: "Batch assignment" that performs assignment in a batch using the [Terminal assignment] screen, and "Individual assignment" that performs assignment for each device.

Point

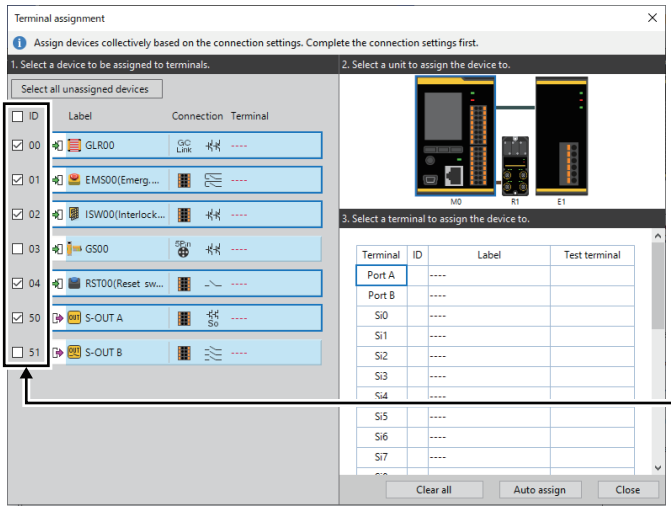
Before assigning terminals, complete the connection settings (connection destination/connection type) for the registered devices.

Batch Assignment

1 Click the [Terminal assignment] button to open the [Terminal assignment] window.

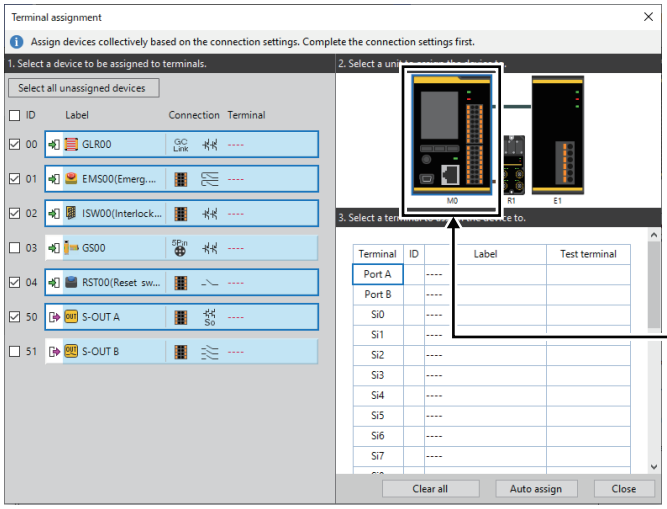


2 Select the assignment target input/output devices.



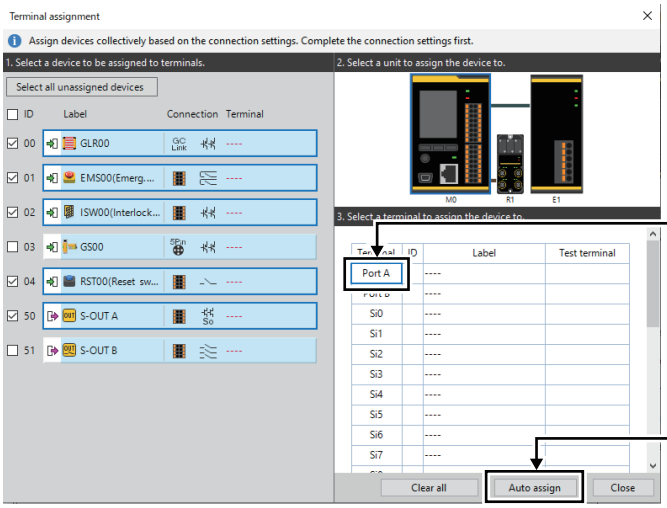
Check the check boxes of the assignment target devices.
* The devices with unassigned terminals are checked by default.

3 Select the unit to assign the devices.



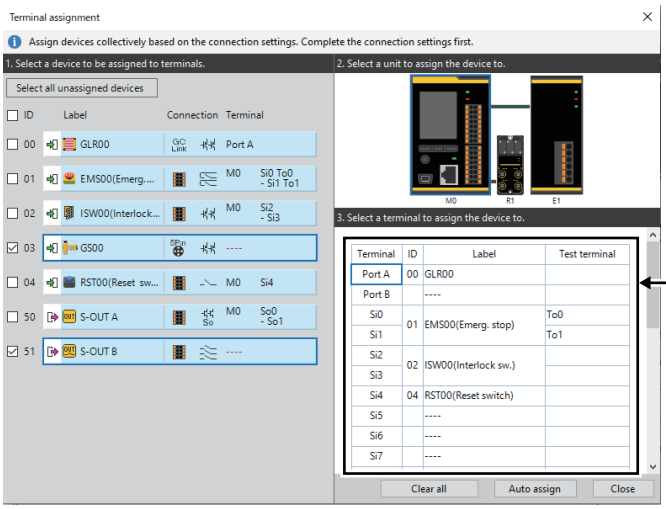
Select the assignment target unit.
The selected unit is indicated with a blue frame.

4 Select the first terminal to assign and then click the [Auto assign] button.



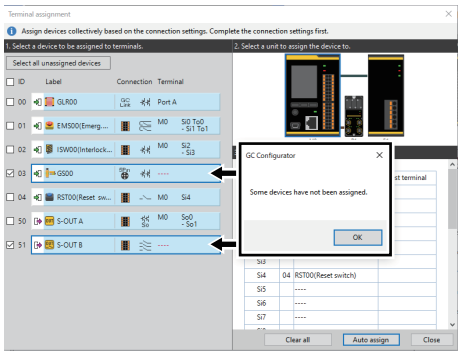
Select the first terminal to assign.

Click the [Auto assign] button.



When the assignment is executed, the registered devices are displayed in the terminal table.

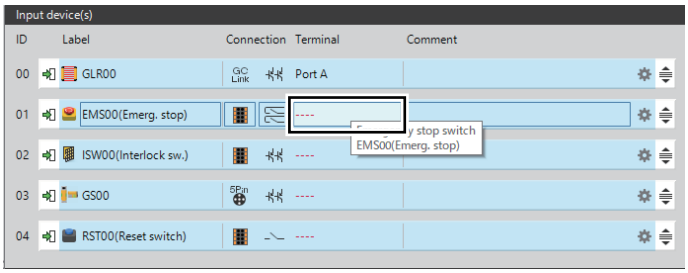
Point



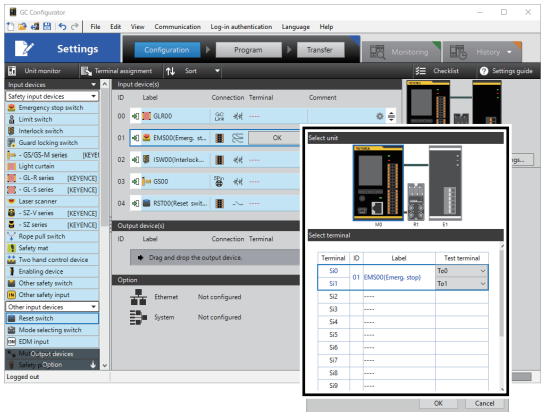
If the terminal assignment fails, a message will be displayed.
In this case, check the device (ID) that failed the assignment and then perform step 3 again to reselect the assignment target unit and execute the assignment.

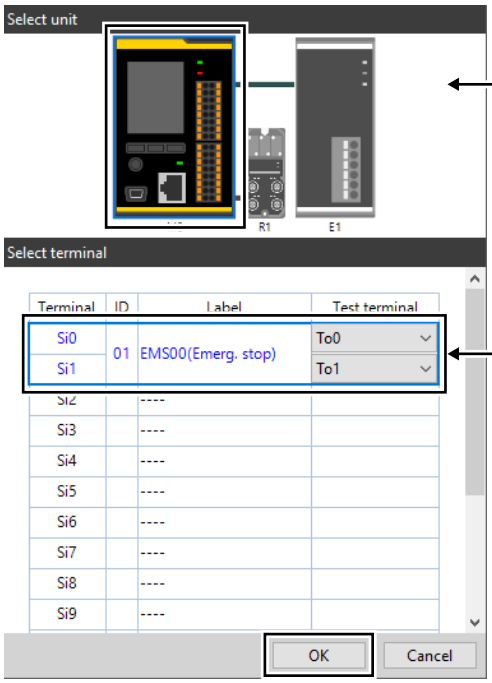
Individual Assignment

1 **Click the [Terminal] block of the assignment target device.**



2 **Select the unit to assign the device and then select the terminal to assign. After assigning, click the [OK] button and close the dialog box.**





Select the unit to assign the input/output device.

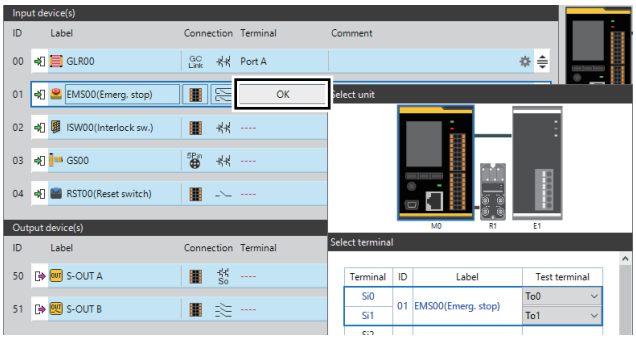
Select the terminal to assign the input/output device.

Reference

When the dialog box is displayed, you will find the device automatically assigned to the terminals. You can change the assignment by clicking the desired terminal number. You can also change the test terminal numbers that you will use.

Reference

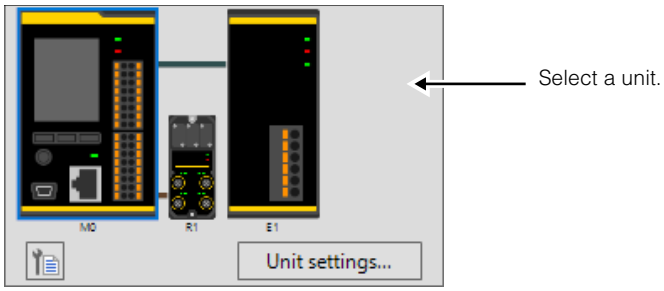
When the [Terminal] block is clicked, the display will change to [OK]. Check the unit and terminal selection status. When there are not any terminal assignment issues, you can just click the [OK] button to assign terminals.



Reviewing Terminal Assignment

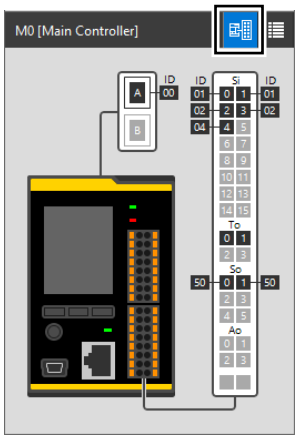
Select a unit in the system configuration area to review the assigned terminals in the project information area.

1 Select a unit you want to review in the system configuration area. The terminal assignment status of the selected unit will be displayed in the project information area.

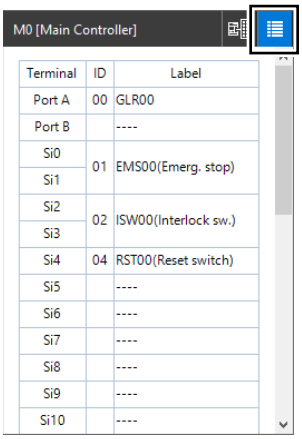


2 You can confirm the assignment while switching the display between the terminal block and the terminal table.

[Terminal block display]



[Terminal table display]



10-7 Setting Options

Ethernet

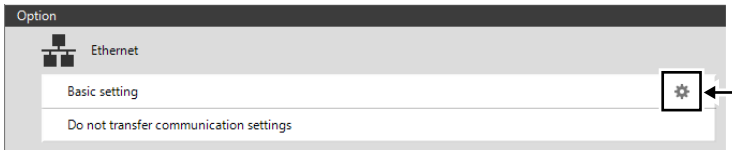
The GC-1000 is equipped with the Ethernet communication function, and it supports Ethernet protocols: EtherNet/IP, Modbus/TCP, MC protocol and the UDP communication function.
For details, refer to "15 Ethernet Communication Function" (page 15-1).

Point

The Ethernet communication function is available only on the main controller "GC-1000".

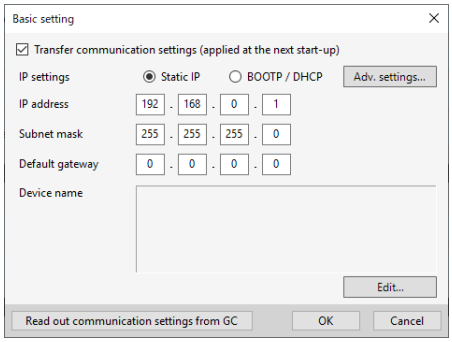
Ethernet basic setting

Select [Ethernet] from the device list and register it by dragging and dropping it to the device setting area.



Clicking this displays the basic setting dialog box.

■ Basic settings



Item	Details
Transfer communication settings (applied at the next start-up)	With the check box checked, the Ethernet settings configured in the basic settings are transferred to the GC Series main controller.
IP settings	Select the IP address setting of the GC Series main controller from [Static IP] and [BOOTP/DHCP].
Advanced settings	Clicking this button displays the advanced settings dialog box.
IP address	Set the IP address (enabled when [Static IP] is selected).
Subnet mask	Set the subnet mask. (enabled when [Static IP] is selected).
Default gateway	Set the default gateway. (enabled when [Static IP] is selected).
Device name	Enter the device name of the GC Series main controller used for the project. Clicking the [Edit] button displays the [Edit device name] dialog box.

Point

The following values cannot be set for an IP address.

- **0.0.0.0**
- **127.0.0.1 to 127.255.255.254**
- **224.0.0.0 to 255.255.255.255**
- **Bits of host are all 0 or 1.**

Point

The following values cannot be set for a subnet mask.

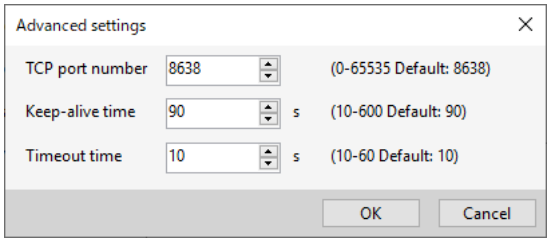
- **0.0.0.0**
- **255.255.255.255**
- **Mask bit is not continued from the higher bit (e.g. 255.254.255.0).**

Point

The following restrictions are placed on a device name to be entered.

- **The device name length is limited to 63 characters.**
- **Usable characters for label are "a to z", "0 to 9" and "-".**
- **A hyphen cannot be used as the first and last characters of device name.**
- **"Port-x (x indicates a number)" cannot be used.**

■ Advanced settings

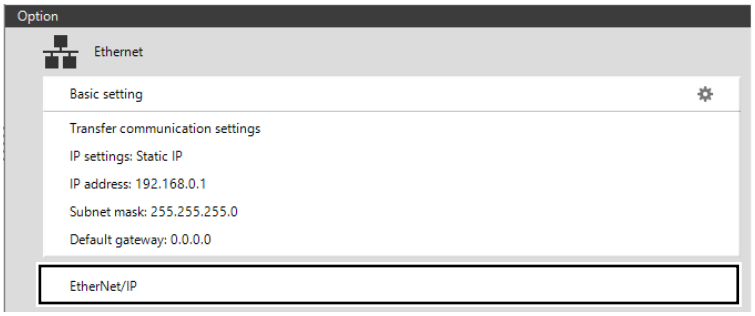


Item	Setting range	Default
TCP port number	0 to 65535*1	8638
Keep-alive time	10 to 600 (seconds)	90 (seconds)
Timeout time	10 to 60 (seconds)	10 (seconds)

*1 The following port numbers cannot be used.
502, 5100, 5900, 44818, 63103

EtherNet/IP

To use the EtherNet/IP communication function, select [EtherNet/IP] from the device list and register it by dragging and dropping it to the device setting area.

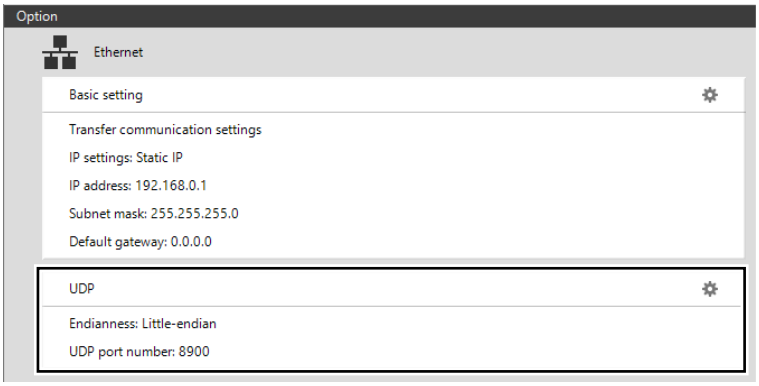


Reference

The EtherNet/IP communication function is described in "16 EtherNet/IP™ Communication Function" (page 16-1).
For details, refer to "16 EtherNet/IP™ Communication Function" (page 16-1).

UDP

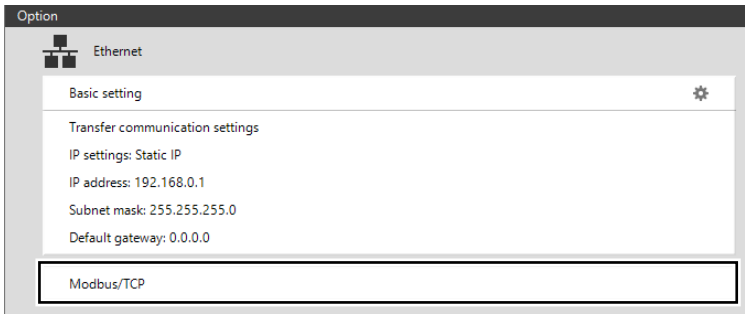
To use the UDP communication function, select [UDP] from the device list and register it by dragging and dropping it to the device setting area.



Reference The UDP communication function is described in "18 UDP Communication Function" (page 18-1).
For details, refer to "18 UDP Communication Function" (page 18-1).

Modbus/TCP

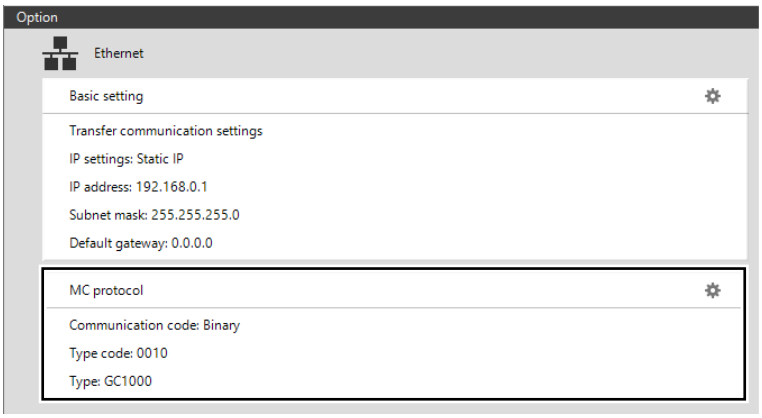
To use the Modbus/TCP communication function, select [Modbus/TCP] from the device list and register it by dragging and dropping it to the device setting area.



Reference The Modbus/TCP communication function is described in "19 Modbus/TCP Communication Function" (page 19-1).
For details, refer to "19 Modbus/TCP Communication Function" (page 19-1).

MC protocol

To use the MC protocol communication function, select [MC protocol] from the device list and register it by dragging and dropping it to the device setting area.



Reference

The MC protocol communication function is described in "20 MC Protocol Communication Function" (page 20-1).
For details, refer to "20 MC Protocol Communication Function" (page 20-1).

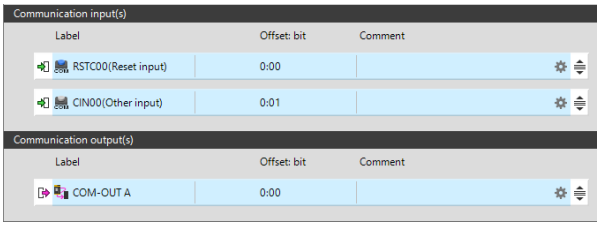
Communication Inputs/Outputs

DANGER	**The data acquired via the EtherNet/IP, UDP, Modbus/TCP and MC protocol communications cannot be used for the safety-related control system. If the data is used accidentally, there is a possibility of significant harm, including serious injury or death, to the machine operators.**

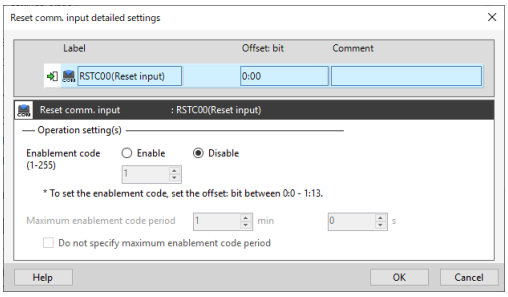
Point

The Ethernet communication function is available only on the main controller "GC-1000".

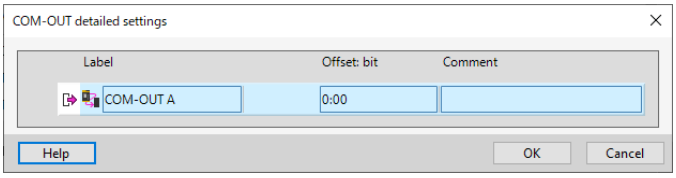
[Communication input] and [Communication output] are an input block and output block that can be used in a program when using the Ethernet communication function.
They can be used in a program alongside input/output devices.



■ Communication input details



■ Communication output details



Reference

The communication function is described in the following chapters.

"15 Ethernet Communication Function" (page 15-1)
"16 EtherNet/IP™ Communication Function" (page 16-1)
"18 UDP Communication Function" (page 18-1)
"19 Modbus/TCP Communication Function" (page 19-1)
"20 MC Protocol Communication Function" (page 20-1)

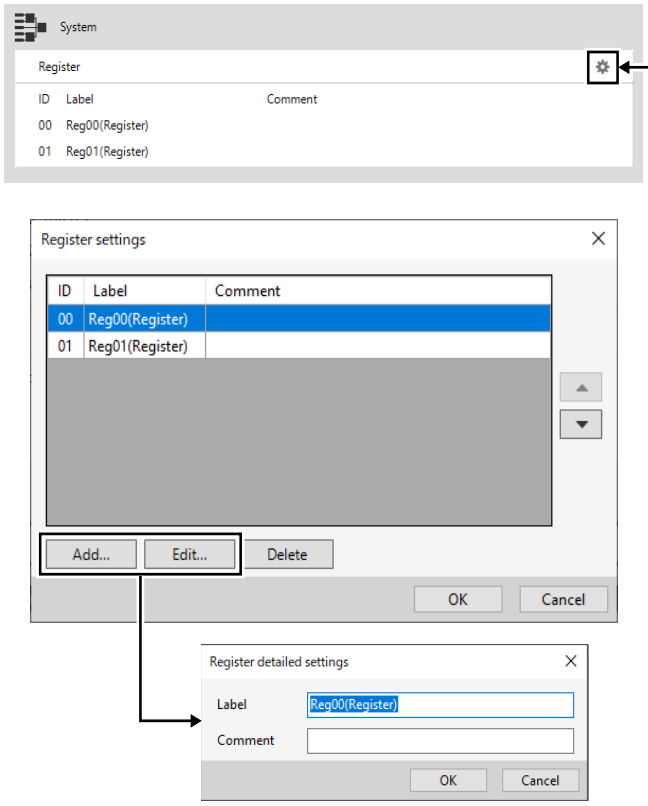
System

Registers

Registers serve as virtual input/output devices, making load and store a pair.
The output status, etc. of a function block can be received by a register to use it as an input signal for another program circuit.
A maximum of 32 registers can be used.

Reference A signal output from a function block to a register (store) is transmitted to the paired register (load) at the next scan.

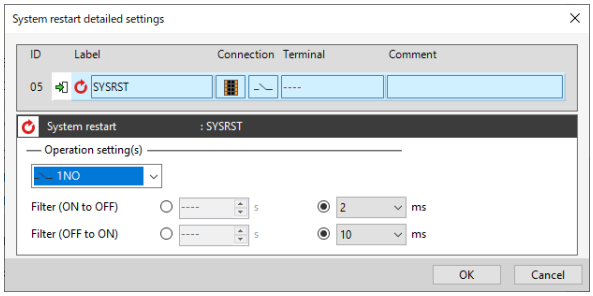
To use a register, select [Register] from the device list and register it by dragging and dropping it to the device setting area.



Item	Details
ID	Automatically assigned register ID.
Name	A register name displayed in a program. (Up to 22 characters)
Comment	A comment for the register. (Up to 50 characters)
Add	Click this button to add a register.
Edit	Clicking this button displays the detailed register settings. You can edit the register name or comment.
Delete	Delete the registered register.

System restart

Using a signal from an external device, you can restart the GC Series.
With system restart registered, "system restart" is registered with the input device.
When the terminal assigned to "system restart" turns ON, the GC Series will restart.



Point **For system restart, only main controller [Terminals] can be selected.**

Event history setting

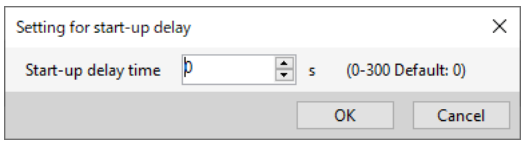
The event history setting is used to set whether or not to save the event of a safety output OFF in the event history.

Item	Details
Enable (default)	When the state of a safety output OFF persists for 90 seconds or longer, it will be saved in the event history.
Disable	Even when the safety output turns OFF, it will not be saved in the event history. Saving in the event history occurs only when the event history trigger function block turns ON.

Reference The event history function is described in "14 GC Configurator [History]" (page 14-1) .
For details, refer to "14 GC Configurator [History]" (page 14-1).

Setting for start-up delay

You can set the delay time of the start of the program operation from the start-up of the GC Series main controller.
Use this setting when there is a time difference between the start of the GC Series main controller and the start of the connected input/output device(s).



Item	Setting range	Default
Start-up delay time	0 to 300 (seconds)	0 (seconds)

11

GC Configurator [Settings] - Programming

This chapter describes how to create a program in the GC Configurator.

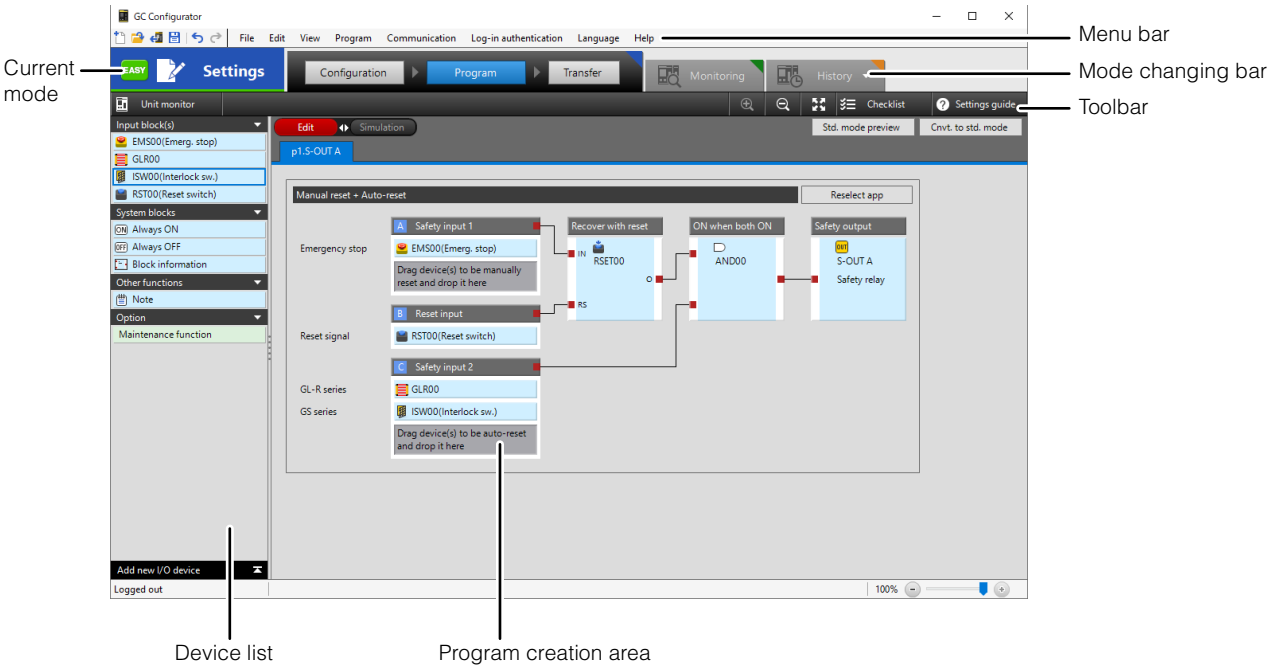
11-1 EASY Mode ..... page 11-2
11-2 Standard Mode..... page 11-25
11-3 Simulation ..... page 11-45

11-1 EASY Mode

Overview of EASY Mode

EASY mode is a programming mode that allows you to easily create a safety control program by selecting an application and registering input devices. Even without special knowledge of safety control, all you need to do to create a safety control program is register input devices according to the displayed guidance. This is used to create a relatively simple safety control program.

Names and Functions on the Program Screen (EASY Mode)



Name	Details
Current mode	Displays the current operation mode.
Menu bar	Menu items. Displays the menu which executes each function. "8-3 Menu" (page 8-6)
Mode changing bar	Changes the operation mode and screen mode.
Toolbar	Displays each function window.
Device list	Area where you select the devices and functions used in the program.
Program creation area	Programming area.

- EASY mode programming flow -

Step 1 **Selecting an application**

Select an application you want to use on the [Select app] screen.
"Selecting an Application" (page 11-4)

Step 2-1 **Registering input devices**

Drag and drop registered input devices to the program to register.
"Registering Input Devices" (page 11-9)

Step 2-2 **Adding the maintenance function**

Set the maintenance function if it is used.
"Maintenance Function" (page 11-10)

Step 3 **Simulation function**

Verify the operation using the simulation function.
"11-3 Simulation" (page 11-45)

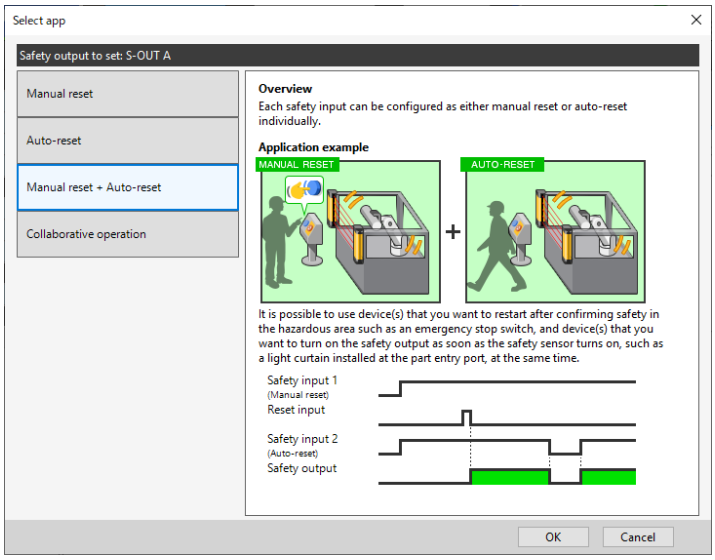
Reference

You can convert a program created in EASY mode into a program for standard mode.
"Conversion into standard mode" (page 11-21)

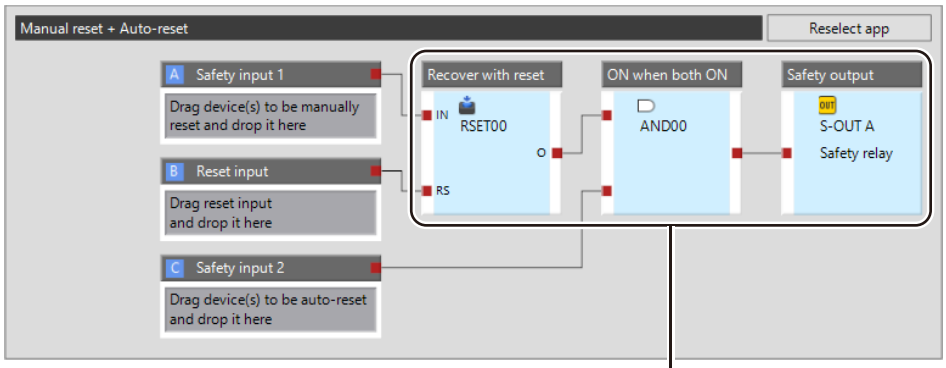
Selecting an Application

There are four applications available in EASY mode. If you select an application appropriate for your machine, the appropriate program for the application is automatically selected.

<<Selecting an application>>



<<Program of the selected application>>



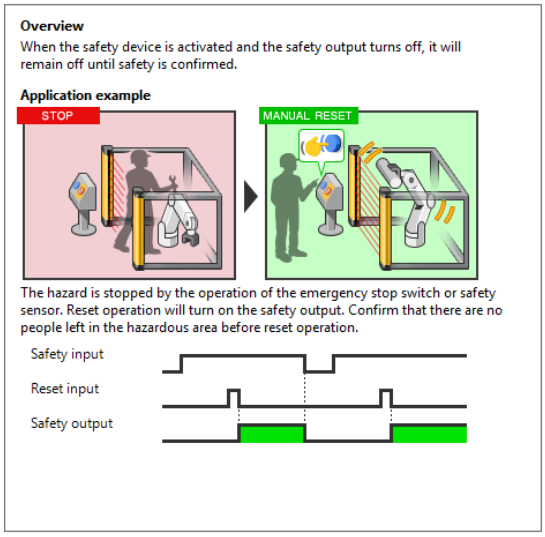
The appropriate program for the selected application is displayed, and already created.

Manual reset

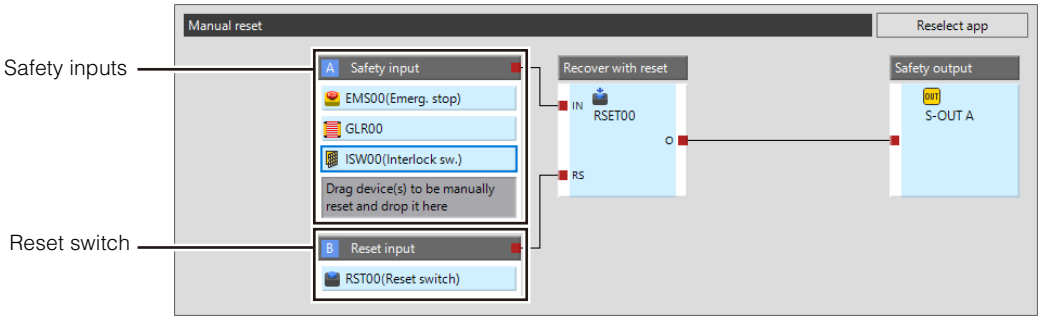
■ Application

"Manual reset" is an interlock method used to initiate the start up and/or restart of the safety output through a reset switch (etc). Once the area is deemed safe by the safety devices and the reset signal is provided, the safety output will be turned on.

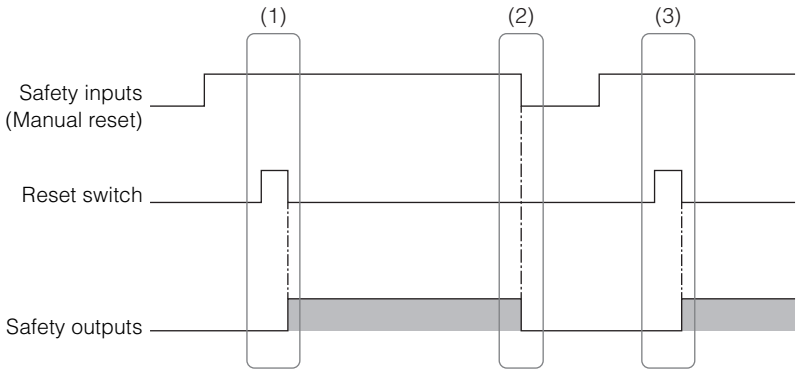
This is required for recovering the safety output after the emergency stop switch has been activated. It is also used when a light curtain is installed in a location where individuals can enter a dangerous area or the door may be closed unexpectedly.



■ Program



■ Timing chart



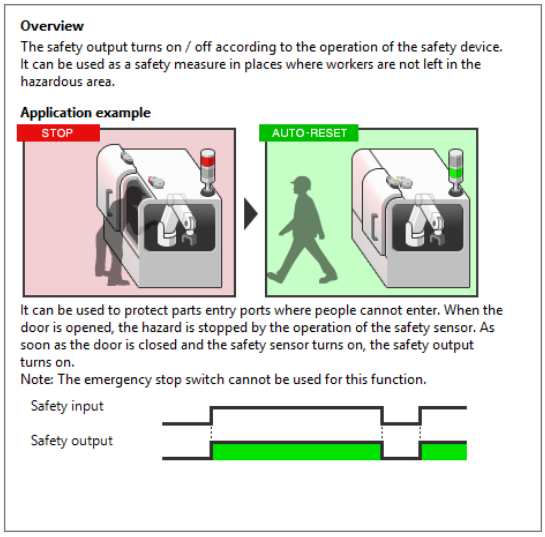
(1) Confirm that all of the safety inputs are ON and then turn OFF, ON, and OFF the reset switch. The safety output is then turned ON.
(2) Even if one of the registered safety inputs is turned OFF, the safety output is turned OFF.
(3) To restart the machine, confirm that all of the safety inputs are ON and turn ON the reset switch to turn ON the safety output.

Auto-reset

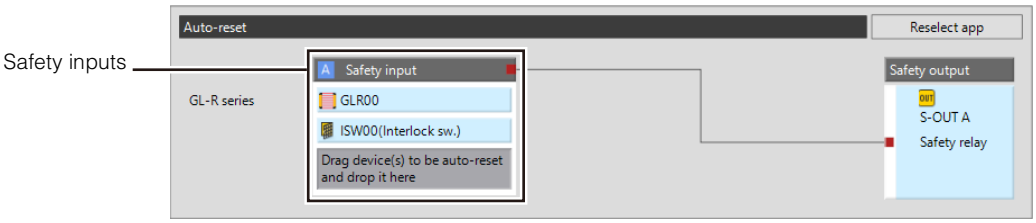
■ Application

"Auto reset" is an interlock method used to automatically initiate the start up and/or restart of the safety output once the area is deemed safe by the safety devices.

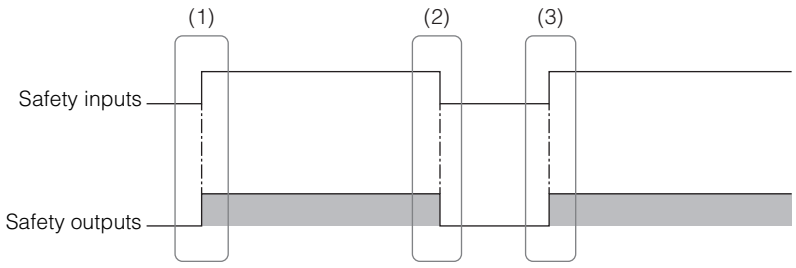
When you place your hand in between the transmitter and receiver, the light curtain will detect an obstruction and the safety output will turn off. When you remove your hand from the detection region, the safety output will restart automatically. This type of interlock method is used when individuals cannot pass through the protected area. (Ex. small machines)



■ Program



■ Timing chart



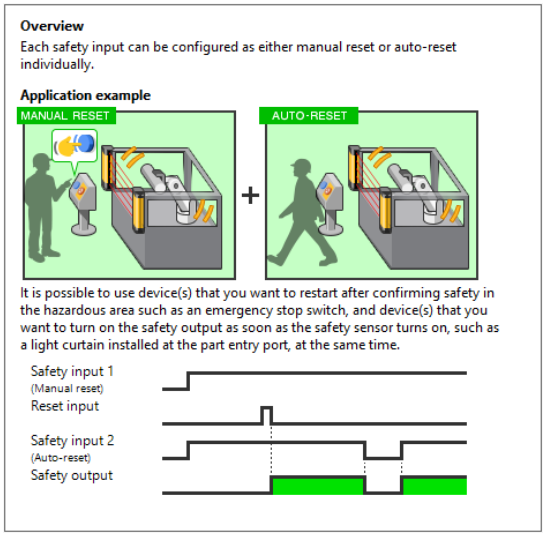
(1) When all of the safety inputs are turned ON, the safety output is turned ON.
(2) Even if one of the registered safety inputs is turned OFF, the safety output is turned OFF.
(3) When all of the safety inputs are turned ON again, the safety output is turned ON.

Manual reset + Auto-reset

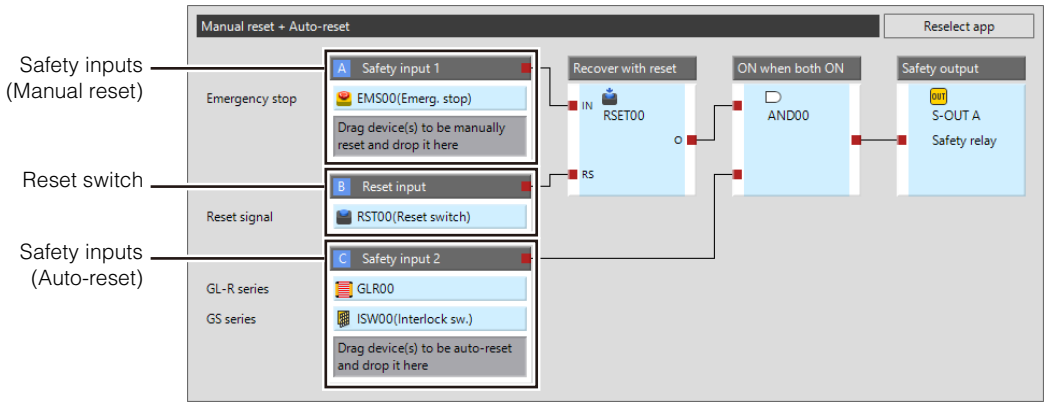
■ Application

This interlock method is used when the safety output will be activated by both a manual reset and an auto reset.

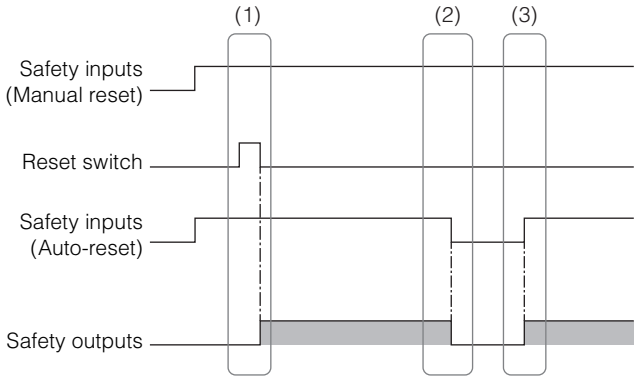
When you place your hand in between the transmitter and receiver, the light curtain will detect an obstruction and the safety output will turn off. When you remove your hand from the detection region, the safety output will restart automatically. When the emergency stop switch is activated, the manual reset switch is required to restart the safety output.



■ Program



■ Timing chart



(1) Confirm that all of the safety inputs are ON and then turn OFF, ON, and OFF the reset switch. The safety output is then turned ON.

(2) Even if one of the registered safety inputs is turned OFF, the safety output is turned OFF.

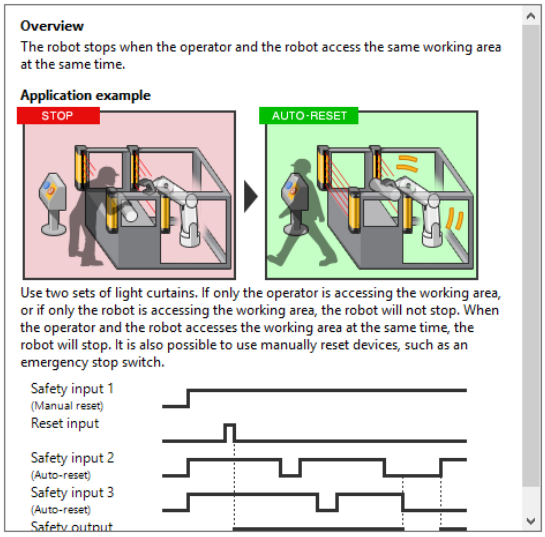
(3) When the safety inputs registered to auto-reset are turned ON, the safety output is turned ON.

* After the safety input (manual reset) is turned OFF, the reset switch needs to be turned OFF, ON, and then OFF to restart the machine.

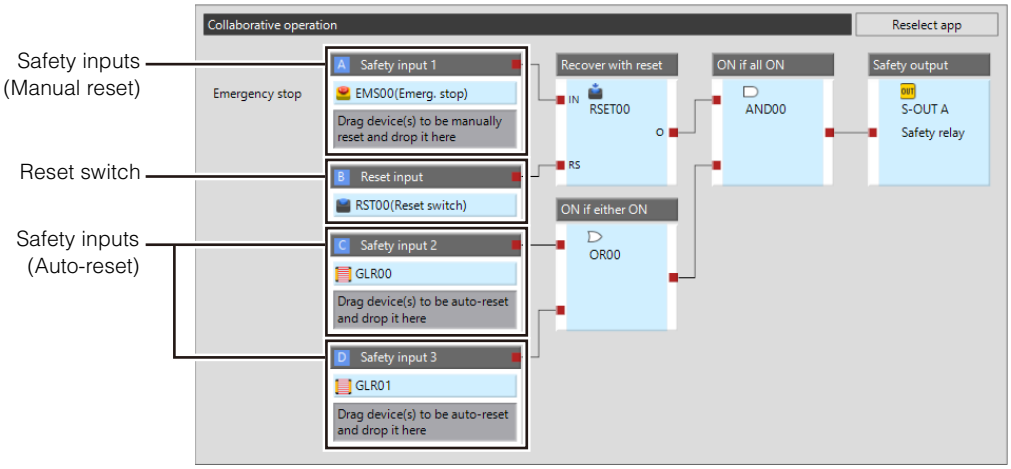
Collaborative operation

■ Application

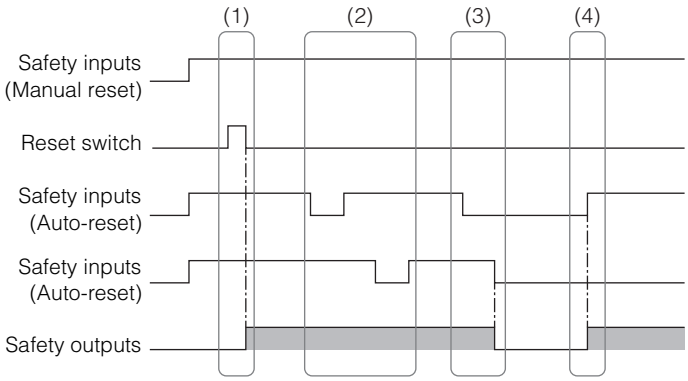
"Collaborative operation" or "Auto-switching" is an interlock method used to employ the operation of multiple sets of safety inputs. The safety output will only turn OFF when all of the involved safety inputs are turned OFF. The safety output will remain ON when only safety input 1 OR safety input 2 is turned off (since there is no risk of contact between the individual and the robot). The safety output is turned off when both safety input 1 AND safety input 2 are turned off. The manual reset signal is required for recovery of the safety output if the emergency stop switch has been activated.



■ Program



■ Timing chart



(1) Confirm that all of the safety inputs are ON and then turn OFF, ON, and OFF the reset switch. The safety output is then turned ON.

(2) Even if one of the safety inputs registered to auto-reset is turned OFF, the safety output remains ON.

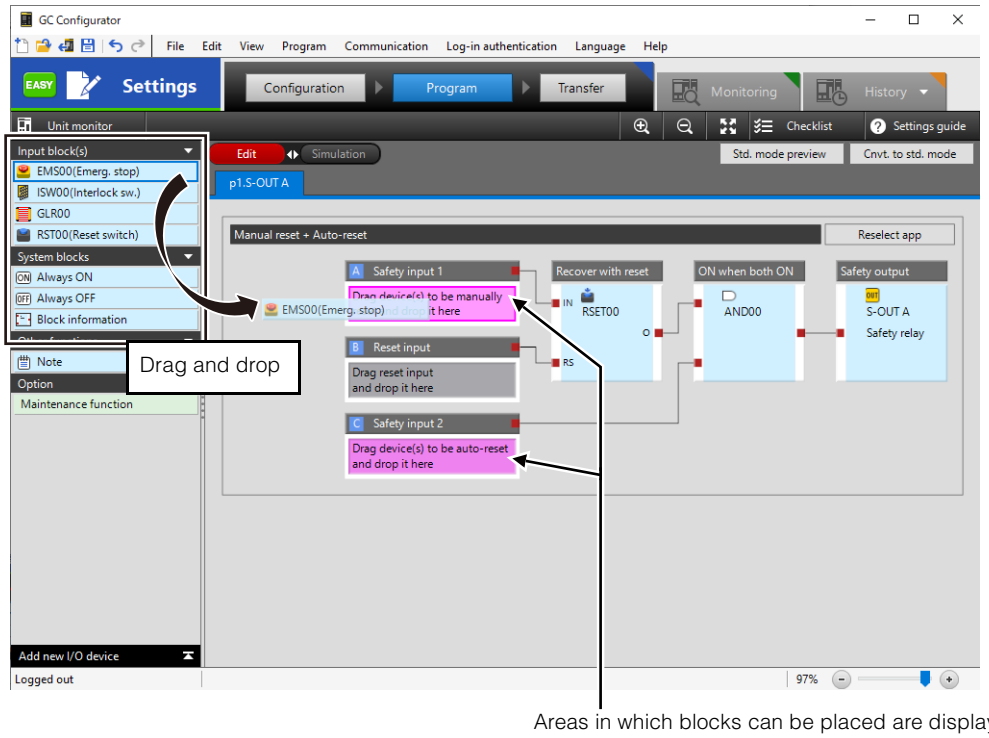
(3) When both of the safety inputs registered to auto-reset are turned OFF, the safety output is turned OFF.

(4) When one of the safety inputs registered to auto-reset is turned ON, the safety output is turned ON again.

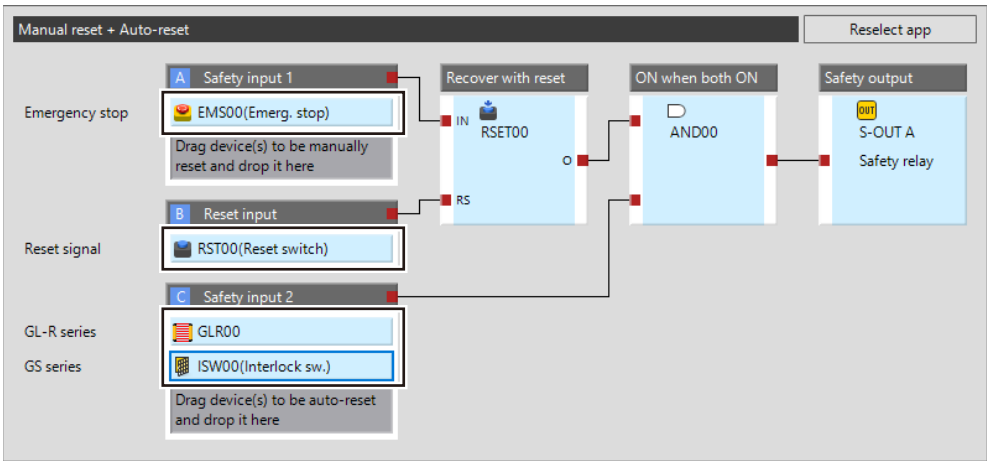
* After the safety input (manual reset) is turned OFF, the reset switch needs to be turned OFF, ON, and then OFF to restart the machine.

Registering Input Devices

In EASY mode, when you select an application, the appropriate program for the application is displayed, and already created.
You can complete the program just by dragging and dropping the input devices registered on the configuration screen to the program to register.



Areas in which blocks can be placed are displayed in pink.



Maintenance Function

What is the maintenance function?

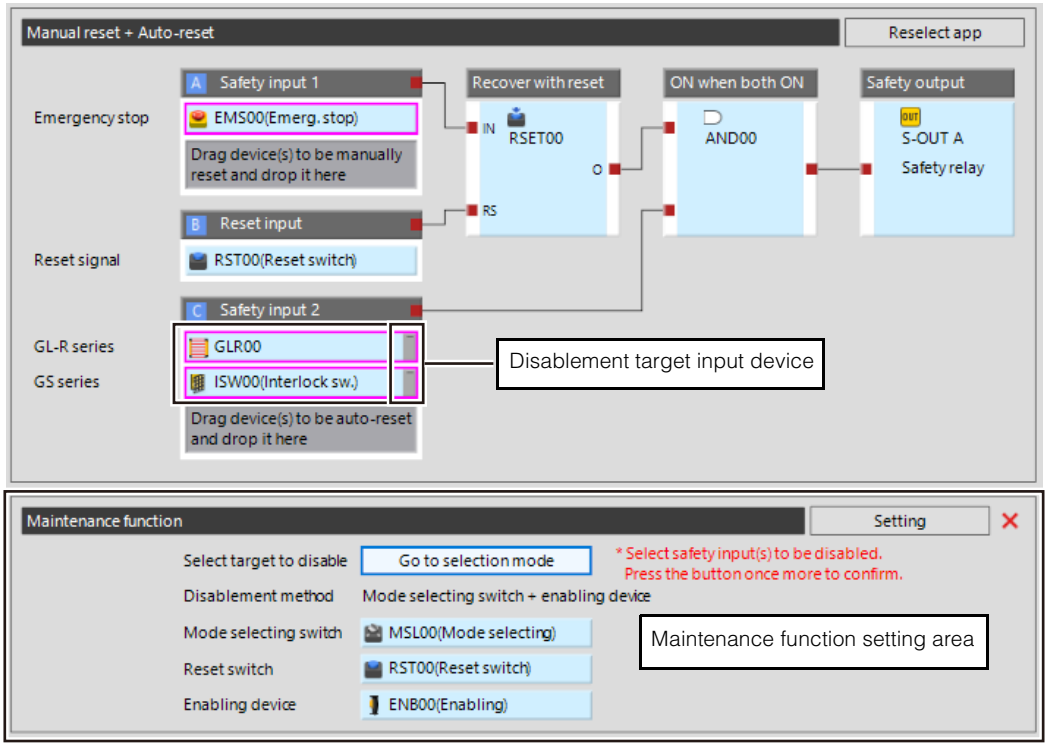
The maintenance function can temporarily disable a signal from a safety input device when specific conditions are met. By temporarily disabling an input from a safety light curtain or safety interlock switch, you can put the machine in the low-speed or inching operation for machine maintenance.
In EASY mode, use the mode selecting switch to change the mode to "maintenance mode". When maintenance mode is set, a safety input signal from the disablement target device is temporarily disabled, allowing you to perform maintenance. After completing maintenance, change the mode back to "standard mode" with the mode selecting switch and configure normal operation.

DANGER	• **The maintenance function disables a signal from a specific safety input device while a signal from the mode selecting switch is active. Therefore, additional safety measures are required for the whole machine in order to ensure safety while the maintenance function is activated.** • **The input devices (such as a mode selecting switch), the installation of those devices, and the procedures to activate the maintenance function must fulfill the conditions specified in this user's manual as well as the requirements of the laws, rules, regulations, and standards in the country or region in which the GC and those devices are used. Failure to follow this warning may result in significant harm, including serious injury or death, to the machine operators.** • **Only the person responsible for safety management may be allowed to install or wire the devices to activate the maintenance function.** • **The customer is fully responsible for complying with the requirements for the maintenance function. KEYENCE accepts NO responsibility or NO liability for any damage or any injury due to the unauthorized installation, usage, or maintenance, which are not specified in this user's manual, and/or due to noncompliance with the laws, rules, regulations and standards in the country or region in which the GC is used.** • **The person responsible for safety management must perform the risk assessment based on the machine operating conditions before changing the conditions for the maintenance function.**

How to Set the Maintenance Function

Point

Set the maintenance function after registering the input devices to the application program in EASY mode. Make sure that the application input devices are registered before this setting.



- Maintenance function setting flow -

[1] Registering the maintenance function

In the device list, drag [Maintenance function] from [Option] and drop it to the program setting area to register.

[2] Selecting the disablement method

On the [Disablement method settings] window, select the disablement method.

[3] Setting the disablement method operation

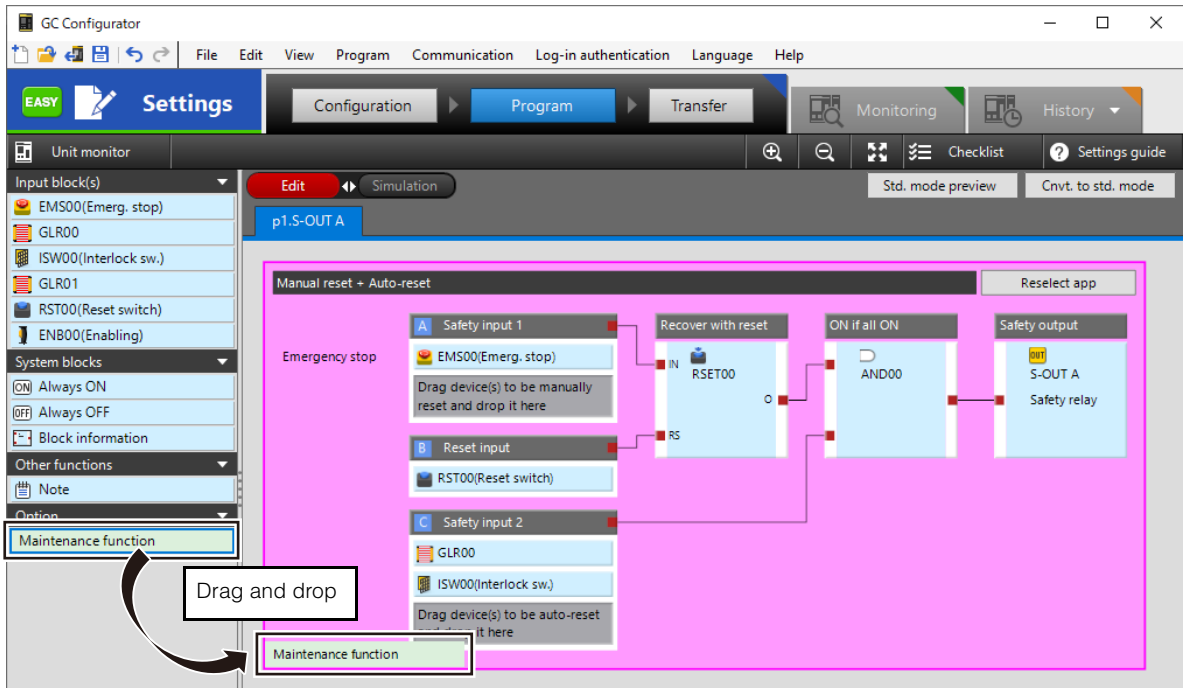
On the [Disablement method settings] window, select a device you want to use for disablement and set the maximum disablement period.

[4] Selecting the disablement target

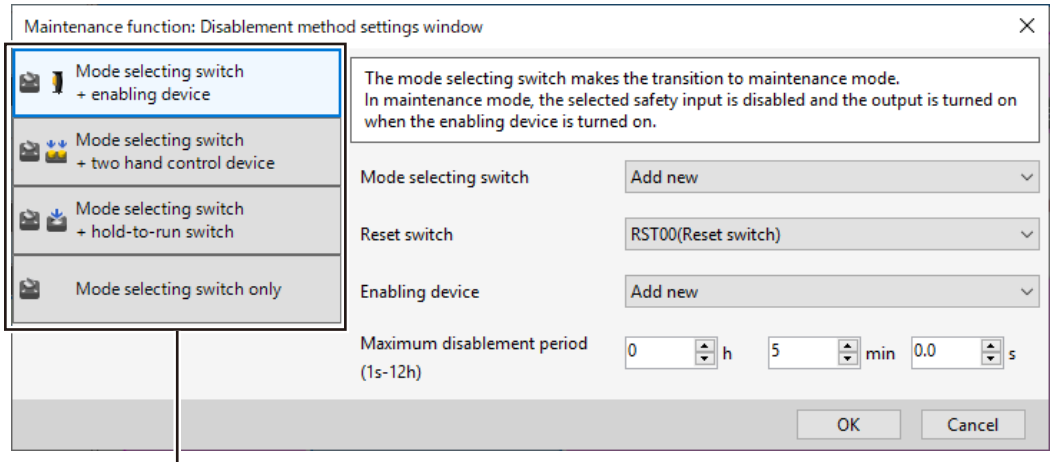
Select a device you want to disable while the maintenance function is used.

[1] Registering the maintenance function

In the device list, drag [Maintenance function] from [Option] and drop it to the program creation area to register.



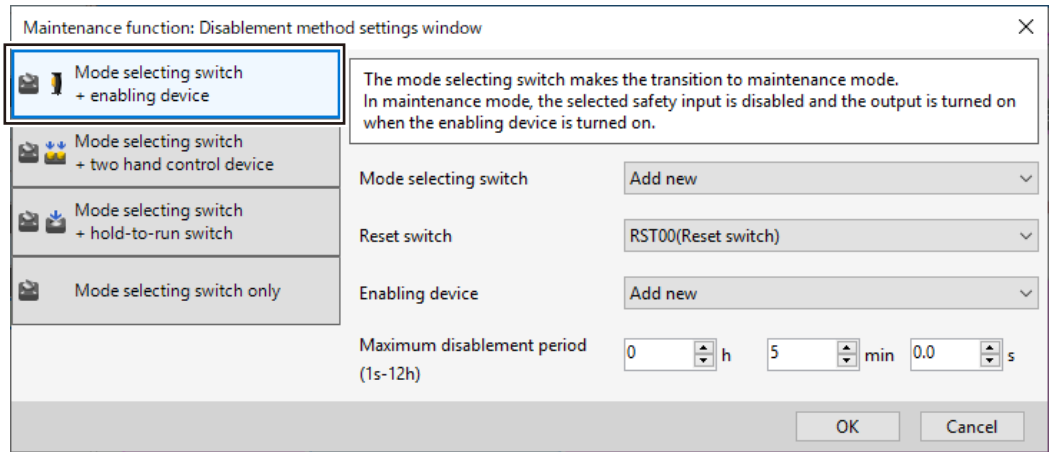
[2] Selecting the disablement method



Select the disablement method from the following options:

- Mode selecting switch + enabling device
- Mode selecting switch + two hand control device
- Mode selecting switch + hold-to-run switch
- Mode selecting switch only

Mode selecting switch + enabling device



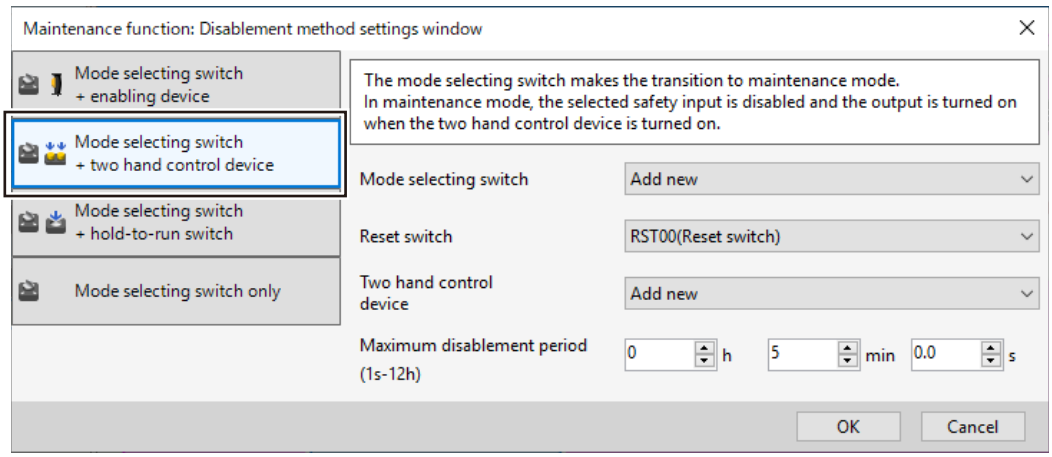
■ Operation description

Use the mode selecting switch to change the mode to maintenance mode.

When maintenance mode is set, the selected safety input is disabled, and the safety output is turned ON by turning on the enabling device input.

Item	Details
Mode selecting switch	Select the mode selecting switch to enable/disable the maintenance function.
Reset switch	Select the reset switch to reset maintenance mode to the normal operation.
Enabling device	Select the enabling device to turn ON the safety output.
Maximum Disablement period	Set the maximum disablement period. (Setting range: 1 (sec) to 12 (hr)) If the specified maximum disablement period is exceeded, the GC Series main controller enters into the error state, and the safety output is turned OFF.

Mode selecting switch + two hand control device



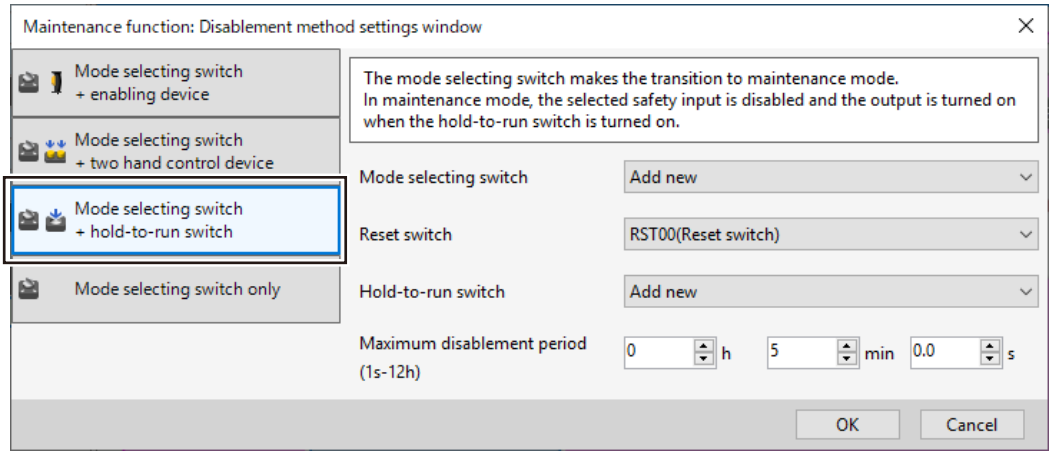
■ Operation description

Use the mode selecting switch to change the mode to maintenance mode.

When maintenance mode is set, the selected safety input is disabled, and the safety output is turned ON by turning ON the two hand control device input.

Item	Details
Mode selecting switch	Select the mode selecting switch to enable/disable the maintenance function.
Reset switch	Select the reset switch to reset maintenance mode to the normal operation.
Two hand control device	Select the two hand control device to turn ON the safety output.
Maximum Disablement period	Set the maximum disablement period. (Setting range: 1 (sec) to 12 (hr)) If the specified maximum disablement period is exceeded, the GC Series main controller enters into the error state, and the safety output is turned OFF.

Mode selecting switch + hold-to-run switch



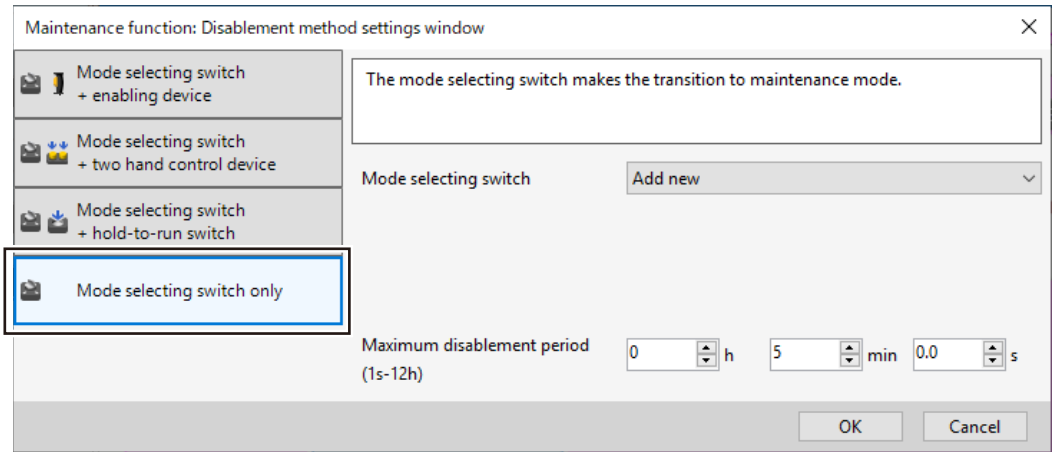
■ Operation description

Use the mode selecting switch to change the mode to maintenance mode.

When maintenance mode is set, the selected safety input is disabled, and the safety output is turned ON by turning ON the hold-to-run switch input.

Item	Details
Mode selecting switch	Select the mode selecting switch to enable/disable the maintenance function.
Reset switch	Select the reset switch to reset maintenance mode to the normal operation.
Hold-to-run switch	Select the hold-to-run switch to turn ON the safety output.
Maximum Disablement period	Set the maximum disablement period. (Setting range: 1 (sec) to 12 (hr)) If the specified maximum disablement period is exceeded, the GC Series main controller enters into the error state, and the safety output is turned OFF.

Mode selecting switch only



■ Operation description

Use the mode selecting switch to change the mode to maintenance mode.
When maintenance mode is set, the selected safety input is disabled and the safety output is turned ON.

Item	Details
Mode selecting switch	Select the mode selecting switch to enable/disable the maintenance function.
Maximum Disablement period	Set the maximum disablement period. (Setting range: 1 (sec) to 12 (hr)) If the specified maximum disablement period is exceeded, the GC Series main controller enters into the error state, and the safety output is turned OFF.

DANGER	**If [Mode selecting switch only] is selected to use the maintenance function, when the mode is changed from maintenance mode to standard mode, the output may be turned ON immediately, depending on the input device status. Additional safety measures are required for the whole machine in order to ensure the area is safe while standard mode is used.**

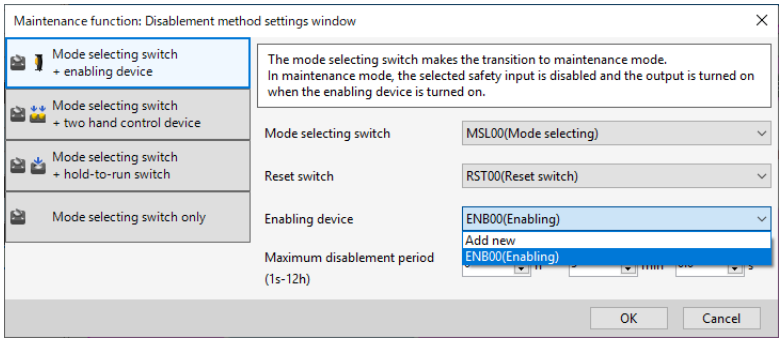
[3] Setting the disablement method operation

■ Selecting an input device

Select an input device you want to use for the maintenance function.

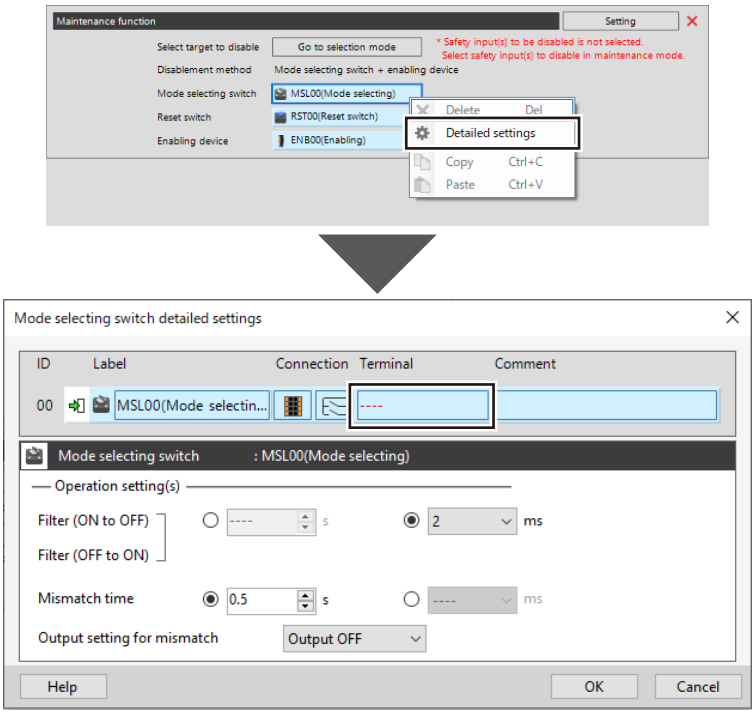
■ Adding an input device

If an input device used for the maintenance function is not registered, select and add it from the pull-down menu.



Point

When a new input device is added on the [Disablement method settings] window, a terminal is not assigned to it.
Select and right-click the target device in the maintenance function setting area and click [Detailed settings] to assign a terminal on the [Detailed settings] screen.



For the terminal assignment method, refer to "10-6 Assigning Terminals" (page 10-17)**.**

■ Maximum Disablement period

Set the maximum disablement period.

Item	Setting range	Default
Maximum Disablement period	1 (sec) to 12 (hr)	5 (min)

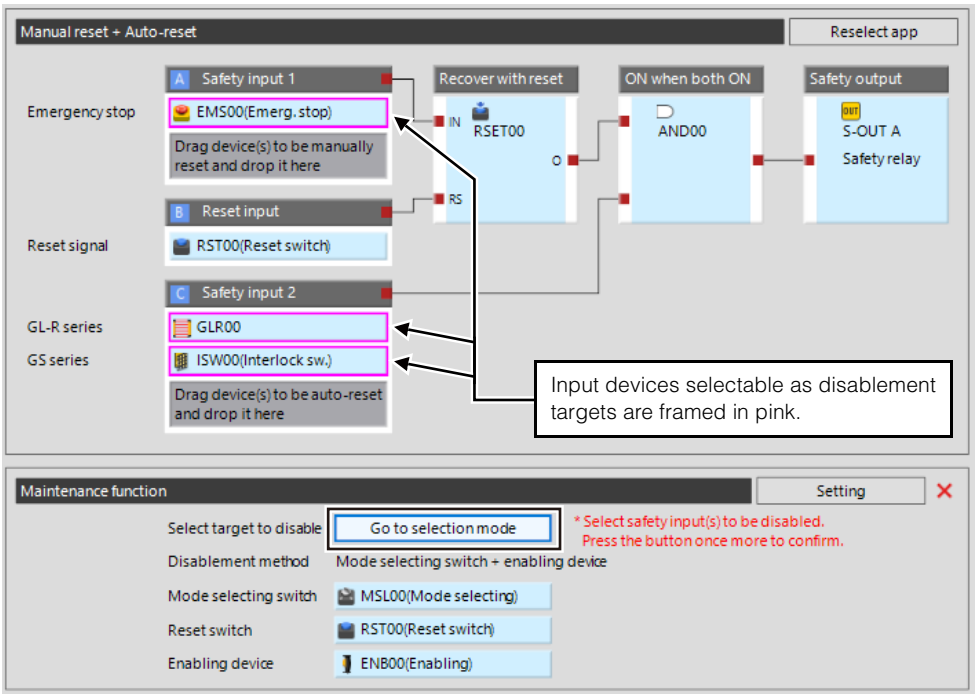
Point

If the specified maximum disablement period is exceeded, the GC Series main controller enters into the error state, and the safety output is turned OFF.

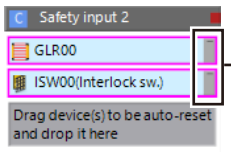
[4] Selecting the disablement target

Select the input device you will use to disable the input signal while the maintenance function is used.

1 When you click the [Go to selection mode] button, the input devices selectable as disablement targets are framed in pink.



2 When you click the block for an input device to be disabled, it indicates that it is selected by framing the device block in pink.



When an input block is selected as a disablement target, the right edge of the block indicates that it is selected.

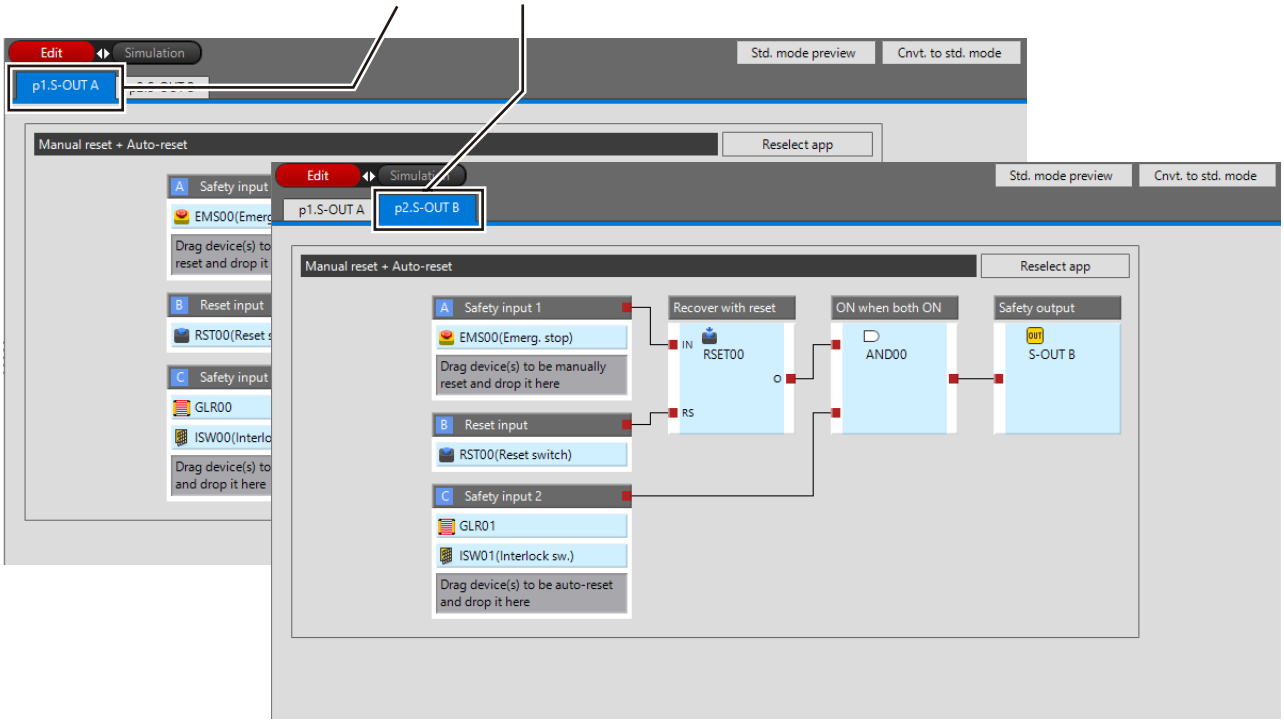
3 When you finish selecting the disablement target, click the [Go to selection mode] button to confirm.

Other Functions

When using multiple S-OUTs

In EASY mode, you need to create a program for each S-OUT.
If multiple S-OUTs are used, they are displayed in separate pages.

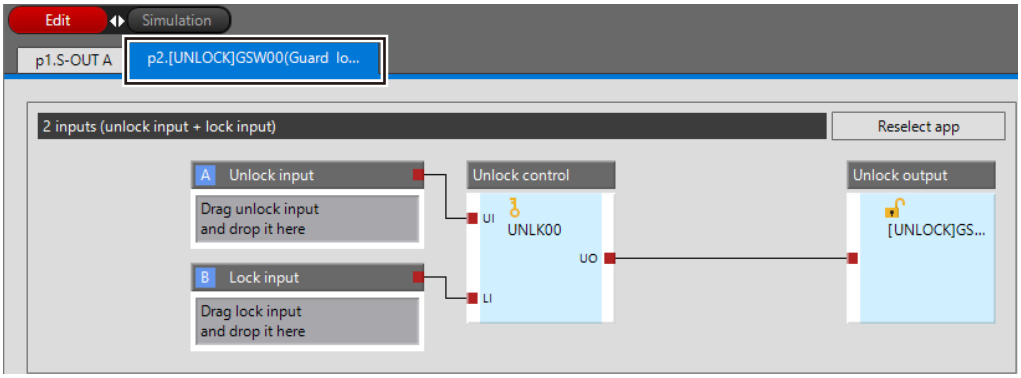
You can create a program in a separate page for each S-OUT.



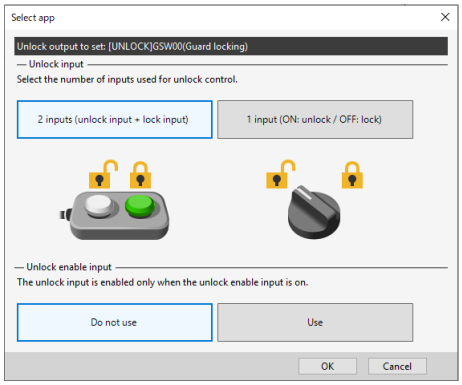
When using the unlock output

When KEYENCE Safety Interlock Switches "GS Series (Lock)" or "Guard locking switch" is selected for the input device, the unlock output can be used. On the [Select app] screen, you can select the unlock input method and set whether or not to use an unlock enable input.

(Example: 2 inputs (unlock input + lock input) * The unlock enable input is not used.)

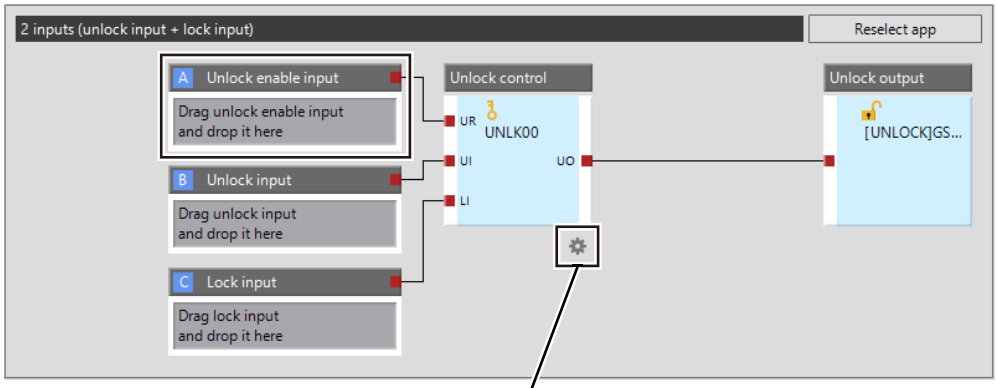


■ [Select app] screen

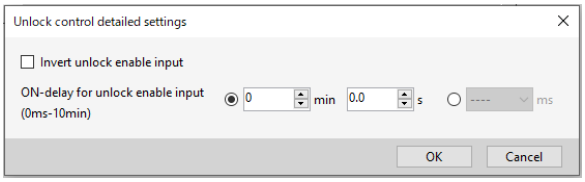


Item	Details
Unlock input	Select the lock control input type. • 2 inputs (unlock input + lock input) • 1 input (ON: unlock / OFF: lock)
Unlock enable input	Use this item to restrict the unlock timing so that the door cannot be opened while the machine is running.

■ When using the unlock enable input



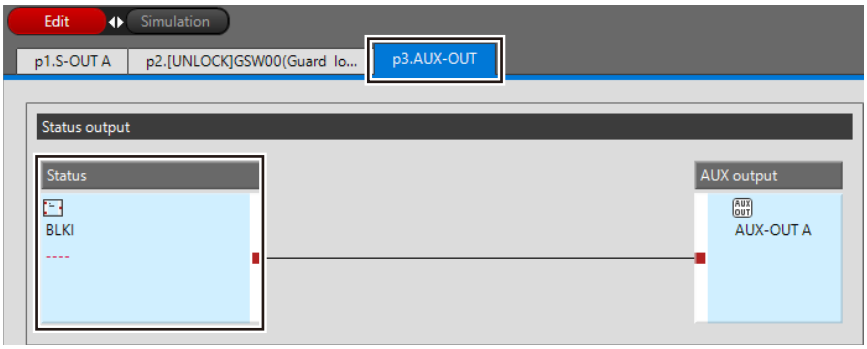
Unlock control enablement detailed settings



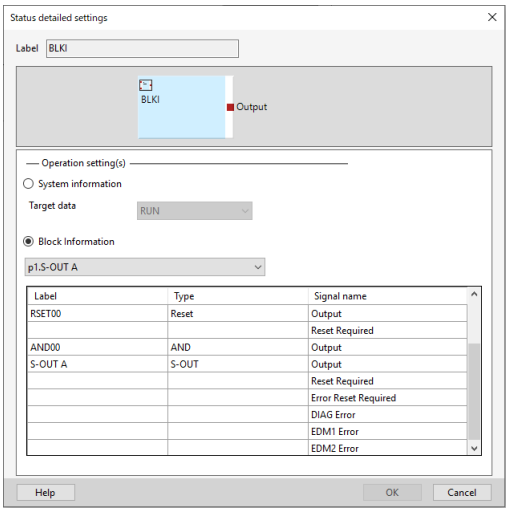
Item	Details
Invert unlock enable input	Inverts the unlock enable input signal when selected.
ON delay for unlock enable input	Set the ON-delay time of the unlock enable input. (Setting range: 0 (ms) to 10 (min))

When using the AUX-OUT output

You can output the system information and block information of the GC Series main controller by using the AUX-OUT output.



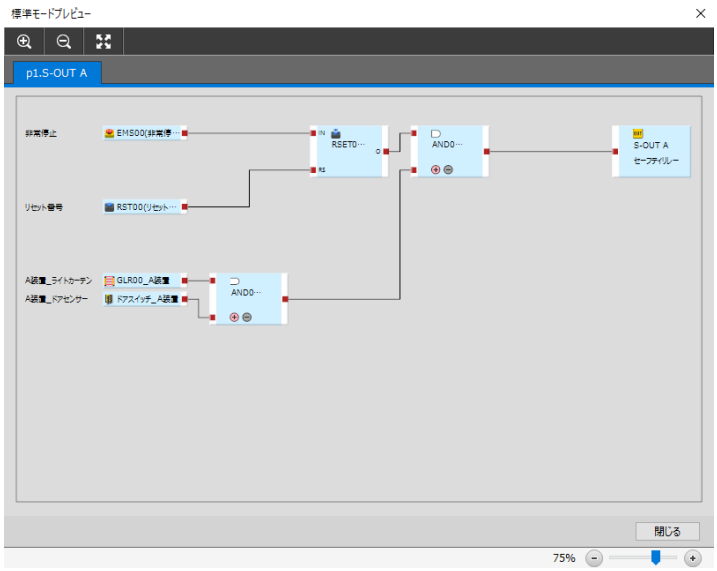
Status Detailed settings



Item	Details
System Information	Outputs the status of the GC Series main controller. • RUN: Turns ON the AUX-OUT output when the GC main controller is running. • Error/Alert: Turns ON the AUX-OUT output when the GC main controller is not in an error or alarm state.
Block information	Outputs the signal status of the input/output blocks and function blocks.

Std. mode preview

Displays the program created in "EASY mode" in a preview of converting it into a program for standard mode.

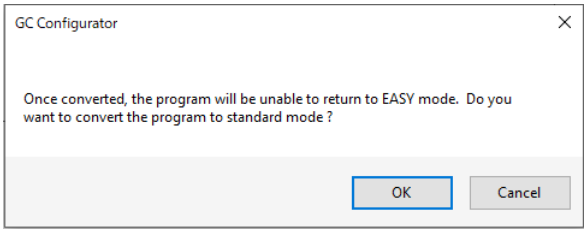


Conversion into standard mode

Convert the program created in "EASY mode" into a program for standard mode.

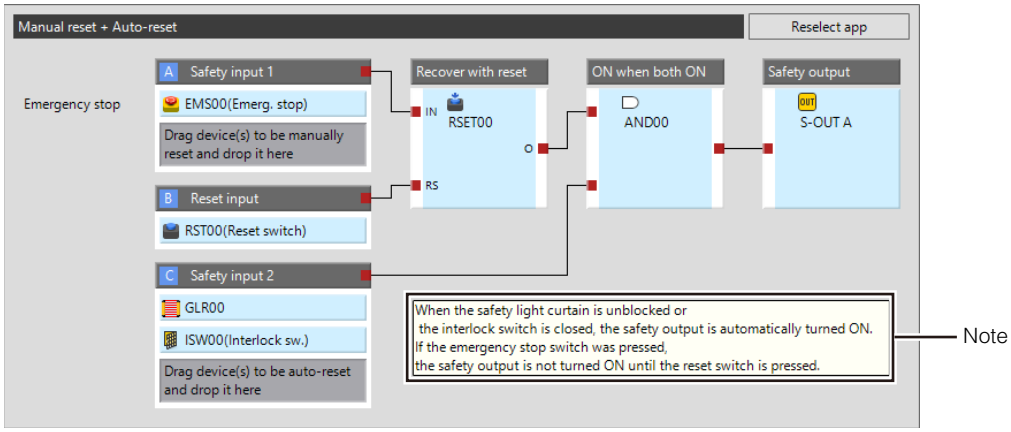
Point

Once a program created in EASY mode is converted into a program for standard mode, it cannot be edited again in EASY mode. To prevent data loss, be sure to save the project before converting it into a program for standard mode.

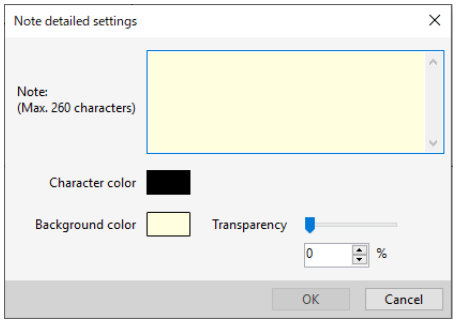


Note

Program information can be displayed as a note.
To use a note, drag [Note] from the device list and drop it to the program creation area.



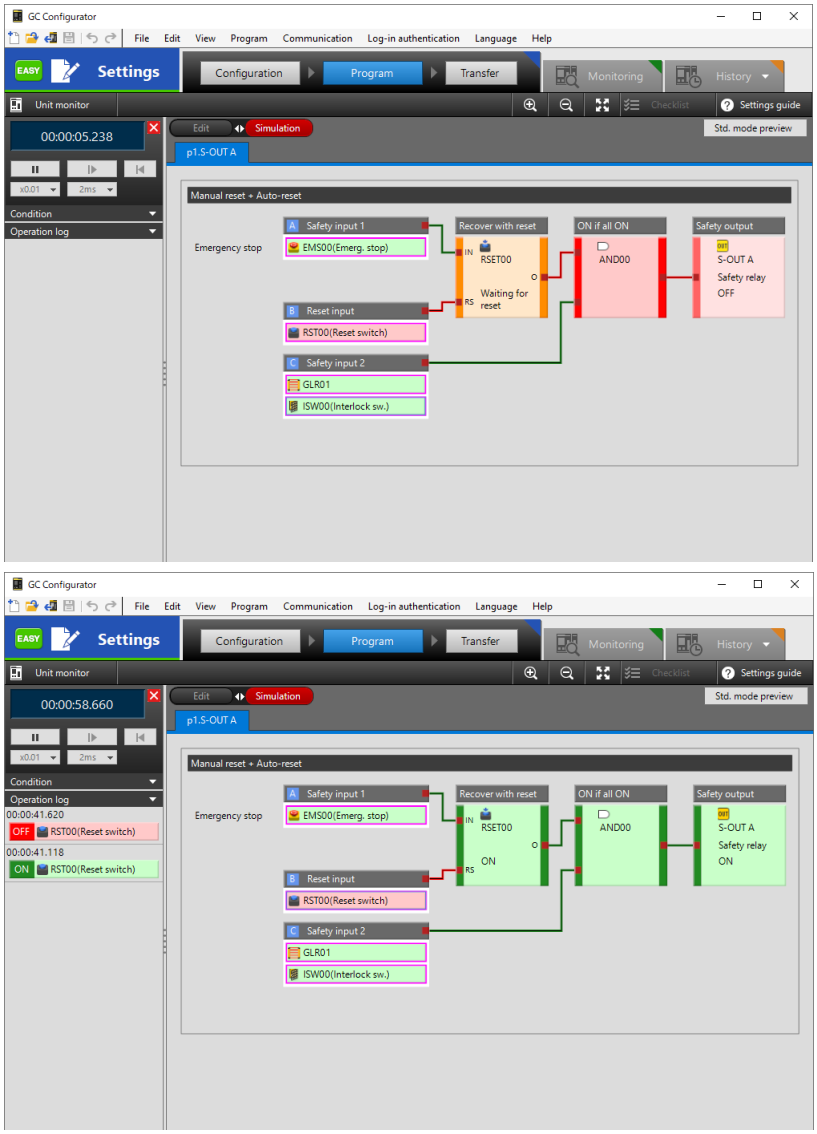
■ Note detailed settings



Item	Details
Note	Edit a string containing 1 to 260 characters. (A break is treated as 2 characters)
Character color	Select the character color from the color palette. Clicking this item displays the color palette.
Background color	Select the background color from the color palette. Clicking this item displays the color palette.
Transparency	Set the transparency of the background color. Specify a value between 0 and 100 (%).

Simulation Function

The simulation function allows you to simulate the operation of a created program on the PC without connecting to the GC Series main controller. Verifying the program operation according to the operation flow conducted by the operator allows efficient debugging.
You can perform simulations using various methods such as continuous execution or step execution.



Reference

The simulation function is described in "11-3 Simulation" (page 11-45).
For details, refer to "11-3 Simulation" (page 11-45).

Restrictions on EASY Mode

These are the following restrictions on EASY mode:

- The reset input cannot be used at the S-OUT block.
- When the GS Series is selected, the indicator control output cannot be used.
- When the GL-S Series is selected, the indicator control output cannot be used.
- When the SZ/SZ-V is selected, the bank output cannot be used.
- When the mode selecting switch is selected, the error output cannot be used.
- The muting input cannot be used for the input device.
- Register cannot be selected.
- On the program screen, a function block cannot be added, deleted, or edited.
- On the program screen, an output block cannot be added or deleted.
- On the program screen, the recipe function cannot be used.
- On the program screen, the page name cannot be edited. (This refers to the label name of an output device.)

11-2 Standard Mode

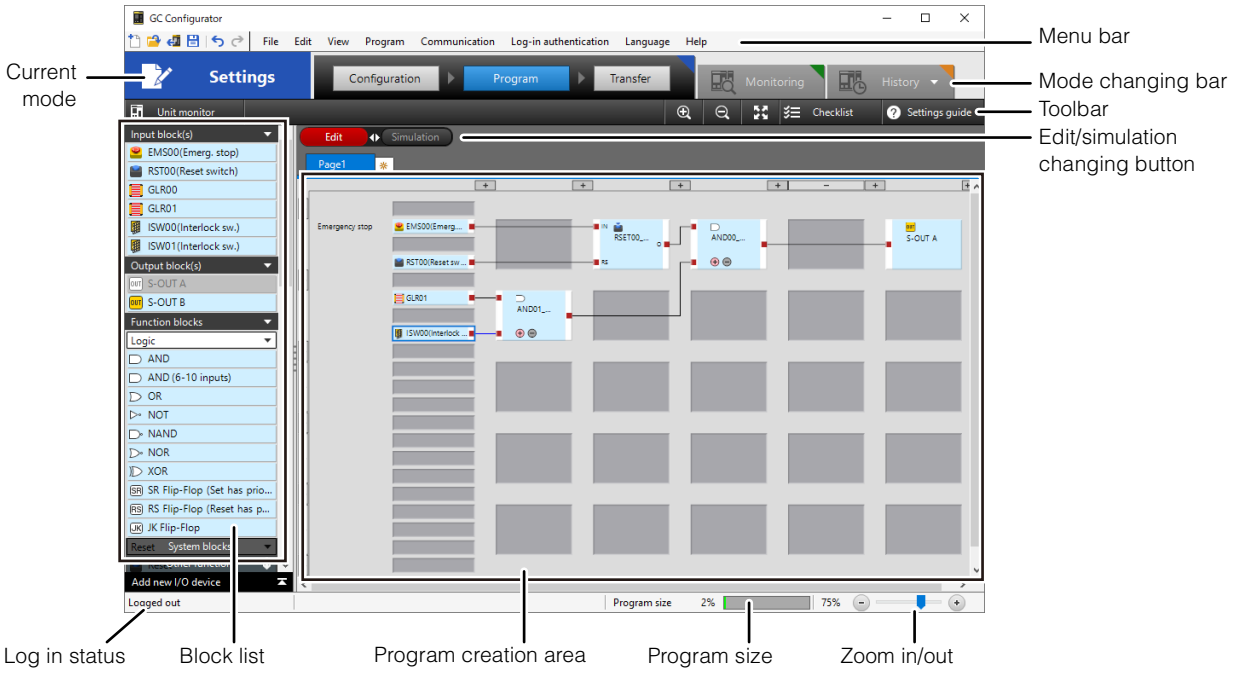
Overview of Standard Mode

Standard mode is used to create a safety control program using function blocks. This mode allows intuitive programming by connecting registered input/output blocks to function blocks with lines. Function blocks supporting various types of applications are provided, so you can easily create a safety control program by selecting function blocks according to your purpose. With a higher degree of freedom than EASY mode, this programming mode supports various applications.

Reference

For details on the function block types and specifications, refer to the "GC Series Function Block Reference Manual".

Names and Functions on the Program Screen (Standard Mode)

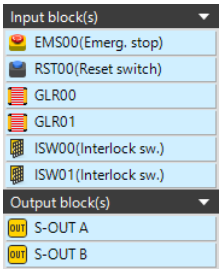


Item	Name
Current mode	Displays the current operation mode.
Menu bar	Menu items. Displays the menu which executes each function. "8-3 Menu" (page 8-6)
Mode changing bar	Changes the operation mode and screen mode.
Toolbar	Displays each function window.
Edit/simulation changing button	Changes between edit mode and simulation mode.
Log in status	Displays the current login status.
Block list	Area where you select input blocks, output blocks, and function blocks.
Program creation area	Programming area.
Program size	Displays the size of the program currently created. (Unit: %)
Zoom in/out	Zooms in or out on the program creation area.

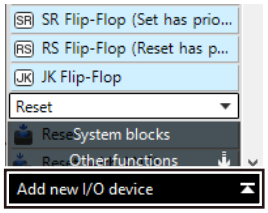
Block list

The block list consists of "Input block(s)" and "Output block(s)", which refer to input devices and output devices registered on the configuration screen, "Communications", "Register", "Function blocks", "System blocks", and "Other functions".

■ Input block(s)/Output block(s)



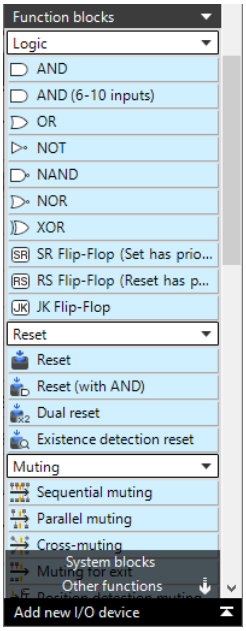
Input devices and output devices registered on the configuration screen are listed.
On the program screen, input devices and output devices are called "blocks", such as "input blocks" and "output blocks", respectively.
Drag and drop them to the program creation area to register.



Reference

An input/output device can also be added on the program screen.
When you click [Add new I/O device] at the bottom of the block list, the input/output device list appears, allowing you to select and add an input/output device.

■ Precautions for using function blocks

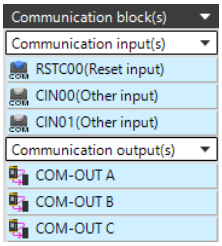


Function blocks which are used in the program.

Reference

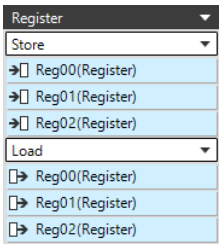
For details on the function block types and specifications, refer to the "GC Series Function Block Reference Manual".

■ Communications



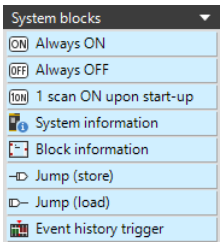
This type of block uses the Ethernet communication function to interact with a general-purpose PLC via Ethernet communication.
"15 Ethernet Communication Function" (page 15-1)

■ Register



A register works as a virtual input/output block with a pair of load and store.
The function block output status received by a register can be used as the input signal for another program circuit.

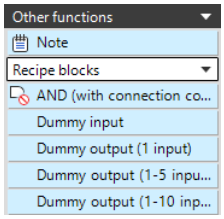
■ System blocks



System blocks which are used in the program.

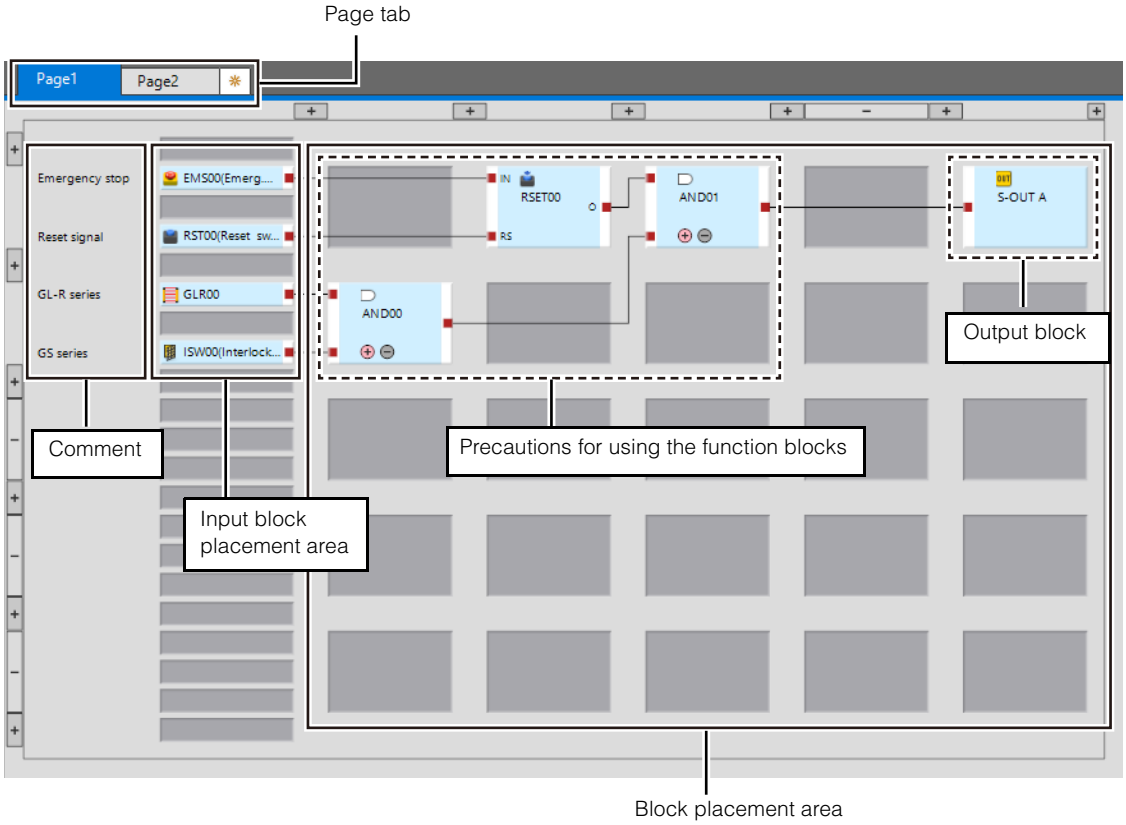
Reference For details on the function block types and specifications, refer to the "GC Series Function Block Reference Manual".

■ Other functions



Blocks used for the note and the recipe functions, which can be written on the program.

Program creation area



Item	Details
Page tab	You can manage programs in separate pages. "Page management" (page 11-42)
Comment	Displays the comment for each input device. "10-4 Registering Input Devices" (page 10-5)
Input block placement area	Area where only input blocks can be placed.
Block placement area	Area where all blocks can be placed.

Standard Mode Programming Flow

- Standard mode programming flow -

Step 1 **Placing input/output blocks**

Drag and drop input/output blocks to the program to place them.

"Placing Input/Output Blocks" (page 11-30)

Step 2 **Placing function blocks**

Drag and drop function blocks to the program to place them according to the safety control program to be created.

"Placing Function Blocks" (page 11-31)

Step 3 **Wiring blocks**

Create a program by connecting blocks with lines.

"Wiring Blocks" (page 11-34)

Step4 **Simulation function**

Verify the operation using the simulation function.

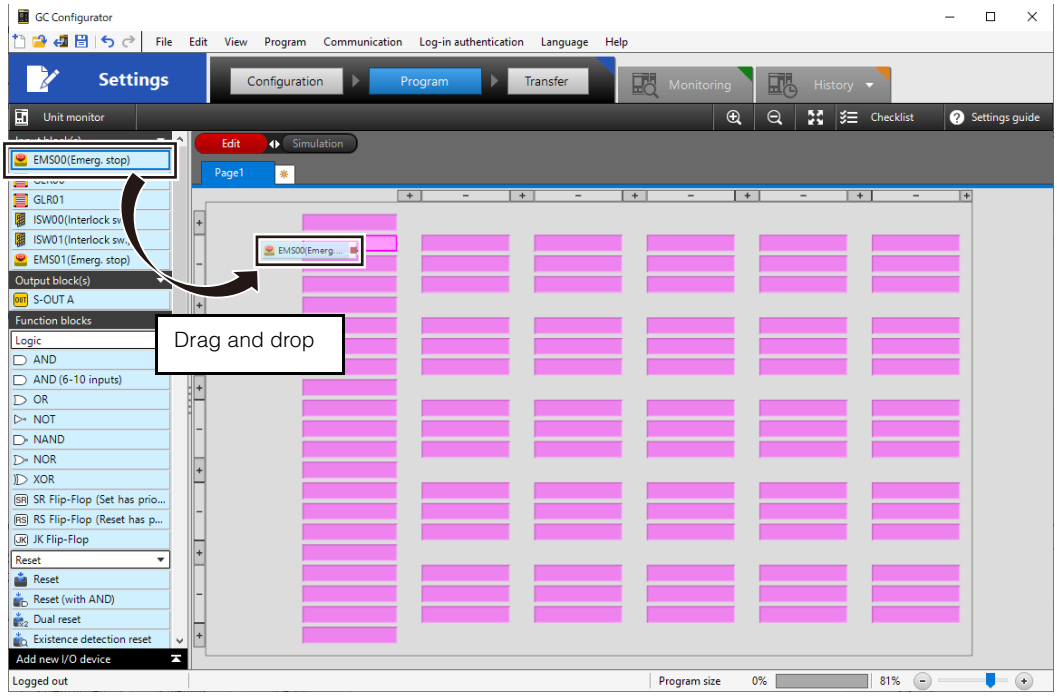
"11-3 Simulation" (page 11-45)

Placing Input/Output Blocks

Input devices and output devices registered on the configuration screen are displayed as input blocks and output blocks in the block list.
Drag and drop them to the program creation area if you want to place them on the program.

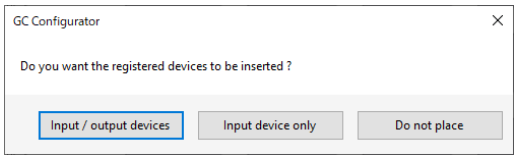
Placing input/output blocks

Drag and drop input/output blocks to place them. Areas in which blocks can be placed are displayed in pink.



Reference

When you go to the program screen for the first time after registering input/output devices on the configuration screen, the following message appears.
If you select [Input / output devices] or [Input device only], the registered devices are automatically placed.

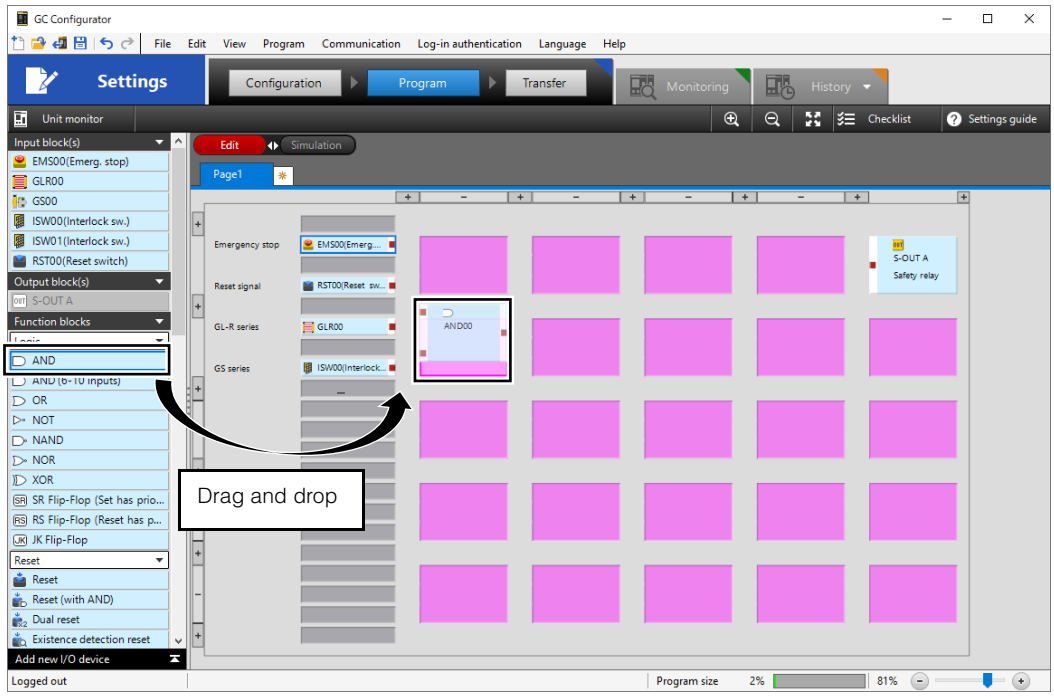


■ Moving a placed block

To move a placed block, select the target block and drag and drop it. Areas in which blocks can be placed are displayed in pink.

Placing Function Blocks

Drag and drop them to the program creation area if you want to place them on the program.



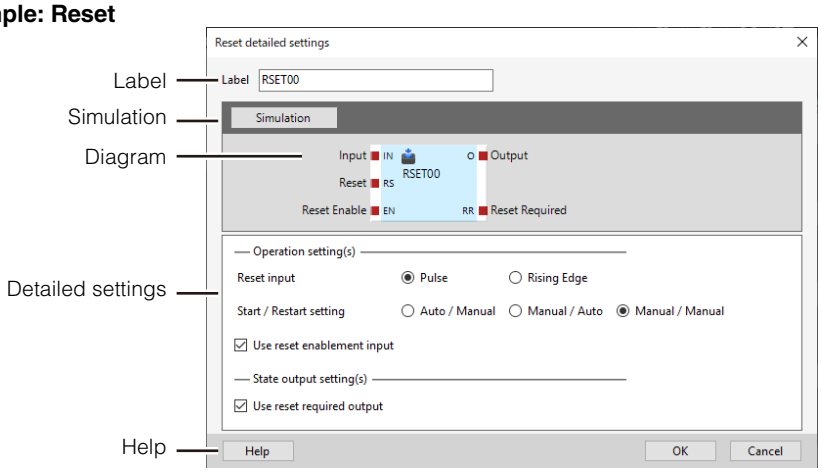
Function block detailed settings

You can configure the operation settings and state output settings on the [Detailed settings] screen depending on the function blocks.

To display the [Detailed settings] screen, use one of the following:

- Double-click the target function block.
- Select and right-click the target function block and click [Detailed settings].
- Select [Edit] > [Detailed settings] from the menu.

Example: Reset



Item	Details
Label	Label of the function block. It is displayed in the diagram.

Item	Details
Simulation	Check the function block operation in a simulation. "Simulating a function block" (page 11-32)
Diagram	Symbol on the program.
Detailed settings	Detailed settings of the function block.
Help	Displays the detailed description manual of the function block when clicked.

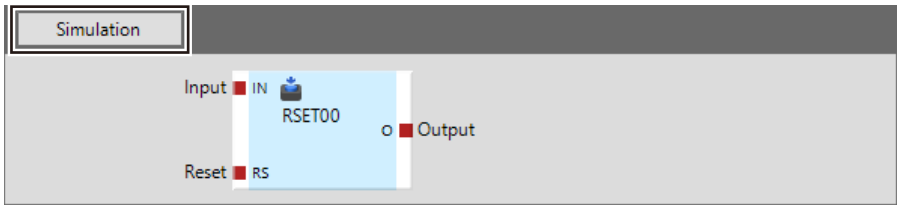
Reference The configurable items on the detailed settings screen vary depending on the function blocks.
For details, refer to the "GC Series Function Block Reference Manual".

Simulating a function block

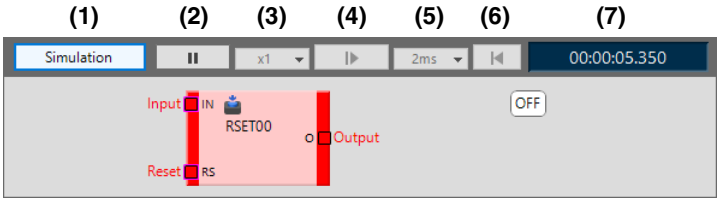
On the function block detailed setting screen, you can simulate a function block.
This is used to verify the basic operation of the function block or when configuring the detailed settings.

■ Entering simulation mode

When you click the [Simulation] button on the function block detailed setting screen, the unit enters into simulation mode.



■ Area and function names of simulation mode



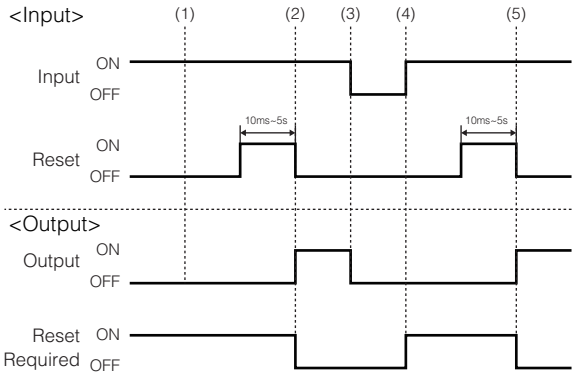
Item		Details
(1)	Simulation	Changes between edit mode and simulation mode.
(2)	⏸ ▶	Executes or pauses the continuous scan for the simulation.
(3)	x1	Set the simulation play interval. (Setting range: x0.01/x0.1/x1/x2/x5/x20)
(4)		Executes at the interval specified by (5).
(5)	100ms	Set the step execution interval. (Setting range: 2 ms/10 ms/100 ms/1 s/10 s/30 s)
(6)		Resets the input status and elapsed time.
(7)	00:00:01.146	Displays the elapsed simulation execution time. (hh:mm:ss:ttt, Maximum: 36:00:00:000)

■ How to operate simulation mode

The following example uses a "reset" function block to describe how to operate simulation mode.

● "Reset" function block

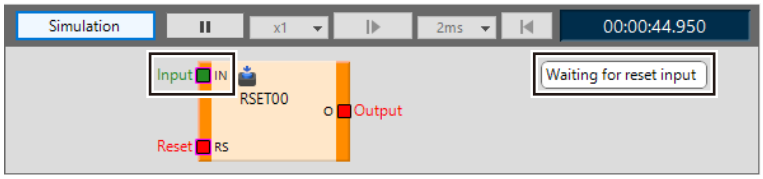
A "reset" function block retains the output OFF state until the reset signal is turned on with the safety inputs ON. When the reset signal is correctly sent, the output is turned ON.



1 When the machine enters simulation mode, a continuous scan automatically starts.

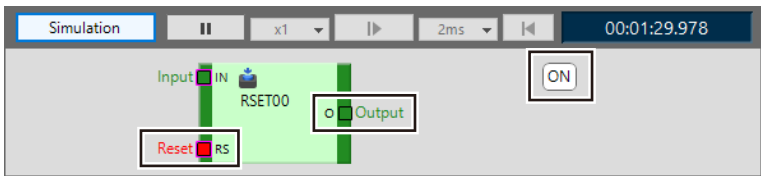
2 Click a port that is the function block input condition. In this example, click "Input".

When "Input" is active, the status changes to "Waiting for reset input".



3 Next, click "Reset" to turn it OFF, ON, and OFF.

When "Reset" is correctly turned on, the function block symbol turns green, turning ON the output.

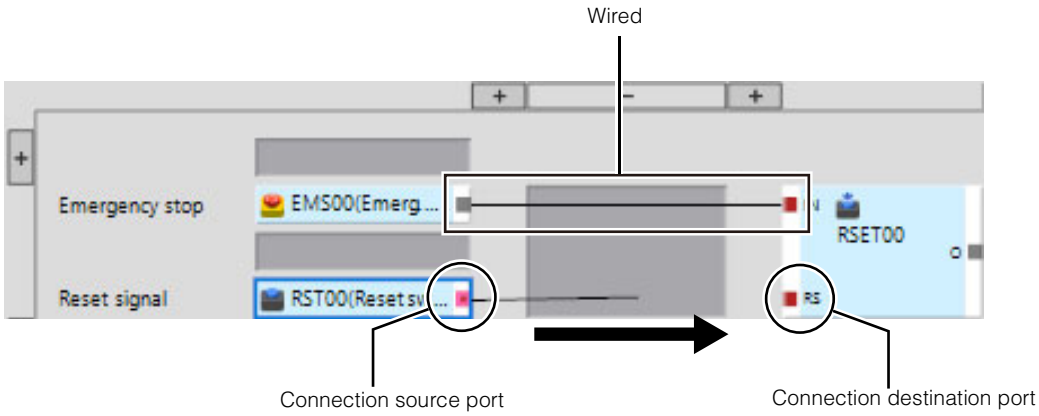


Reference

The operation and setting items vary depending on the function blocks.
For details, refer to the "GC Series Function Block Reference Manual".

Wiring Blocks

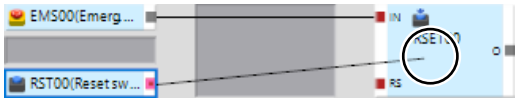
When you click or drag a block port, the wiring path is formed. Click the destination block port to connect the two ports with a line.



Point

Wiring is not permitted in the following cases:

- **You are unable to wire a port to any other location besides another port.**



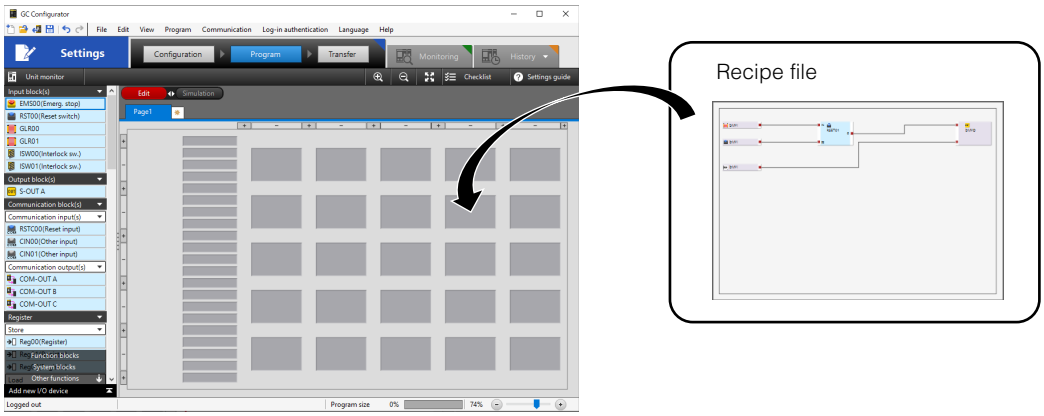
- **If you try to wire from IN to IN or from OUT to OUT or wire to a non-connectable port, the destination port is displayed in gray.**

- **When a wired circuit ends up looping, the error message "The wire connection has a loop." appears.**
- **Under the following conditions, the error message "Connection is not permitted." appears, preventing the wiring from completing.**
  - **You try to connect an input device without configuring input permission settings to AND (with connection constraint function).**
  - **You try to connect any other block than the specified block: port (MMC input bypass: BY for IB, MMC output enable: EN for OE) to the output port under the manual mode control.**

Recipe Function

What is the recipe function?

The recipe function allows you to reuse a standard program, for another project by registering it as a recipe file. Using the recipe function, programs are registered or read out in units of pages.
These are the following recipe file types: "Preset recipe", pre-registered in the GC Configurator, and "Registered recipe", which can be newly registered by the user.

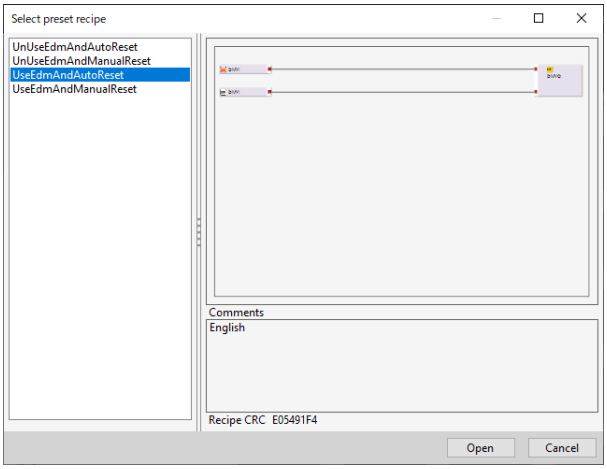


Preset recipe

Preset recipes are pre-registered in the GC Configurator.
You can use a program just by selecting an appropriate recipe for the application and registering input blocks and output blocks.

■ How to use a preset recipe

1 **From the menu, select [File] > [Recipe] > [Open] > [Preset recipe].**
The [Select preset recipe] dialog box appears.

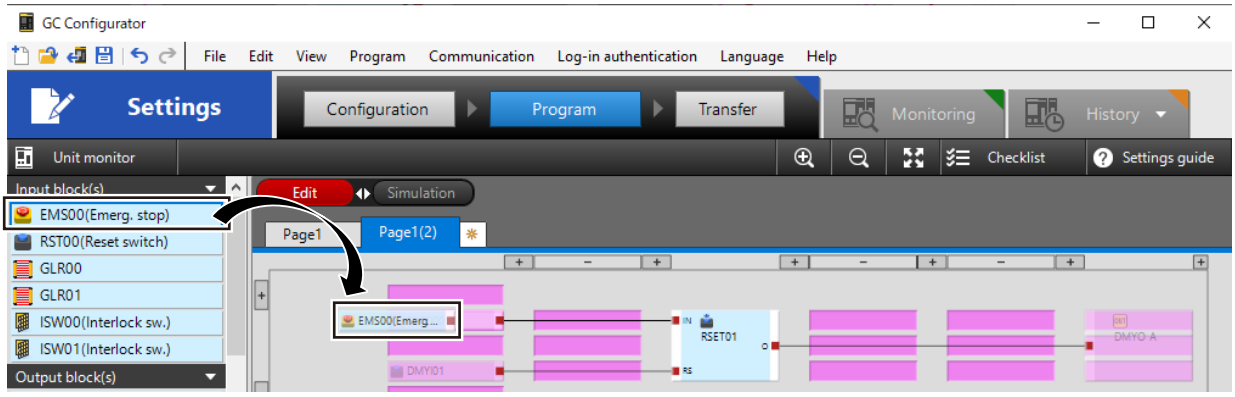


2 **Select the preset recipe and click the [Open] button.**

A page is added to the program screen and displays the program of the selected preset recipe.

The file is opened with dummy blocks placed in input blocks and output blocks.

3 **Place the registered input blocks and output blocks in the dummy block locations.**



Point

- **Dummy input blocks and dummy output blocks cannot be transferred to the GC Series main controller. To use a recipe, replace the dummy blocks with the input blocks and output blocks to be used.**
- **You can execute a simulation even when there are dummy input blocks and dummy output blocks.**

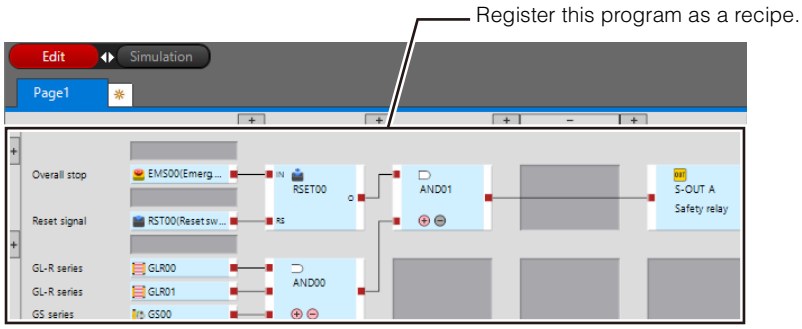
Registered recipe

The registered recipe function allows registration of a program created by the user as a recipe file.
A registered recipe can be used for another project, so you can create a program efficiently by registering a standard program.

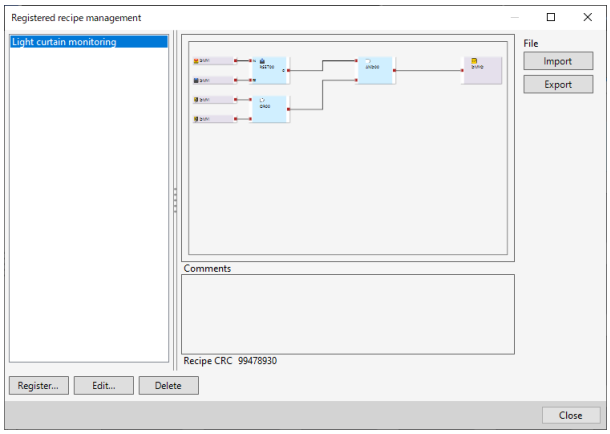
■ How to register a recipe

The following describes how to register a created program as a recipe.

Reference Register a recipe for each program page.

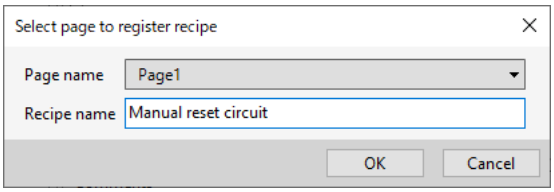


1 From the menu, select [File] > [Recipe] > [Registration/management] to display the [Registered recipe management] dialog box.



Item	Details
Register	Select the page where you want to register the recipe and set the recipe name. (Recipe name: limited to a maximum of 64 characters) Clicking this button displays the [Select page to register recipe] dialog box.
Edit	Rename a registered recipe name. Clicking this button displays the [Edit recipe name] dialog box.
Delete	Deletes the selected registered recipe when clicked.
Import	Import a recipe created in another project. Clicking this button displays the [Open] dialog box.
Export	Export a registered recipe. Clicking this button displays the [Save as] dialog box.
Comment	Displays the page information of the registered recipe. (The note set in the page properties is shown.)
Recipe CRC	Displays the CRC of the registered recipe. (This is the CRC value when the recipe was registered.)

2 **Click the [Register] button, and then select the page where you want to register the recipe and set the recipe name.**



3 **When you click the [OK] button, the recipe is registered.**

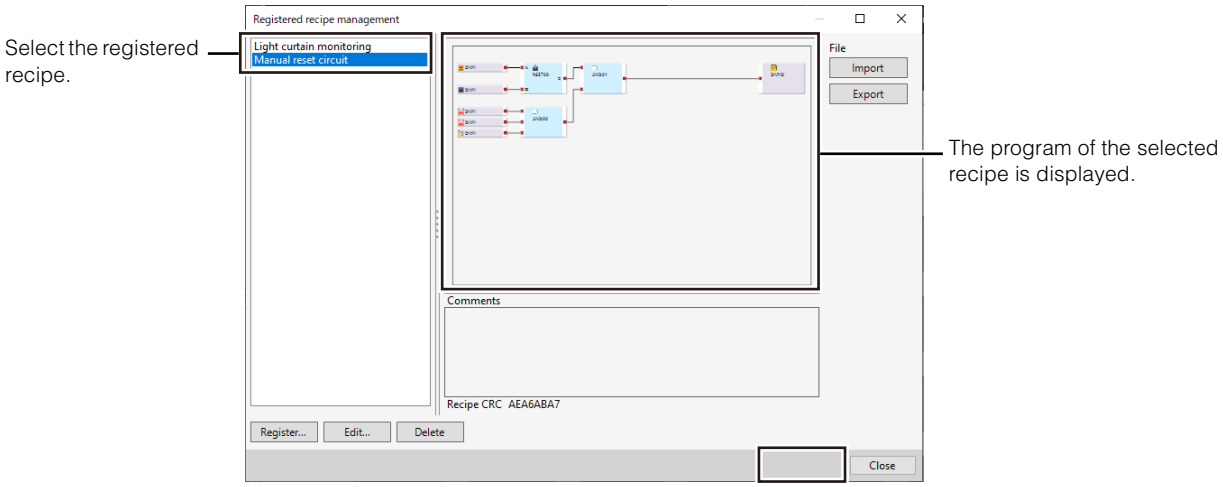
Point

During recipe registration, the input blocks and output blocks of a program to be registered are converted into dummy input blocks and dummy output blocks.

■ Load the registered recipe and create a program.

The following describes how to create a program by loading a recipe registered to the project currently created.

1 **From the menu, select [File] > [Recipe] > [Open] > [Registered recipe].**
The [Select registered recipe] dialog box appears.



2 **Select the registered recipe and click the [Open] button.**
A page is added to the program screen and displays the program of the selected preset recipe.

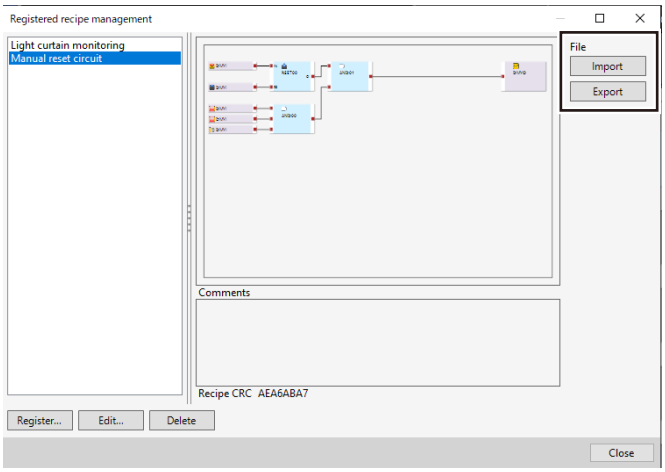
3 **Place the registered input blocks and output blocks in the dummy block locations.**

Point

Dummy input blocks and dummy output blocks cannot be transferred to the GC Series main controller. To use a recipe, replace the dummy blocks with the input blocks and output blocks to be used.

■ Importing/exporting a registered recipe

On the [Registered recipe management] dialog box, you can import a recipe created on another PC or export a recipe file.



Point

The registered recipe file extension is "*.gcr".

■ Lift restrictions on edit

When you load a preset recipe or registered recipe, you cannot change the detailed settings of the read function blocks.

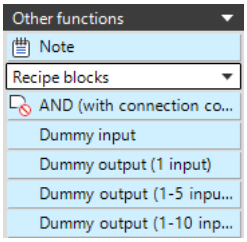
To edit the read function block detailed settings, select [File] > [Recipe] > [Lift restrictions on edit] from the menu to enable editing.

Point

- **Once the edit restriction is lifted, you cannot place the edit restriction again. To place the edit restriction, register the edited program as a recipe. "How to register a recipe" (page 11-37)**
- **When the edit restriction is lifted, the edit restriction on all the preset recipes and registered recipes currently placed as programs will be lifted.**

Recipe blocks

A recipe block can be placed as a dummy input/output block.
Use it to create a standard program, which can be reused for a registered recipe.



Point

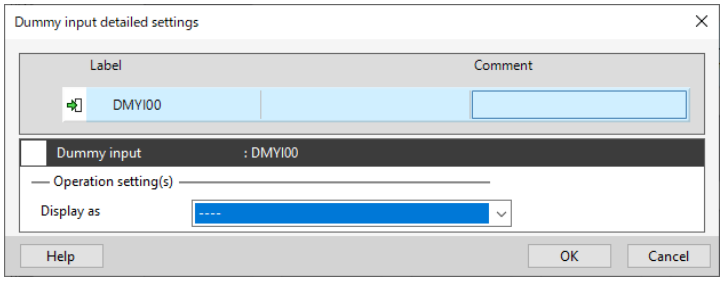
Dummy input blocks and dummy output blocks cannot be transferred to the GC Series main controller.
To use a recipe, replace the dummy blocks with the input blocks and output blocks to be used.

■ Dummy inputs

A dummy input block can be used as an input block when creating a program for a registered recipe.

<<Dummy input>>

<<Dummy input detailed settings>>



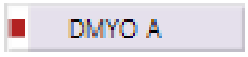
Item	Details
Display as	You can add an input device icon to a dummy input block. This indicates which input is assumed to be placed on the program when using a recipe.

Reference An input device other than those set for [Display as] can also be placed.

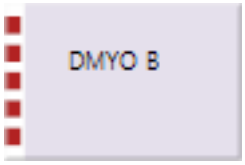
■ Dummy outputs

A dummy output block can be used as an output block when creating a program for a registered recipe.

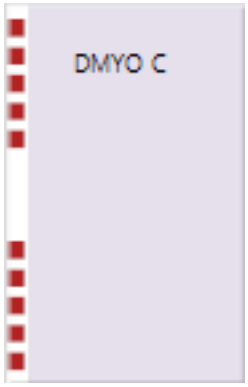
<<Dummy output (1 input)>>



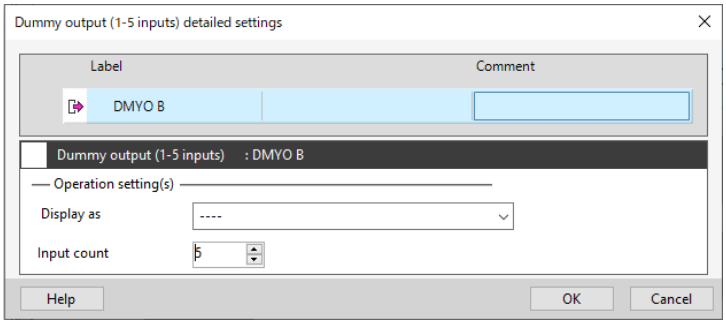
<<Dummy output (1-5 inputs)>>



<<Dummy output (1-10 inputs)>>



<<Dummy output detailed settings>>



Item	Details
Display as	You can add an output device icon to a dummy output block. This indicates which output is assumed to be placed on the program when using a recipe.
Input count	When "Dummy output (1-5 inputs)" or "Dummy output (1-10 inputs)" is selected, you can set the number of inputs to an output block.

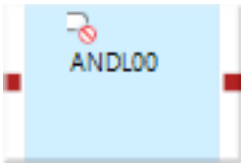
■ AND (with connection constraint function)

AND (with connection constraint function) is an AND function block that allows you to limit the number of device blocks that can be connected to the input.

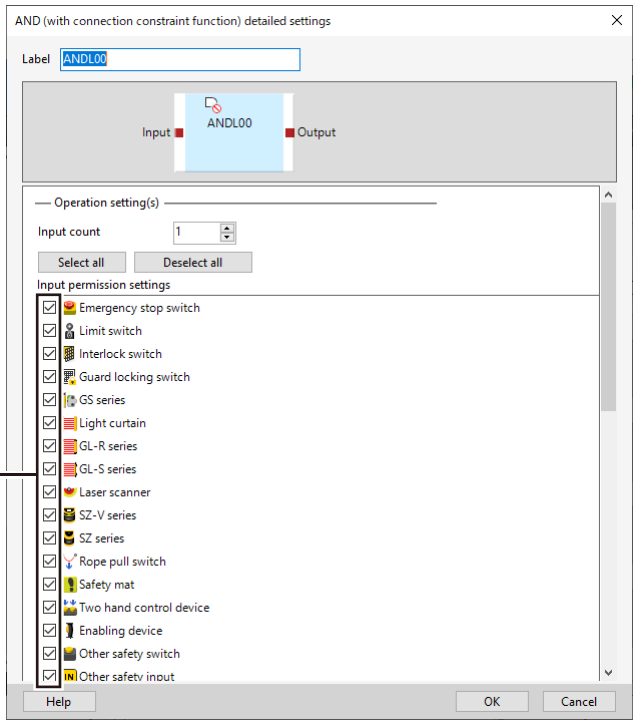
You can set it so that only specified input devices (input blocks) can be wired when creating a program for a registered recipe.

If you try to wire any other input block than the ones specified, the error message "Connection is not permitted." appears.

<<AND (with connection constraint function)>>



<<AND (with connection constraint function) detailed settings>>

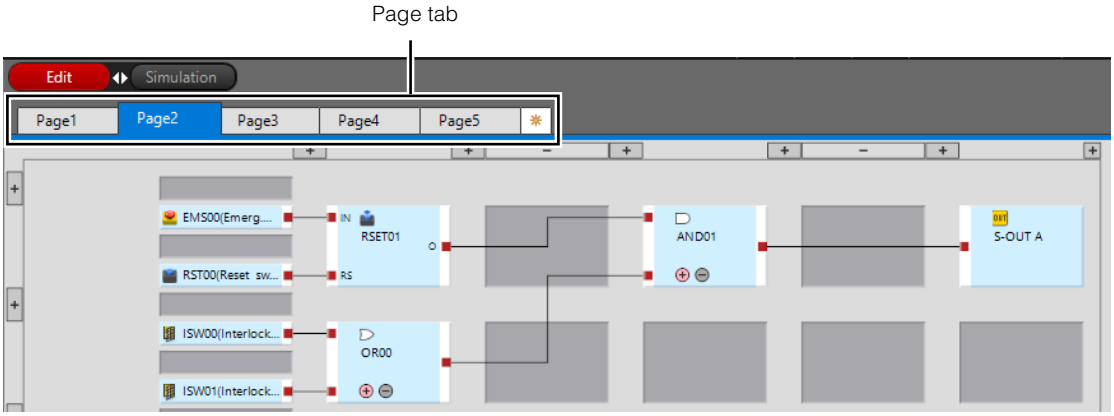


Only selected input devices (input blocks) can be wired.

Other Functions

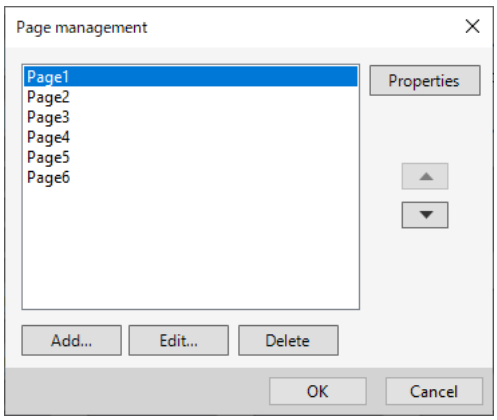
Page management

In the GC Configurator, you can create and manage safety control programs in separate pages.
The following describes how to manage the pages.



■ Page management dialog box

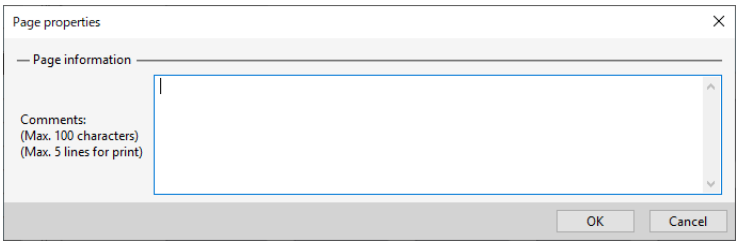
On the [Page management] dialog box, you can add or delete a page and set the page name and page properties.
You can open the [Page management] dialog box from the right-click menu of any page tab.



Item	Details
Properties	Displays the [Page properties] dialog box when clicked. You can edit the note as the page information.
▼ ▲	Changes the page order.
Add	Adds a new page. Clicking this button displays the [Page detailed settings] dialog box, allowing you to set the page name.
Edit	Edits the page name of the selected page. Clicking this button displays the [Page detailed settings] dialog box.
Delete	Deletes the selected page.

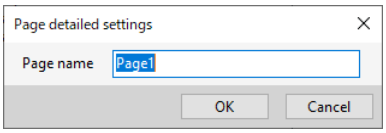
● **[Page properties] dialog box**

On the [Page properties] dialog box, you can set a comment as page information. (Maximum: 100 characters)



● **[Page detailed settings] dialog box**

On the [Page detailed settings] dialog box, you can set the page name. (Maximum: 22 characters)



Adding or deleting a row/column

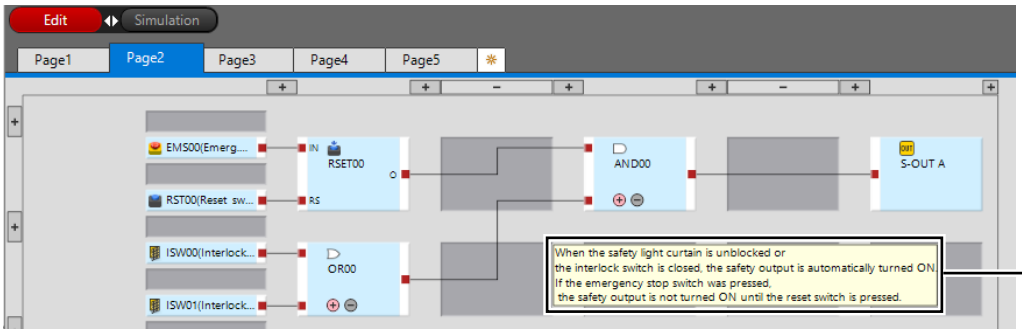
You can add or delete a row/column in the program creation area.

Point

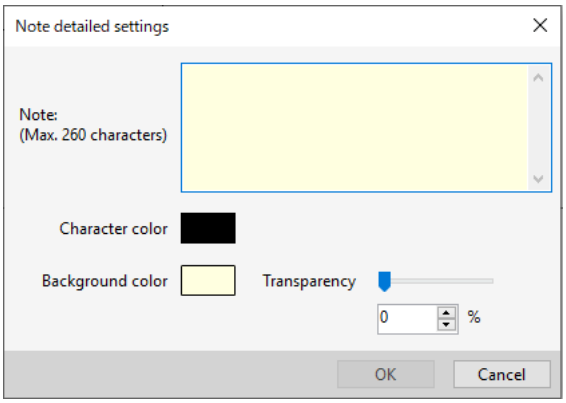
A row/column cannot be deleted if a block is already placed in it.

Notes

Program information can be displayed as a note.



■ Note detailed settings



Item	Details
Note	Edit a string containing 1 to 260 characters. (You can break it up into ten lines.)
Character color	Select the character color from the color palette. Clicking this item displays the color palette.
Background color	Select the background color from the color palette. Clicking this item displays the color palette.
Transparency	Set the transparency of the background color. Specify a value between 0 and 100 (%).

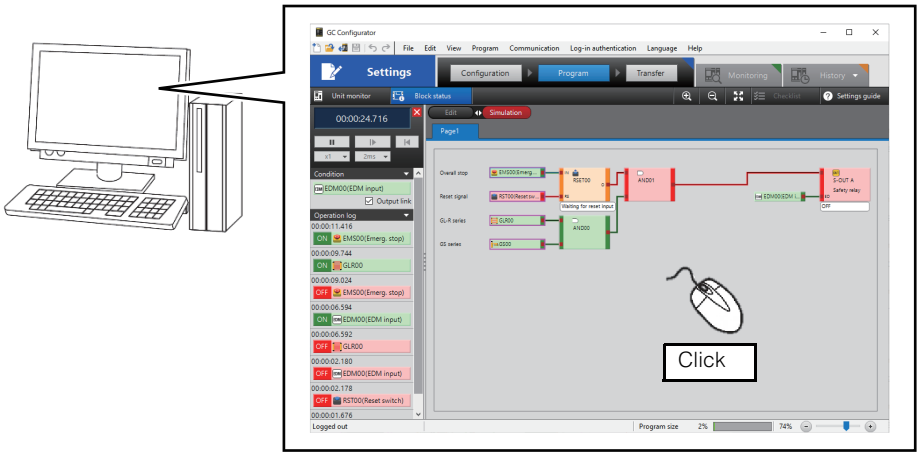
11-3 Simulation

Overview of the Simulation Function

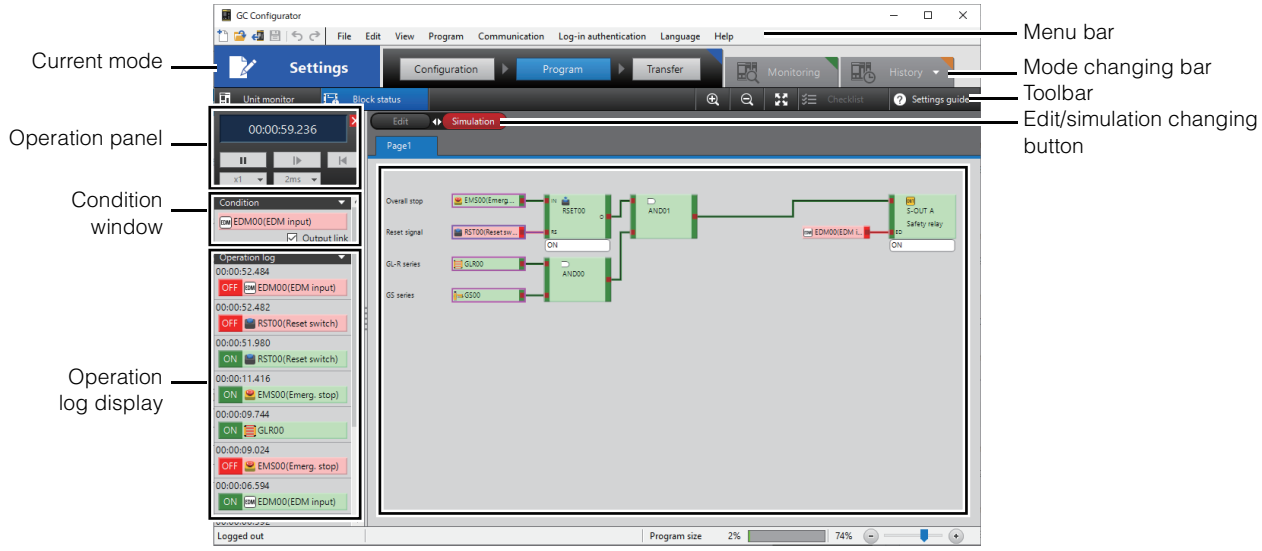
The simulation function allows you to simulate the operation of a created program on the PC without connecting to the GC Series.

With this function, you can perform the following:

- Check the operating state of the program by changing the state of an input block.
- Perform simulations using various methods such as continuous execution or step execution.
- Verify the operation according to the correct operation flow in the operation log.



Area and Function Names of the Simulation Function



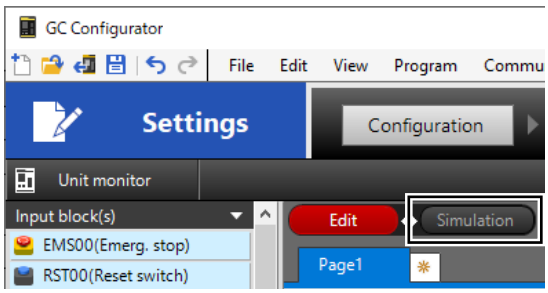
Item	Name
Current mode	Displays the current operation mode.
Operation panel	Start or stop the simulation or perform the step execution.
Condition window	Simulate the EDM input status when using the EDM input.
Operation log	Displays up to 50 simulation operations in order from newest to oldest.
Menu bar	Menu items. Displays the menu which executes each function. "8-3 Menu" (page 8-6)

Item	Name
Mode changing bar	Changes the operation mode and screen mode.
Toolbar	Displays each function window.
Edit/simulation changing button	Changes between edit mode and simulation mode.
Program area	Displays the created program.

Starting and Stopping the Simulation

How to start the simulation

When you click the [Simulation] button, the simulation starts.

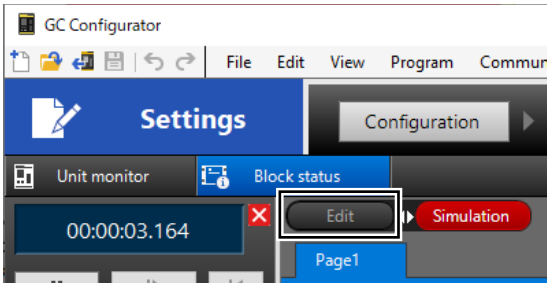


Point

If there is a setting error that does not allow a simulation, the simulation does not start. The error details are shown in the checklist. Correct the error and start the simulation again.

How to stop the simulation

When you click the [Edit] button, the simulation stops.



How to Operate the Simulation

When you click an input block during simulation, you can check the program operation with the ON/OFF state changing.

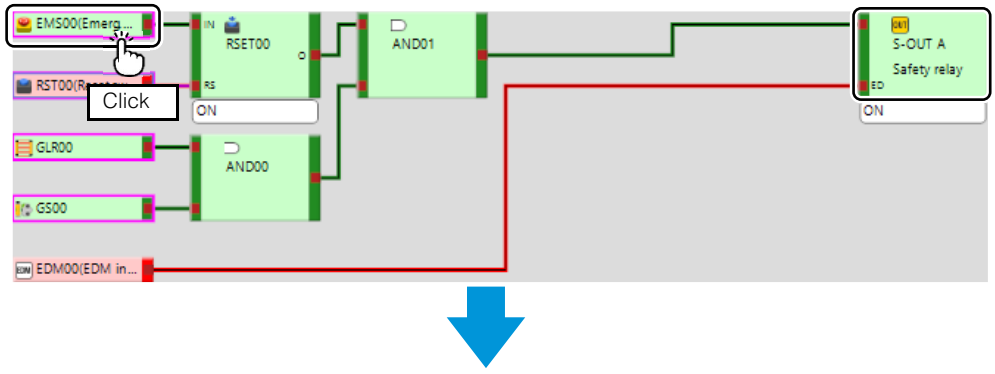
Reference

- An input block with the input logic set to "N.C." starts with the ON state when the simulation starts.
- A mode selecting switch starts with In1 ON when the simulation starts.

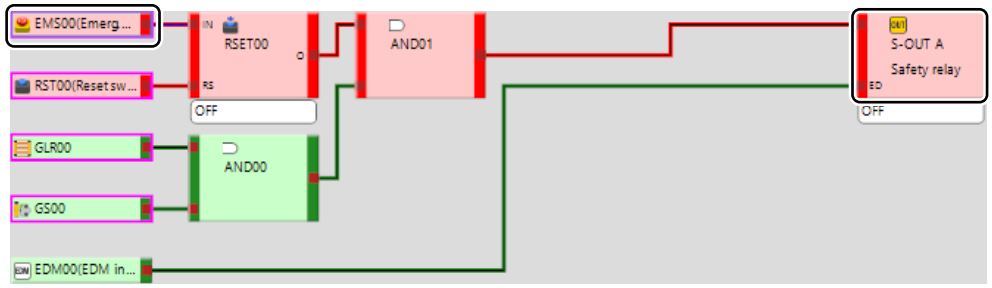
(Operation example)

1 **Click the "emergency stop switch" input block.**

When clicked, the "emergency stop switch" input block changes from ON to OFF.



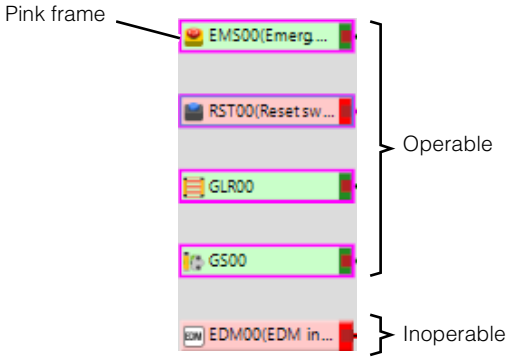
2 **The program changes, turning OFF the "S-OUT" output block.**



■ Operable input blocks

You can operate the input status in a simulation only for input blocks.

Input blocks framed in pink are operable.



Reference

Some input blocks such as "System information", "GS closed state" and "Always ON" cannot be operated in a simulation.

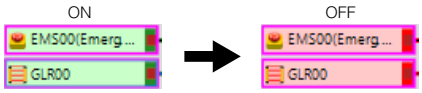
■ ON/OFF state change by clicking

Every time you click an input block, the state toggles between ON and OFF.

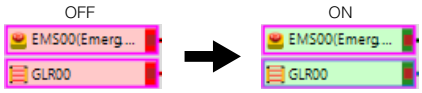
However, when operating a "reset switch", one click changes the state from OFF to ON to OFF.

● Input blocks other than a "reset switch" input block

Clicking when the state is ON changes the status from ON to OFF.

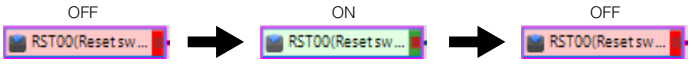


Clicking when the state is OFF changes the status from OFF to ON.



● "Reset switch" input block

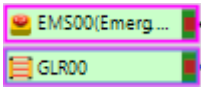
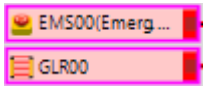
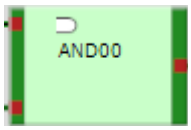
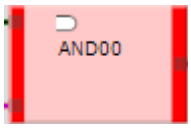
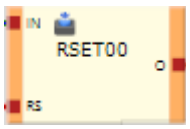
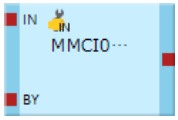
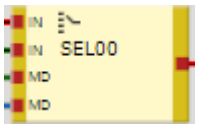
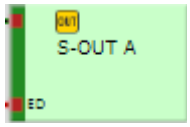
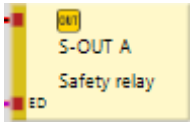
One click changes the status from OFF to ON to OFF.



Reference When you unselect [Enable auto-OFF] from the right-click menu, the behavior changes so that each click toggles the block between ON and OFF like other input blocks.

■ Block states and display colors

The following table shows the states and display colors of input blocks, output blocks, and function blocks.

State	ON	OFF	Standby*	Suspended	Error
Display color	Green	Red	Orange	Blue	Yellow
Input block					
Precautions for using the function block					
Output block					

Standby

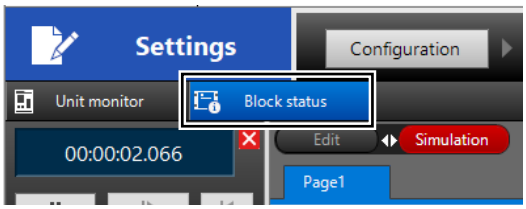
When a "reset" function block is waiting for a reset input or an "ON-delay" function block is within its ON-delay time, the background color is orange as the block is on standby.

Precautions for using the function blocks	Standby
Reset, Reset (with AND)	Waiting for reset input
Dual reset	Waiting for reset input
Existence detection reset	Waiting for reset input
Control guard	Waiting for reset input
Master ON	Waiting for reset input
PSDI	Waiting for reset input

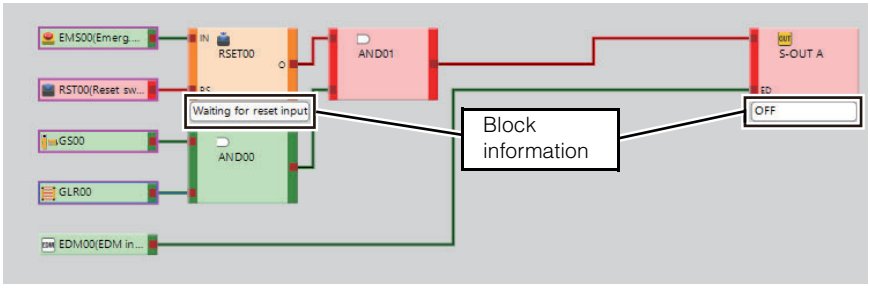
Precautions for using the function blocks	Standby
Manual mode control (MMC)	Waiting for restart input
Mode changing control	Waiting for error recovery
ON-delay	During ON-delay

Block status

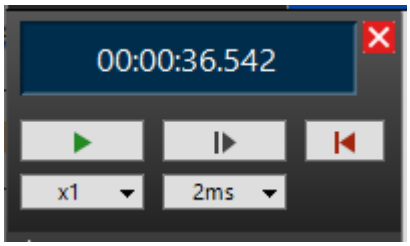
You can display the states of the function blocks and input/output blocks on the program screen.
To display the block status, click the [Block status] button.

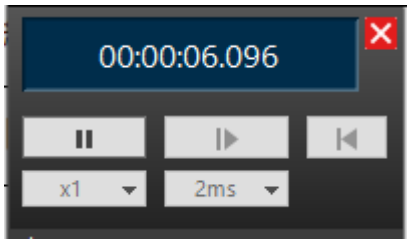


(Image)



Operation panel



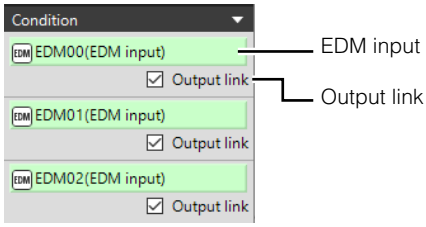


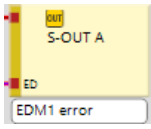
Item	Details
Elapsed time	Displays the elapsed simulation execution time. (hh:mm:ss:ttt, Maximum: 36:00:00:000)
▶ ⏸	Executes or pauses the continuous scan for the simulation.
⏮	Resets the elapsed time.
⏭	Performs the step execution at the interval specified as "step interval".
2ms ▾	Set the step execution interval. (Setting range: 2 ms/10 ms/100 ms/1 s/10 s/30 s)
x1 ▾	Set the simulation play interval. (Setting range: x0.01/x0.1/x1/x2/x5/x20)

Item	Details
	Exits the simulation and returns to edit mode.

Condition window

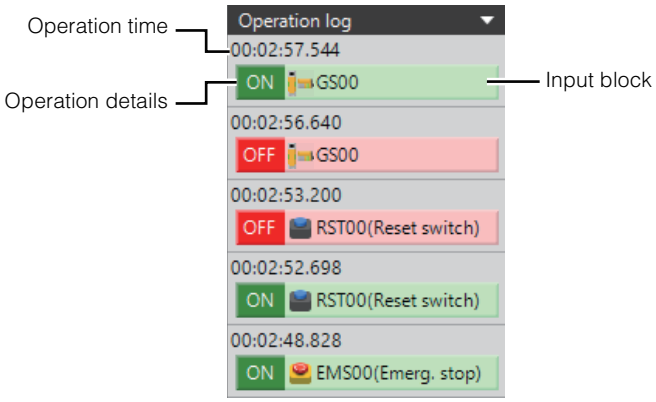
You can simulate the EDM input status when using the EDM input.



Item	Details
Output link	When this check box is selected, the EDM input block starts linking with the S-OUT that is set to use the EDM input. The output link operation is in reverse order of the ON/OFF operation of the S-OUT block. When this check box is unselected, the ON/OFF state of the EDM input block can be changed by clicking. If the EDM input operation is incorrect in a simulation, an EDM error occurs at the S-OUT block. EDM error 

Operation log

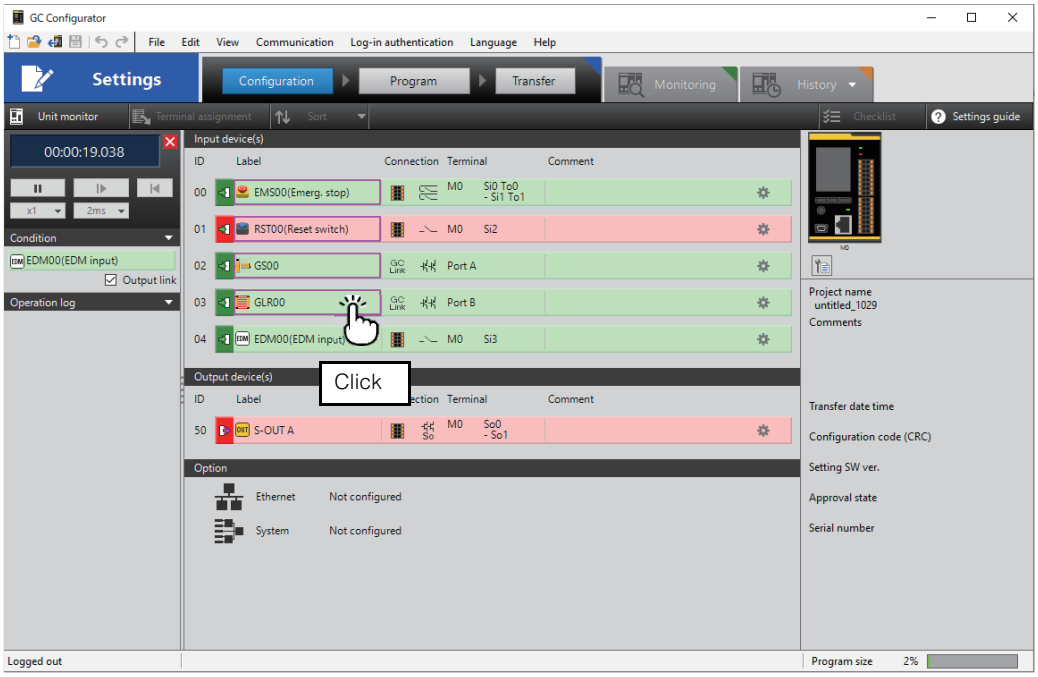
The input block operations (ON/OFF switching) can be recorded in a simulation. (Maximum: 50)



Item	Details
Operation time	Displays the elapsed operation time of the simulation.
Operation details	Displays the details of the operation. ON: The input block was changed from OFF to ON. OFF: The input block was changed from ON to OFF.
Input block	Displays the operated input block.

Configuration screen

You can perform a simulation by operating the input devices on the configuration screen.



Reference

Like the program screen, you can operate the input status in a simulation only for the input blocks. The input blocks framed in pink are operable.

MEMO

12

GC Configurator [Settings] - Transfer

This chapter describes the procedure for transferring a project and the log-in authentication in the GC Configurator.

12-1 Log-in Authentication ..... page 12-2
12-2 Transfer ..... page 12-5

12-1 Log-in Authentication

To transfer the settings to the GC Series main controller, connect the PC to the GC Series main controller and log in to the controller.

Point

Be sure to connect the PC to the GC Series via USB or Ethernet before login.
"Communication settings" (page 8-3)

Log-in privileges

Access to the GC Series can be restricted through the use of passwords in order to prevent unauthorized changes. There are restrictions on access to some functions depending on the log-in privileges, and you can configure a password for each of the log-in privileges.

Log-in privilege types and accessible functions

The following table shows the log-in privilege types and accessible functions.

Item	Page	Privilege Types		
		Responsible personnel	Maintenance personnel	Operator
Read out the settings from the GC main controller	8-12	O	O	O
Monitor the GC main controller	13-1	O	O	O
Read out the history from the GC main controller	14-1	O	O	O
Switch the GC main controller operation between RUN and STOP	8-12	O	O	-
Restart the GC main controller	8-12	O	O	-
Transfer the approved settings	12-7	O	O	-
Transfer the unapproved settings	12-7	O	-	-
Run the forced input during monitoring	13-14	O	-	-
Initialize the GC main controller	8-12	O	-	-
Clear the history of the GC main controller	8-12	O	-	-
Clear the error history of the GC main controller	13-13	O	-	-
Change the password	12-3	O	-	-

Point

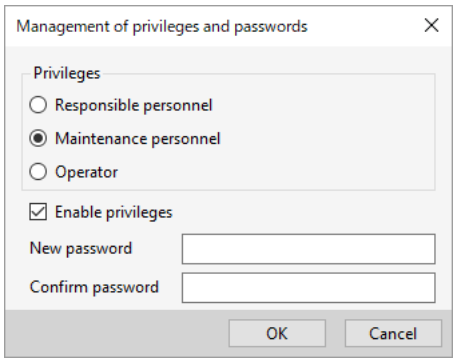
- **Only the "responsible personnel" privileges can be used by default.**
- **The user must manually configure the "maintenance personnel" and " operator" privileges.**
  "How to set the log-in privileges"
- **The default "responsible personnel" password is "1111".**
- **There are no set default "maintenance personnel" and "operator" passwords.**
  You need to log in as the "responsible personnel" to reset the password.
- **The "maintenance personnel" privileges can only transfer the settings that have been approved by the "responsible personnel".**
- **If the settings approved by the "responsible personnel" are saved to a file, the "maintenance personnel" can open the file and transfer the settings. However, if the "maintenance personnel" modifies the settings, then those settings cannot be transferred.**
- **The following operations are possible even without log-in privileges:**
  - **Saving, reading, and viewing the configuration file (project)***
  - **Viewing and saving the GC main controller error list and error history***
  - **Saving the GC main controller history file***
  - **Viewing the unit monitor**
  - **Reading out the unit configuration, and GS and GL-R configuration information**

  *** When the "operator" privileges are granted, the "operator" or higher privileges are required.**

Management of the log-in privileges and passwords

This section describes how to add the "maintenance personnel" and "operator" privileges and how to set the password.

1 **From the menu, select [Log-in authentication] > [Management of privileges and passwords].**
The [Management of privileges and passwords] dialog box appears.



Item	Details
Privileges	Select the privileges to configure the privileges and password settings.
Enable privileges	Displayed only when "maintenance personnel" or "operator" is selected. With the check box checked, the respective privileges are enabled.
New password	Enter a new password. (Maximum: 16 characters. Allowable characters are only single-byte alphanumeric characters and hyphens (-).)
Confirm password	Enter the new password (for confirmation).

Important

If you forget the password, you cannot change the safety control settings. Keep the password in a safe place.
"If you forget the password"

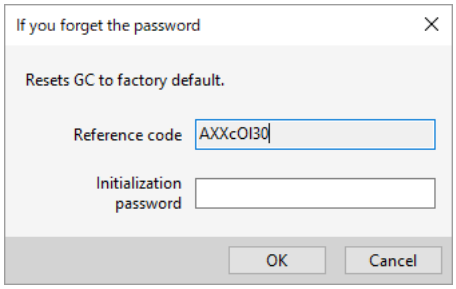
Point

- **The default "responsible personnel" password is "1111".**
- **There are no set default "maintenance personnel" and "operator" passwords. You need to log in as the "responsible personnel" to set the password.**

If you forget the password

When you enter the initialization password, the password is reset to the default setting.

1 **From the menu, select [Log-in authentication] > [If you forget the password].**

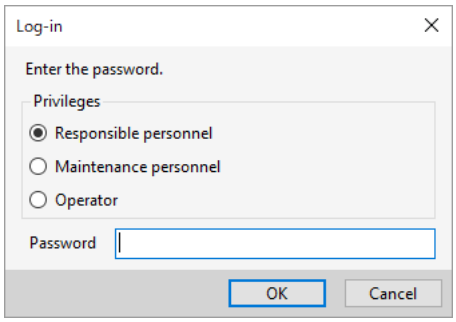


Item	Details
Reference code	The code necessary to reset the password. Contact your nearest KEYENCE office with this code to receive an initialization password.
Initialization password	Enter the initialization password.

Log-in

1 From the menu, select [Log-in authentication] > [Log-in].

The [Log-in] dialog box appears.



Item	Details
Privileges	Select the log-in privileges.
Password	Enter the password set for the privileges.

Log out

1 From the menu, select [Log-in authentication] > [Log out].

When you are logged out, the log in status at the lower left of the screen changes to "Log out".

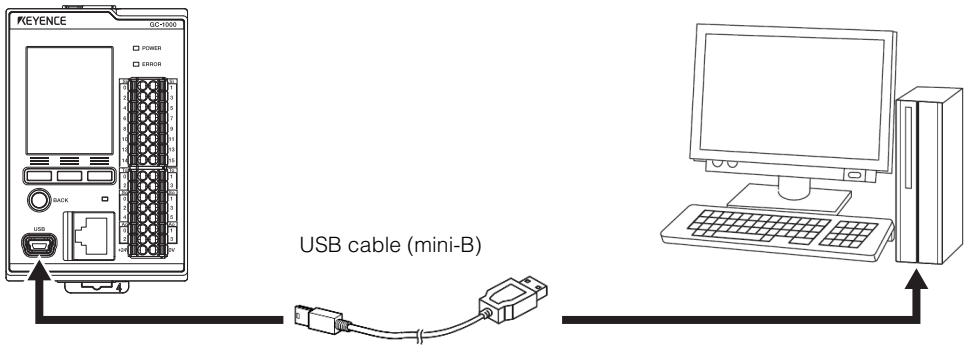
12-2 Transfer

Point

- **To transfer the settings to the GC Series main controller, you need to connect the PC to the GC Series main controller and log in to the unit.**
  "12-1 Log-in Authentication" (page 12-2)
- **If the unit configuration set in [Unit settings] is different from that of the GC Series main controller, you can transfer the settings, but an error will occur in the GC Series main controller after the transfer.**

Connecting the PC to the GC Series

Connecting to a USB port

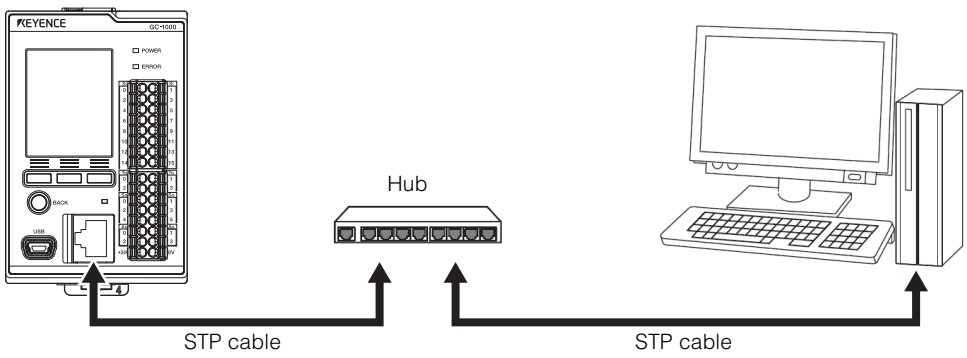


Reference

- OP-51580 (2 m-USB cable) and OP-86941 (5 m-USB cable) can be used.
- The ground of USB port is electrically-connected to the "0V" of power supply terminal.

Connecting to an Ethernet port

Configure the communication settings before transfer.
"Communication settings"



Point

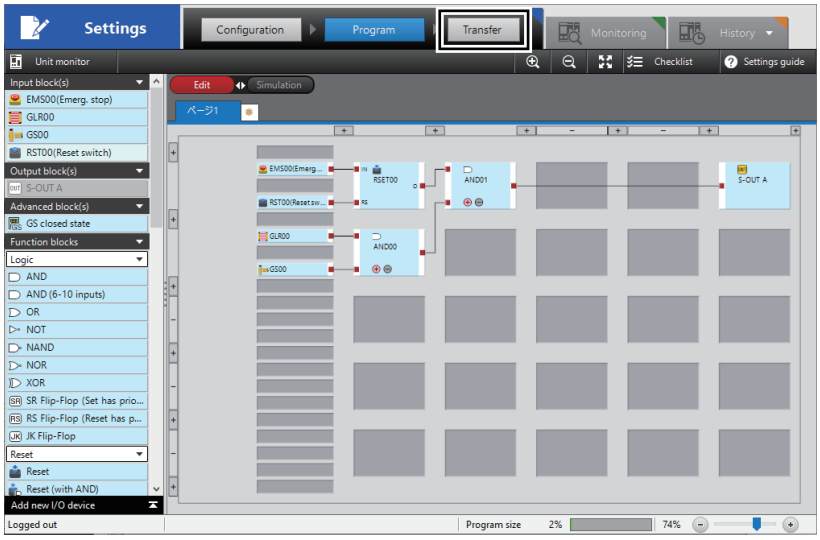
- **Ethernet connection is available only for the GC-1000.**
- **The IP address of the GC-1000 is not assigned as the factory default, so use one of the following methods to assign the IP address:**
  - **Use the IP Setting Tool to assign the IP address.**
  - **Use the BOOTP/DHCP server to assign the IP address.**
  - **Transfer the settings via USB connection in advance.**
- **Both a straight cable or cross cable can be used since the GC-1000 Ethernet port supports AutoMDIX.**

Transfer

Point

- **Only the "responsible personnel" privileges can be used by default.**
- **Only the "responsible personnel" privileges can approve unapproved settings and transfer them to the GC Series main controller.**
- **When settings are transferred to the GC Series main controller and approved with the "responsible personnel" privileges, the file is handled as approved file. With the "maintenance personnel" privileges, only the approved files can be transferred to the GC Series.**
- **When a part of approved file is edited, the file will return to the unapproved state.**
- **The default "responsible personnel" password is "1111".**

1 Click [Settings] > [Transfer] in the mode changing bar.
Alternatively, select [Communication] > [Transfer settings to GC] from the menu.

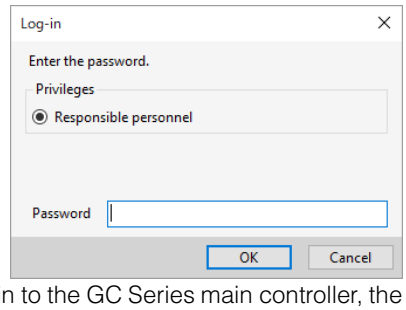


The [Check] dialog box appears. When you click the [OK] button, the [Log-in] dialog box appears.

Point

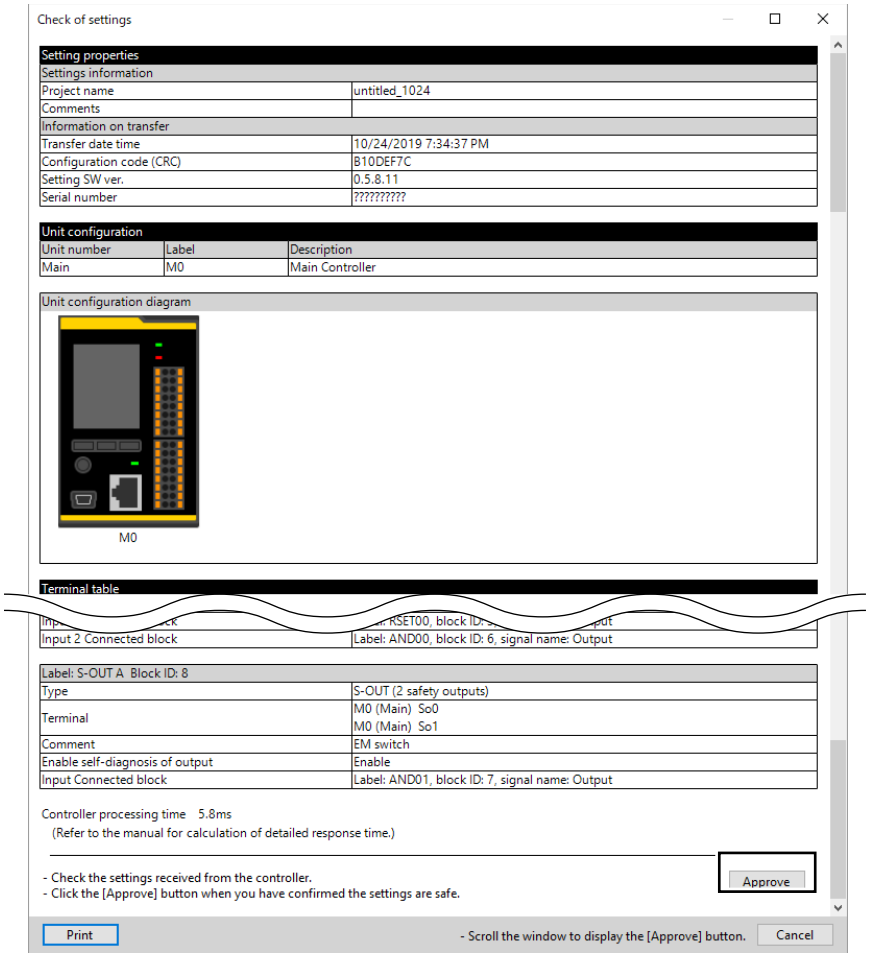
- **If the settings cannot be transferred due to a setting error, the "Checklist" appears. Review the error details and correct the error.**
- **Once the settings are transferred, the history data in the GC Series main controller is discarded. Select [Communication] > [Read out history from GC] from the menu as necessary to load and save the history data.**
  "Reading Out the History Data" (page 14-6)

2 Enter the password and click the [OK] button.



When you communicate with and log in to the GC Series main controller, the first page of the [Check of settings] dialog box appears.

3 **Scroll the scroll bar down to the bottom and review all of the settings. If there are no problems with the settings, click the [Approve] button.**

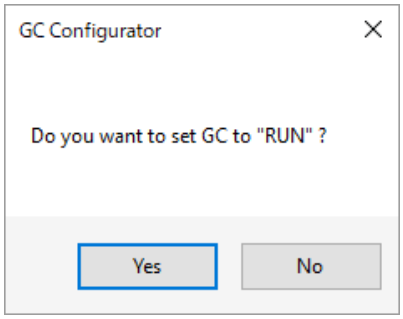


Point

Make sure that all of the settings to be transferred are correct before clicking the [Approve] button. If any unintended settings are displayed, click the [Cancel] button.

4 **Set the GC Series main controller to "RUN".**

The GC Series starts operation according to the transferred settings. The GC Configurator enters monitoring mode.



MEMO

13

GC Configurator [Monitoring]

This chapter describes how to monitor in the GC Configurator.

13-1 Monitoring Function.....page 13-2
13-2 Names and Functions on the Monitoring Screen.....page 13-3
13-3 How to Check the Monitor.....page 13-5
13-4 Responsible Function (Forced Input).....page 13-14

13-1 Monitoring Function

Overview of the Monitoring Function

Monitoring refers to transferring a project created in the GC Configurator to the GC Series main controller and verifying the operation by running the program. You can also load a project from the GC Series main controller currently connected and verify the project operation.
With this function, you can perform the following:

- Verify the program operation in real-time on the program screen.
- Check the alert and error status of the GC Series main controller.
- Monitor the ON/OFF states of the input/output devices.
- Monitor the ON/OFF states of the input/output devices in a timing chart.
- Change the operation mode of the GC Series main controller.
- Run a forced input (ON/OFF) for an input block.

Functions Available in the Monitoring Function

Program monitor

The program monitor allows you to monitor the execution status on the program screen. You can check the execution status of the input blocks, the function blocks, and the output blocks in real-time.
For details, refer to "Program Monitor" (page 13-5).

Timing chart

The timing chart allows you to check the ON/OFF states of the input blocks, the function blocks, and the output blocks in a timing chart form.
For details, refer to "Timing Chart" (page 13-6).

Block status

The block status allows you to display and monitor the information of the function blocks and the output blocks on the program screen.
You can monitor the status of blocks in real-time.
For details, refer to "Block Status" (page 13-8).

Unit monitor

The unit monitor allows you to monitor the terminal ON/OFF states of the main controller, expansion units, and remote I/O modules and the status of KEYENCE safety sensors connected to GC-Link ports.
For details, refer to "Unit Monitor" (page 13-9).

Status panel

The status panel allows you to check the operation mode, the operation time, and the error status of the GC Series main controller.
For details, refer to "Status panel".

Responsible function (forced input)

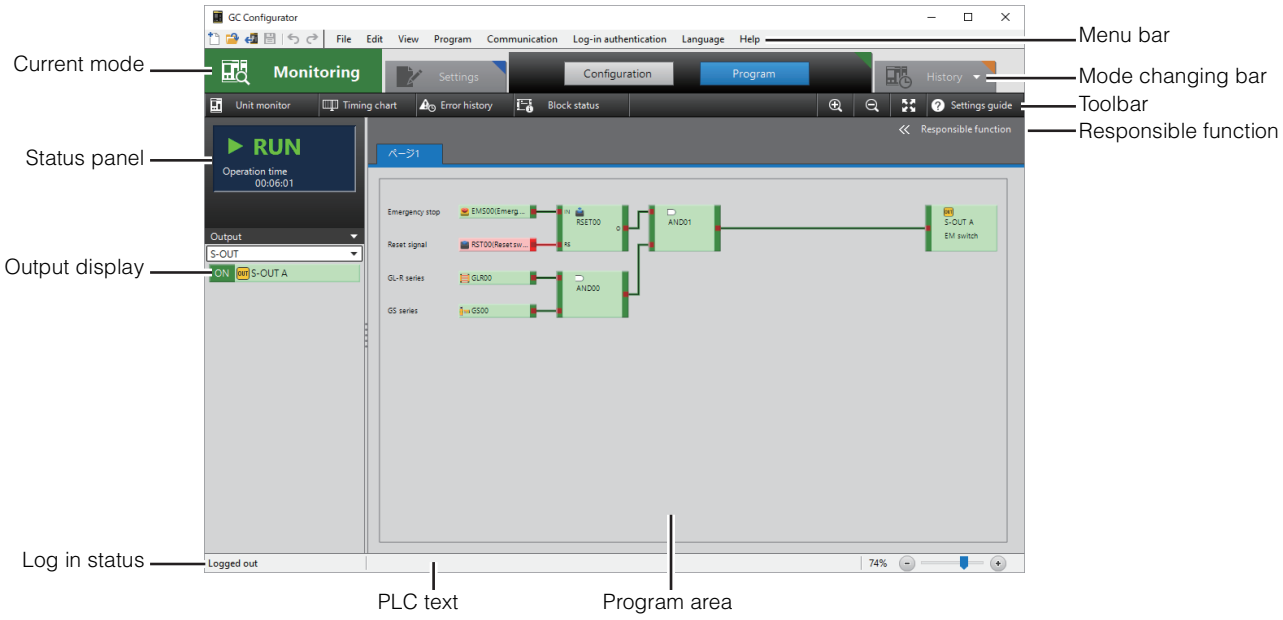
The responsible function (forced input) allows you to run a forced input (ON/OFF) for an input block through the PC.
For details, refer to "13-4 Responsible Function (Forced Input)" (page 13-14).

Error history

The error history allows you to display errors that occurred in the GC Series main controller in order from the newest to oldest.
For details, refer to "Error History" (page 13-13).

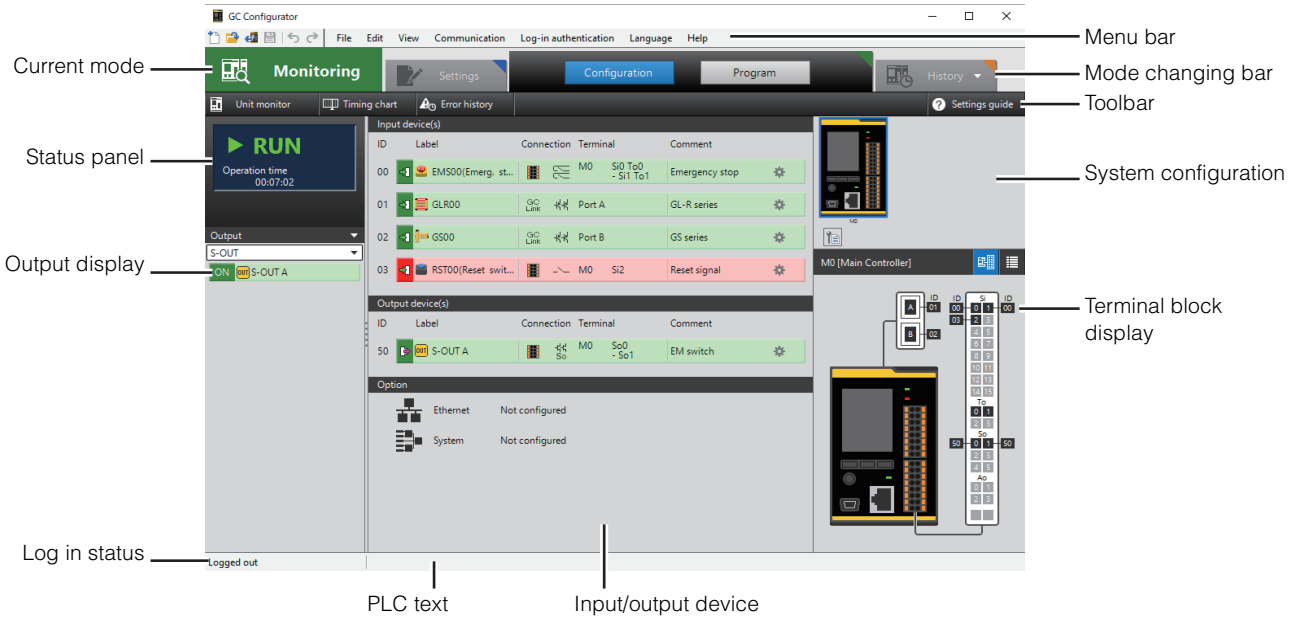
13-2 Names and Functions on the Monitoring Screen

[Monitoring] - Program



Item	Details
Current mode	Displays the current operation mode.
Menu bar	Menu items. Displays the menu which executes each function. "8-3 Menu" (page 8-6)
Mode changing bar	Changes the operation mode and the screen mode.
Toolbar	Displays each function window.
Responsible function	Displays the responsible function (forced input).
Status panel	Displays the operating state, the operation time, and the error state of the GC Series main controller.
Output display	Displays the output status.
Log in status	Displays the current login status.
Program area	Displays the program execution status.
PLC text	Displays the PLC text written from the PLC via Ethernet communication.

[Monitoring] - Configuration

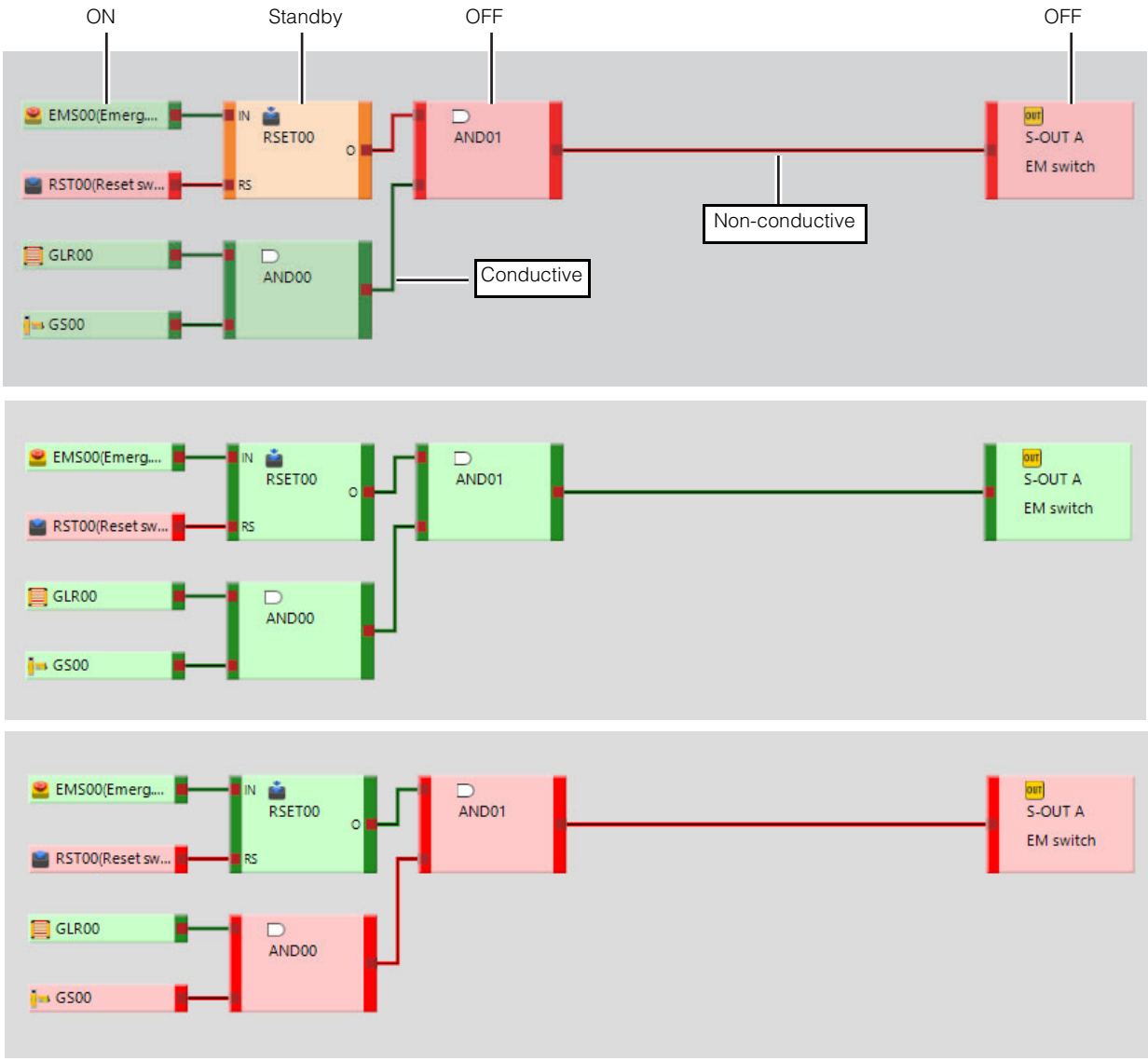


Item	Details
Current mode	Displays the current operation mode.
Menu bar	Menu items. Displays the menu which executes each function. "8-3 Menu" (page 8-6)
Mode changing bar	Changes the operation mode and the screen mode.
Toolbar	Displays each function window.
System configuration	Displays the current system configuration.
Terminal block display	Displays the assignment of the registered input/output devices to the terminal blocks.
Status panel	Displays the operating state, the operation time, and the error state of the GC Series main controller.
Output display	Displays the output status.
Log in status	Displays the current login status.
Input/output device	Displays the ON/OFF states of the registered input/output devices.
PLC text	Displays the PLC text written from the PLC via Ethernet communication.

13-3 How to Check the Monitor

Program Monitor

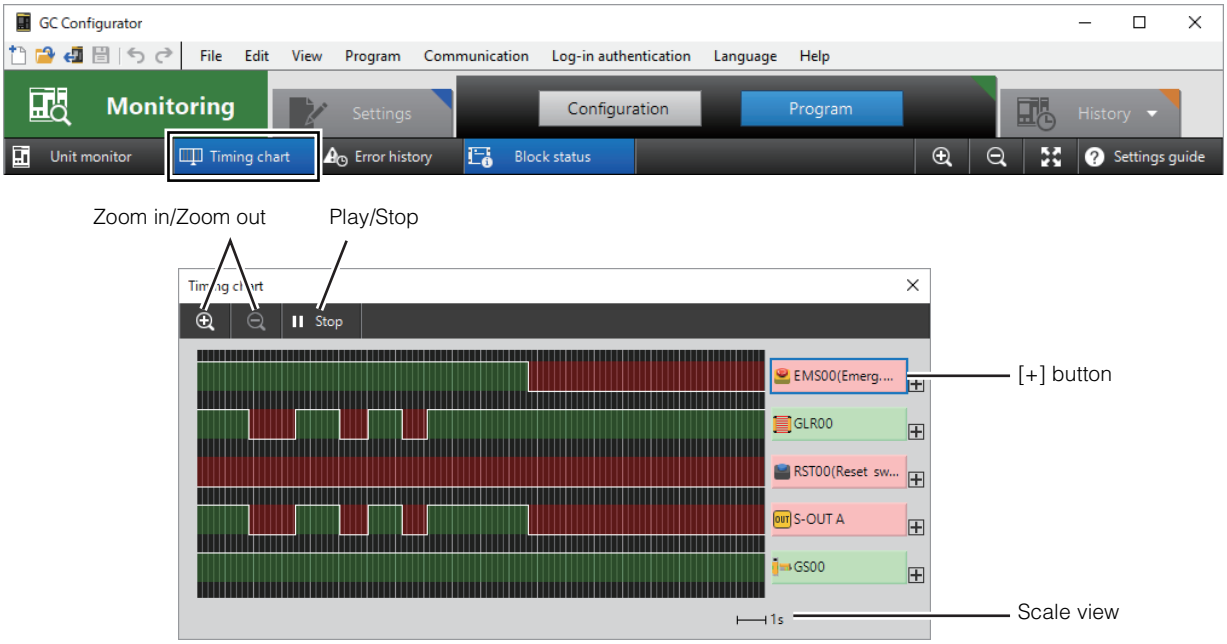
The program monitor allows you to check the ON/OFF state of each block and the conductive/non-conductive state of the wiring connections.



Item	Display color	State
Block	Green	ON
	Red	OFF
	Orange	Standby
	Blue	Muted
	Yellow	Error (OFF)
Connected wire	Green	Conductive
	Red	Non-conductive

Timing Chart

You can check the ON/OFF state of each block in a timing chart form. Clicking [Timing chart] displays a pop-up screen.

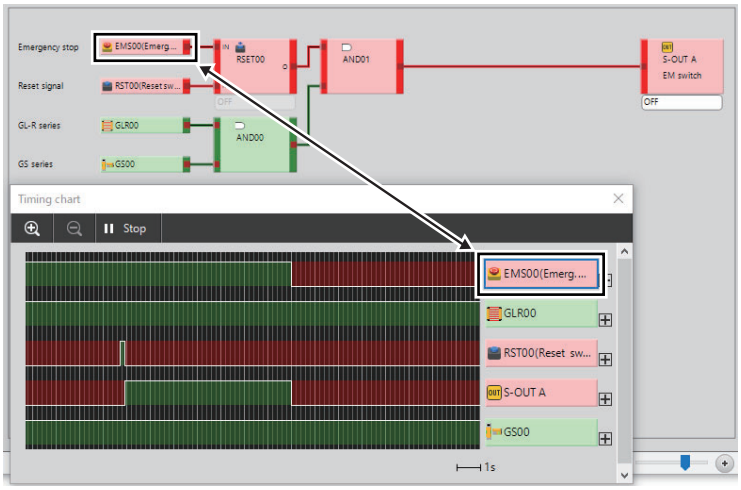


Item	Details
Zoom in/Zoom out	Zooms in or out on the time axis.
Play/Stop	Plays or stops the timing chart view.
[+] button*	Adds a detailed signal if it is available for the block when clicked.
Scale view	Displays the current time scale.

* This cannot be set when the program mode is "EASY mode".

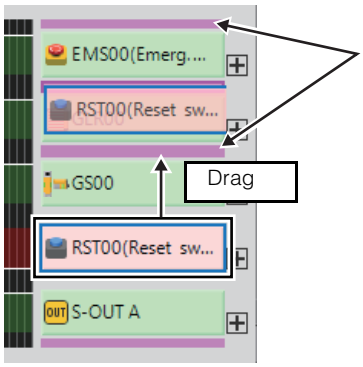
Selecting a block

When you select a block, the block is focused.



Moving a block

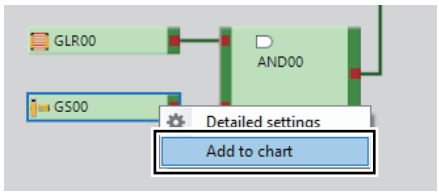
You can change the block order. To change the order, select a block and drag it.



Areas to which a block can be moved are displayed in pink.

Adding and deleting a block

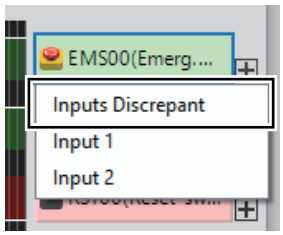
To add a block to the timing chart, select and right-click it and click [Add to chart].



To delete a block from the timing chart, right-click the block on the timing chart and select [Delete].

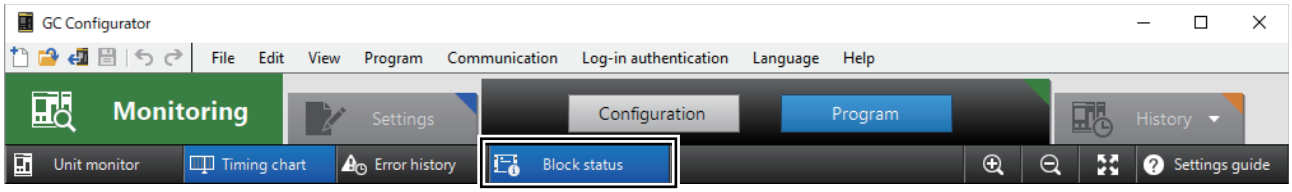
Adding a detailed signal

When detailed signals are available for a block, you can click the [+] button next to the signal block and add the target signal to the timing chart.

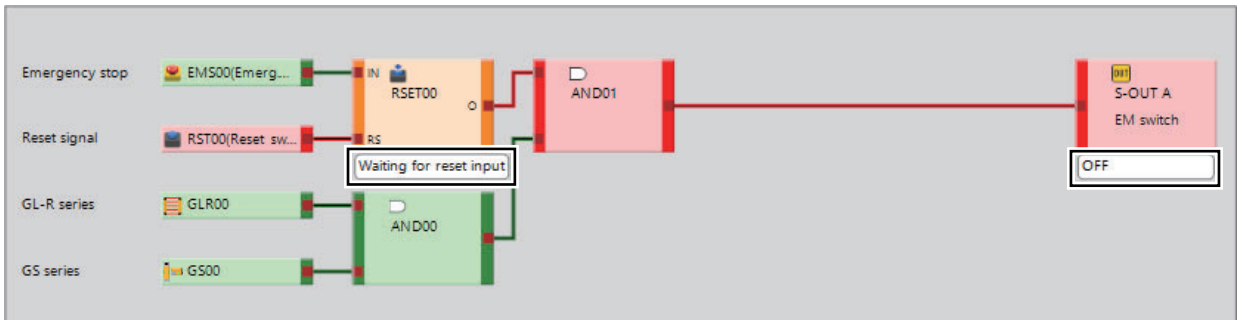


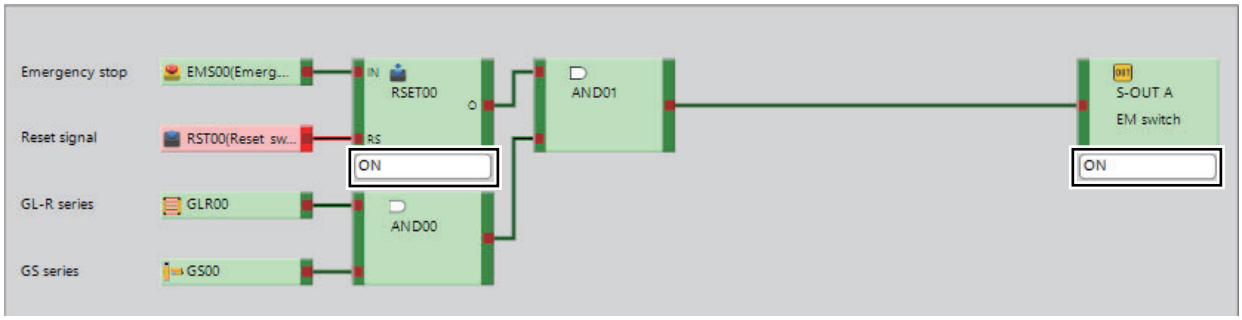
Block Status

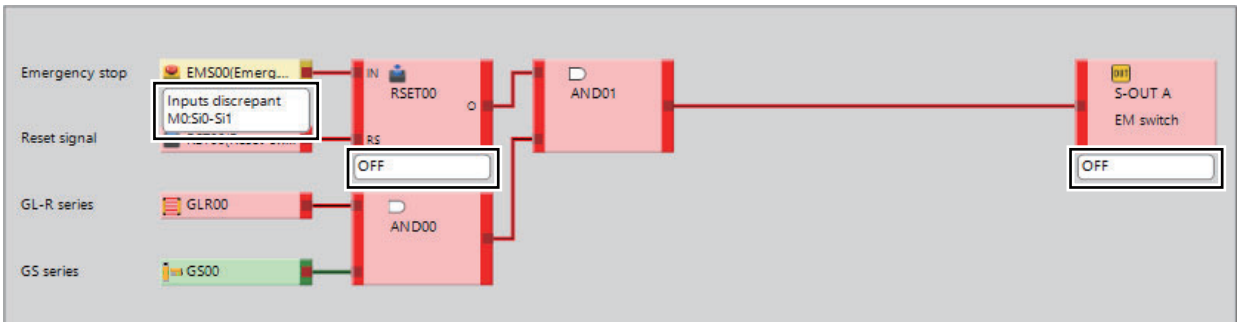
You can display and monitor the status of the function blocks and the input/output blocks on the program screen.
To display the block status, click the [Block status] button.



(Image)

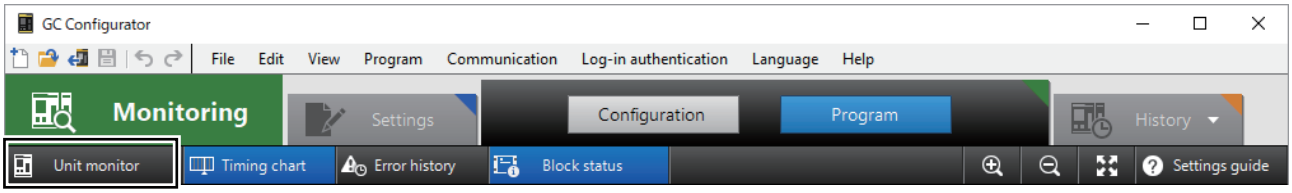






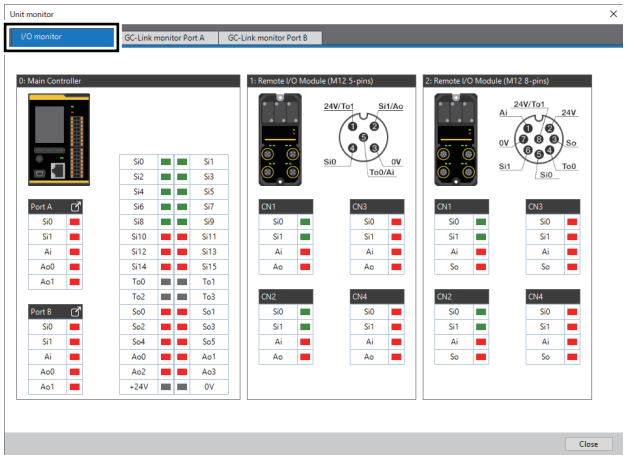
Unit Monitor

You can also monitor the ON/OFF states of terminals and the statuses of sensors connected to the GC-Link ports. Clicking [Unit monitor] displays a pop-up screen.

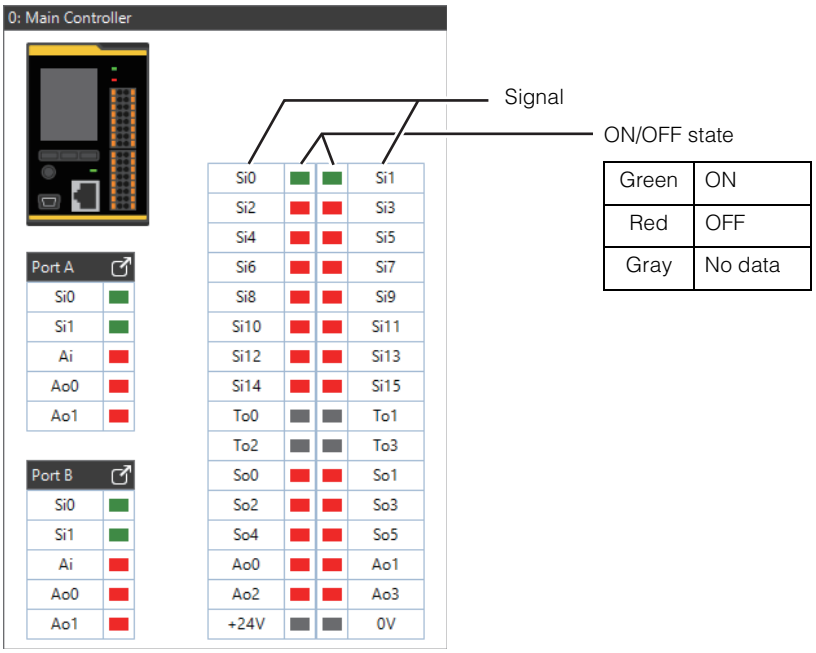


I/O monitor

The I/O monitor allows you to monitor the terminal status of the main controller, expansion unit(s), and remote I/O module(s).



Reference Only the connected units are displayed.



Green	ON
Red	OFF
Gray	No data

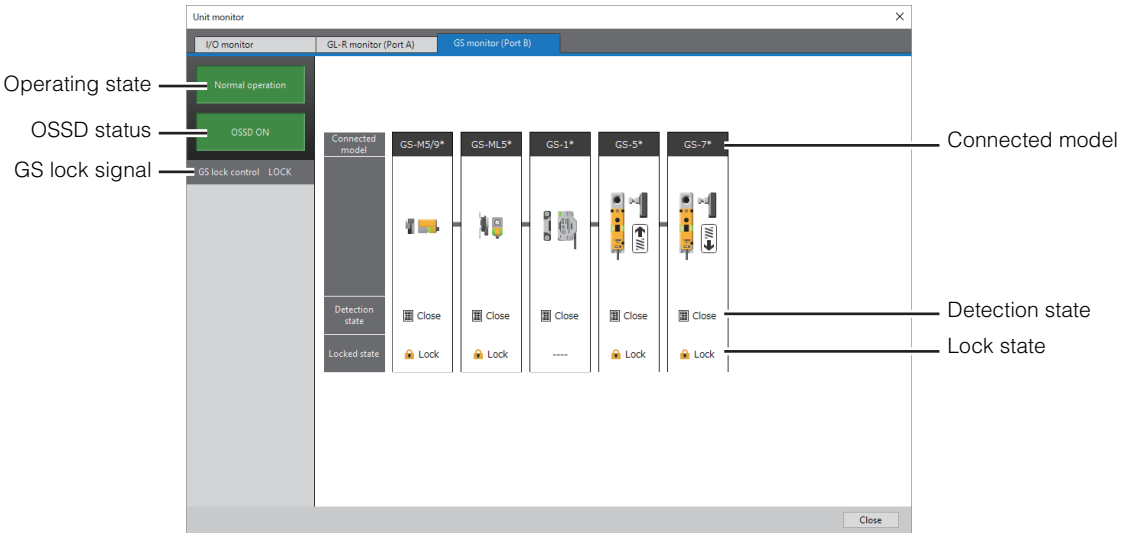
GC-Link monitor (Port A/Port B)

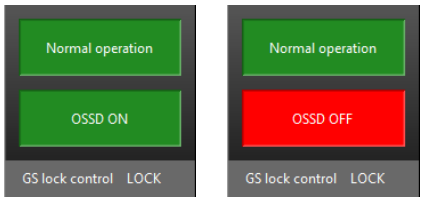
You can monitor the status of the GS Series and GL-R Series connected to GC-Link ports.

Point

GC-Link monitor is only available for the GS Series and GL-R Series.
If any other device is connected to a GC-Link port, only the input/output statuses can be monitored.

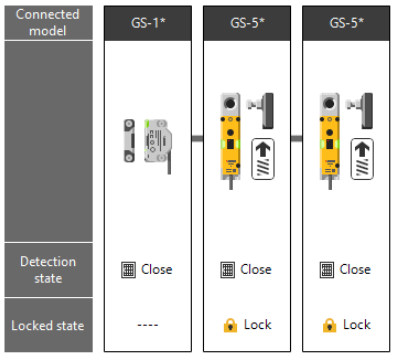
■ GS Series monitor





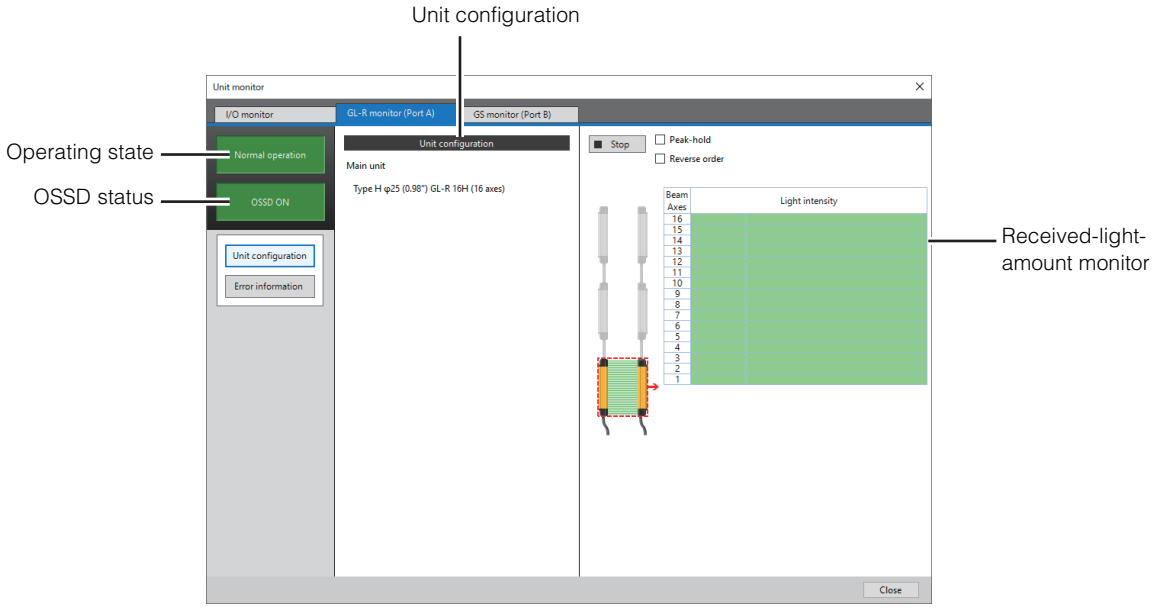
Item	Details
Operating state	Displays the operating state. Green: Normal operation
OSSD status	Displays the OSSD status. Green: OSSD ON Red: OSSD OFF
GS lock signal	Displays the GS unlock output state. LOCK: Unlock output OFF UNLOCK: Unlock output ON

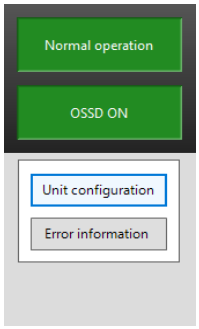
You can check the status of each GS Series unit connected.



Item	Details
Connected model	Displays the model name. (GS-M5/9*, GS-ML5*, GS-1*, GS-5*, GS-7*)
Detection state	Displays the detection state. Closed: An actuator is detected. Open: No actuator is detected.
Lock state	Displays the lock state of the GS Series. Locked: The unit is locked. Unlocked: The unit is unlocked.

■ GL-R monitor

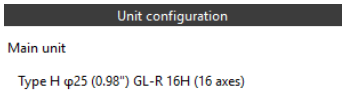


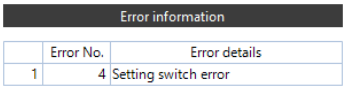


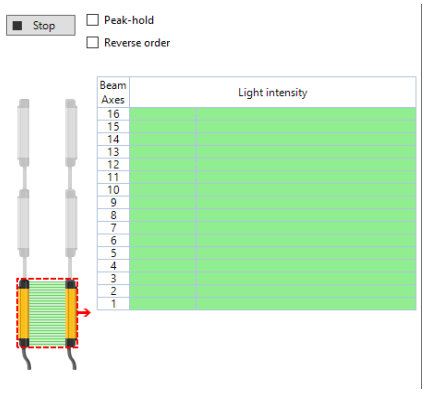
Item	Details
Operating state	Displays the operating state. Green: Normal operation/Normal operation (Received light amount decreases)/Normal operation (Unstable clear)*1 Red: Error
OSSD status	Displays the OSSD status. Green: OSSD ON Red: OSSD OFF
Unit configuration	Changes to the GL-R monitor (configuration display).
Error information	Changes to the GL-R monitor (error information).

*1 Normal operation (Received light amount decreases): Displayed when the conditions for received-light-amount decrease alert set in the GC Series main controller are met.
Normal operation (Unstable clear): Displayed when the received-light-amount of the GL-R is unstable. For example, when at least one of multiple optical axes remains unstable for at least five seconds.

Item	Details
Unit configuration	Displays the models of the main controller, sub unit 1, and sub unit 2.
Error information	Displays the error information.



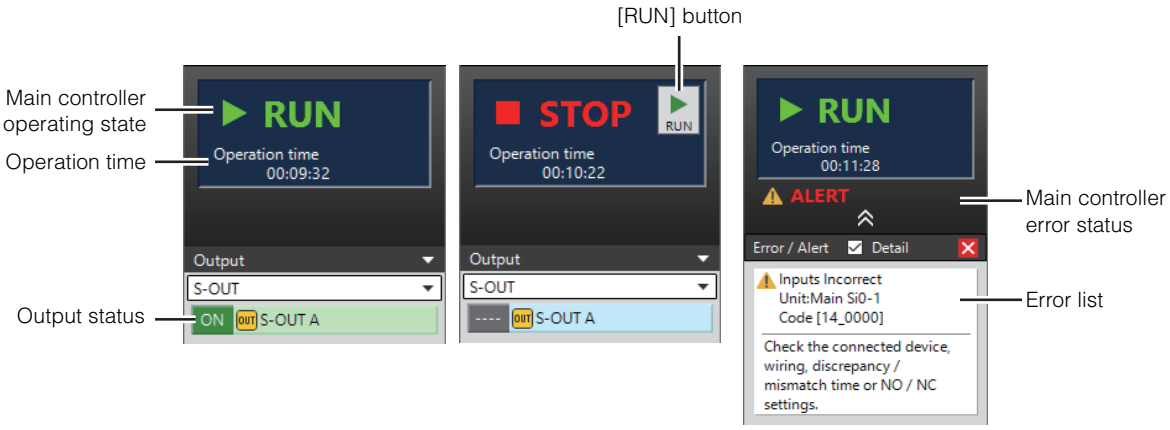




Item	Details
Stop/Start	Stops or starts the received-light-amount monitor.
Peak-hold	Displays a (red) line that indicates the peak value of the received-light-amount when selected.
Reverse order	Reverses the unit display and the beam axis order.

Status Panel

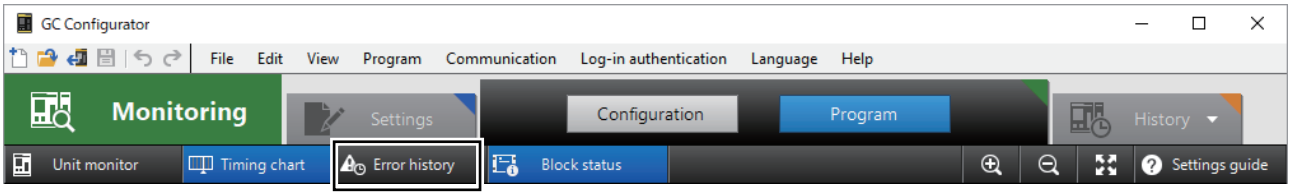
The status panel displays the operating state, the operation time, and the error state of the GC Series main controller.

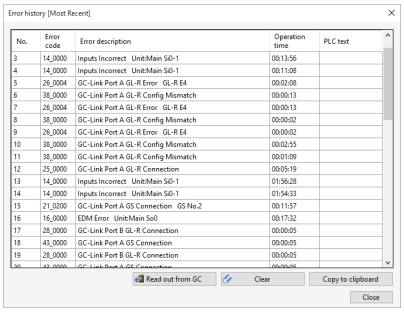


Item	Details
Main controller operating state	Displays the operating state of the GC Series main controller. RUN (green): The GC main controller is running. STOP (red): The GC main controller is stopped. OFFLINE (white): The PC is not connected to the main controller.
Operation time	Displays the operation time elapsed since the start of the GC main controller. (hh: Hour, mm: Minute, ss: Second)
Output status	Displays the output status of the output device.
[RUN] button	Clicking the [RUN] button sets the GC main controller to run. This button is displayed only when the GC main controller is stopped.
Main controller error status	Displays the error/alert status of the main controller. : ERROR (red) : ALERT (red) : INFORMATION (white)
Error list	Displays any INFORMATION/ERRORS/ALERTS that are currently occurring.

Error History

Error history displays errors that occurred in the GC main controller in order from the newest to oldest.
Clicking [Error history] displays a pop-up screen.





Item	Details
Error code	Displays the code associated with the error.
Error cause	Displays the error description.
Operation time	Displays the operation time elapsed since the start of the GC main controller to when the error occurred.
PLC text	Displays the contents of the "PLC text" written from the PLC via communications.
Read out from GC	Reads out the error history from the GC main controller.
Clear	Clears the error history of the GC main controller.
Copy to clipboard	Saves the error history details to the clipboard.

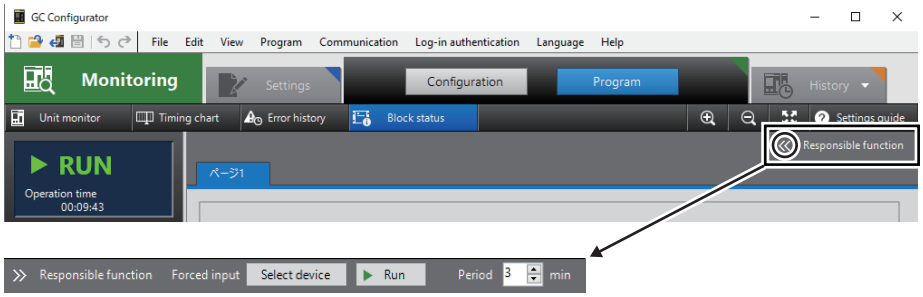
13-4 Responsible Function (Forced Input)

Responsible Function (Forced Input)

The responsible function (forced input) allows you to run a forced input (ON/OFF) for an input block through the PC.
This is used to verify the program operation by forcibly turning ON/OFF an unconnected input device or inoperable device when starting up the machine.

DANGER	**The forced input function changes the signal state of an input device in the GC Configurator through the PC operation to differentiate from that of the actual input device. Therefore, the safety manager must perform a risk assessment in order to appropriately determine the risk of a forced input.**

Point **Only responsible personnel can run a forced input. You need to log in as the responsible personnel.**

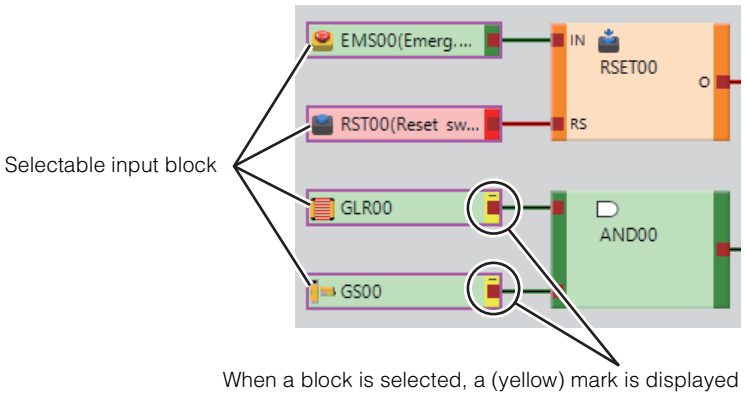


Item	Details
<<	Shows the responsible function.
>>	Hides the responsible function.
Select device	Makes input blocks selectable for a forced input when clicked. When you click the button again, the selection is finished, allowing you to run or stop the function.
Period	Set the forced input period. (1 to 20 (min))

Force input execution flow

1 **Click the [Select device] button.**
A dialog box appears. Click the [OK] button.

2 **Select an input block you want to forcibly turn ON/OFF.**
Selectable blocks are framed in pink.

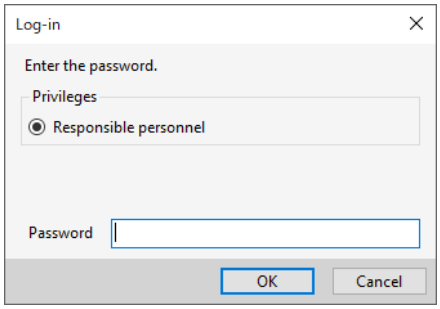


When a block is selected, a (yellow) mark is displayed on the right edge of the block.

3 **When you select the block, click the [Select device] button.**
A dialog box appears. Click the [OK] button.

4 **When you click the [Run] button, a dialog box appears.**
Click the [OK] button to close the dialog box.

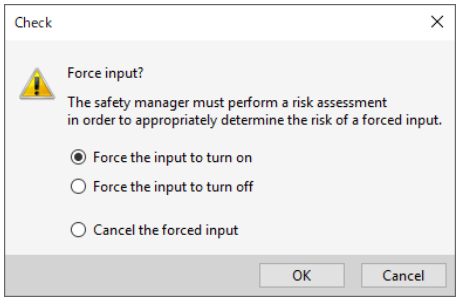
5 **On the [Log-in] dialog box, enter the password.**



Point

Only responsible personnel can run a forced input.
Log in as the responsible personnel.

6 **Click the input block you want to forcibly turn ON/OFF.**
When you select [Force the input to turn on.] or [Force the input to turn off.] and click the [OK] button, the block is forcibly turned ON/OFF.



Point

When [Period] reaches 0, the GC Series main controller is stopped.
The forced input run state is also reset.
To continue the forced input beyond [Period], click the [Reset] button and reset the period.

MEMO

14

GC Configurator [History]

This chapter describes how to check the history in the GC Configurator.

14-1 History Function ..... page 14-2
14-2 Area and Function Names on the History Screen ..... page 14-4
14-3 How to Check the History ..... page 14-6

14-1 History Function

Overview of the History Function

The history function stores the input/output block statuses before and after a specific change event and the execution timing of the event history trigger function blocks into the GC Series main controller. This helps the user investigate the cause of the change event after trouble occurs.
There are two history data types: "Full-time histories", which are stored in the volatile memory, and "event histories", which are stored in the non-volatile memory so that they are not erased even when the GC Series main controller is turned OFF.

Full-time histories

Full-time histories store the states of the change timing (ON -> OFF, OFF -> ON) of the input/output blocks and function blocks. Without any special settings required, the states of the change timing of all blocks can be stored. Full-time histories are stored in the volatile memory of the GC Series main controller, so you can check the change state by loading a specific history in the GC Configurator.

Point

- **Full-time histories are stored in the volatile memory of the GC Series main controller. Therefore, when the GC Series main controller is turned OFF, full-time histories data is erased. To prevent history data loss, read out the history data in the GC Configurator before turning OFF the GC Series main controller.**
- **Up to 100,000 full-time history data can be saved. However, this number varies depending on the program size. In the case of the maximum program size, up to 40,960 data can be saved. (If multiple blocks change during the same scan, they are counted as one save.)**

Event histories

Event history data are saved into the system memory (non-volatile memory) mounted on the GC Series main controller and not erased even when the GC Series main controller is turned OFF. Therefore, data are not erased even if the equipment is rebooted after a trouble occurs.
Event histories are saved at the following timings:

- States before and after an event history trigger function block is executed
- States before and after an S-OUT block remains OFF for 90 seconds and is then turned OFF

Based on the above timings, 31 block changes before and 8 block changes after an event occurs are stored. Check the saved data in the GC Configurator.

Point

- **For event history data, 31 block changes before and 8 block changes after an event are stored as one history. Up to 915 events can be saved. However, this number varies depending on the program size. In the case of the maximum program size, up to 121 events can be saved.**
- **If an interval between events to be saved as event histories is short, a "history data save alert" occurs, which may prevent the second event history from being saved. In such a case, change the trigger occurrence frequency. An event interval that causes a "history data save alert" varies depending on the program size (approximately 4 to 25 seconds).**
- **You can set whether or not to save the turning off of the S-OUT block (safety output) as an event history. (Default: Enabled) "Event history setting" (page 10-28)**

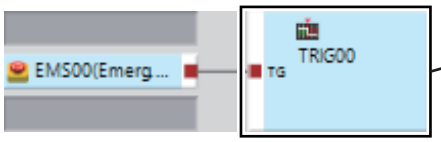
■ Event history trigger

By using an event history trigger function block, you can store the change of any block into the event history.

Connect a block you want to store into the event history to an event history trigger function block in the program.

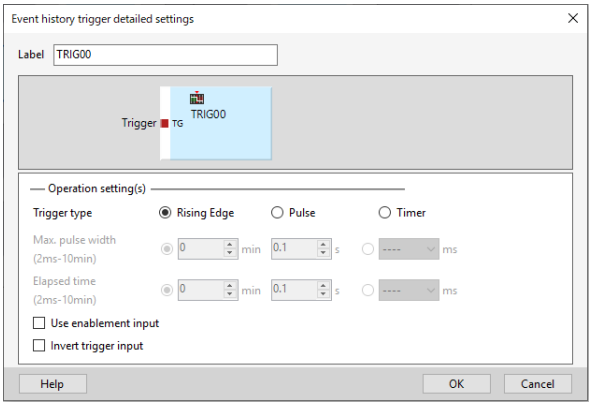
(Example: Store when the AND block changes.)

(Example: Store when the emergency stop input block changes.)



Event history trigger Function blocks

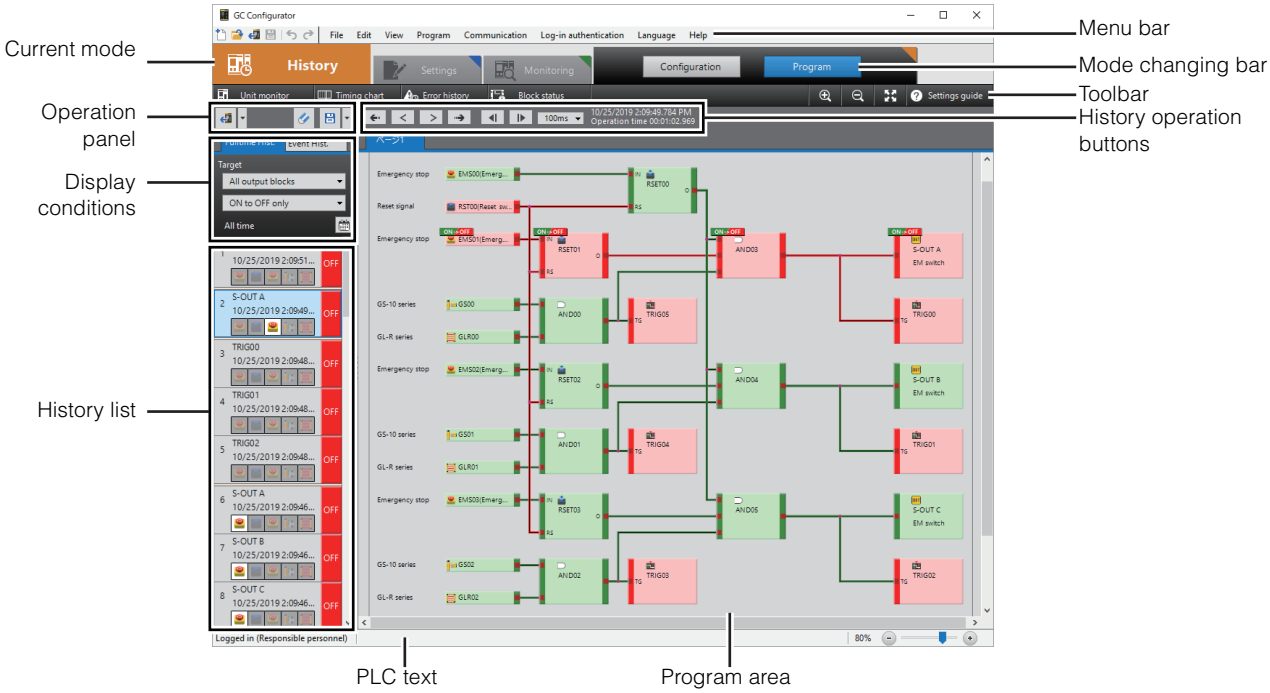
Event history trigger



Item	Details
Trigger type	Select the trigger type. [Rising Edge]: Detects the rising edge of the trigger signal and stores it as a history. [Pulse]: Stores a history if the ON width is within the time specified in [Max. pulse width] when the trigger signal changes from ON to OFF after it is turned ON. If the trigger signal remains ON for more than the specified time, it is not stored. [Timer]: Stores a history when the trigger signal remains ON for more than the time specified in [Elapsed time].
Max. pulse width	This item is available when [Pulse] is selected for the trigger type. Setting range: 2 ms to 10 min, Default: 100 ms
Elapsed time	This item is available when [Timer] is selected for the trigger type. Setting range: 2 ms to 10 min, Default: 100 ms
Use enablement input	Allows you to use an enablement input when selected. (Default: Disabled)
Invert trigger input	Inverts the trigger input signal logic when selected.

14-2 Area and Function Names on the History Screen

[History] - Program



Item	Details
Current mode	Displays the current operation mode.
Menu bar	Menu items. Displays the menu which executes each function. "8-3 Menu" (page 8-6)
Mode changing bar	Changes the operation mode and the screen mode.
Toolbar	Displays each function window.
History operation buttons	Use these buttons to change the history display screen.
Operation panel	Read out the history data from the GC main controller and clear or save it.
Display conditions	Set the conditions to display in the history list.
History list	Lists the histories.
Program area	Displays the program execution status when the selected history occurred.
PLC text	Displays the PLC text written from the PLC via Ethernet communication.

[History] - Configuration

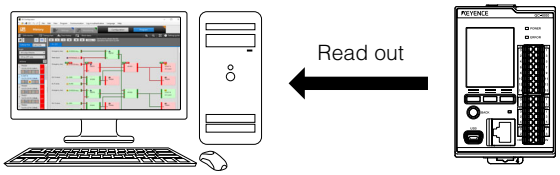
Item	Details
Current mode	Displays the current operation mode.
Menu bar	Menu items. Displays the menu which executes each function. "8-3 Menu" (page 8-6)
Mode changing bar	Changes the operation mode and the screen mode.
Toolbar	Displays each function window.
Operation panel	Read out the history data from the GC main controller and clear or save it.
Display conditions	Set the conditions to display in the history list.
History list	Lists the histories.
Input/output device	Displays the program execution status when the selected history occurred.
PLC text	Displays the PLC text written from the PLC via Ethernet communication.

14-3 How to Check the History

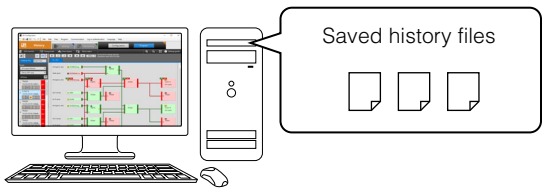
Reading Out the History Data

There are two methods to check the history data: Reading out the history data from the GC main controller or opening a saved history file.

<<Reading out from the GC main controller>>

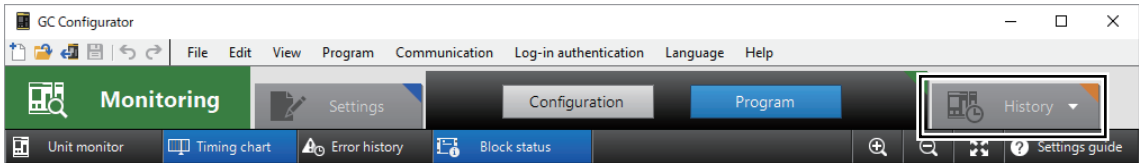


<<<Opening a saved history file>>



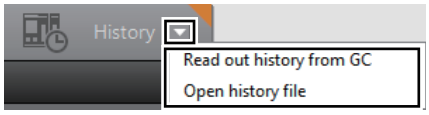
■ Click [History] in the mode changing bar.

When clicked, it reads out the history data from the GC Series.



■ Click [▼] in [History] on the mode changing bar.

- When [Read out history from GC] is selected, the history data is read out from the GC Series.
- When [Open history file] is selected, the current settings are closed, and you can open a saved history file in the [Open] dialog box.



■ From the menu, select [File] > [Open history file].

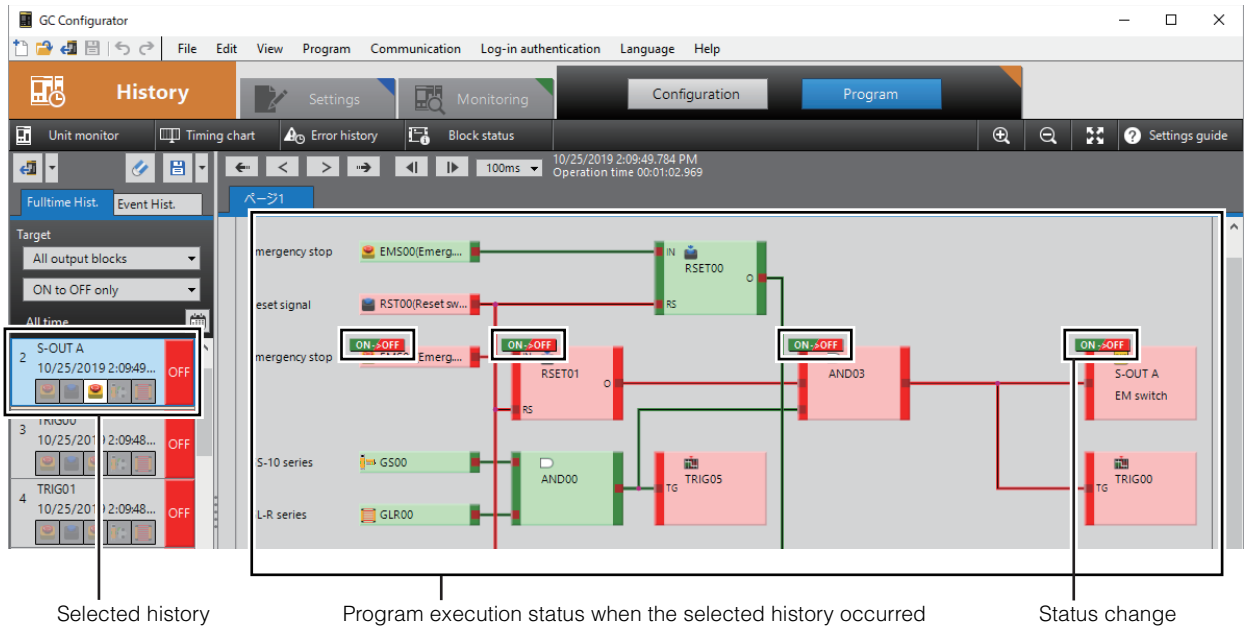
The current settings are closed, and you can open a saved history file in the [Open] dialog box.

■ From the menu, select [Communication] > [Read out history from GC].

The history data is read from the GC Series.

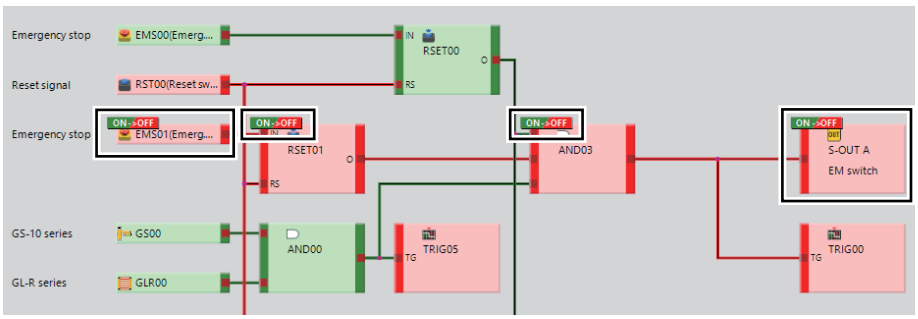
How to Check the History

The program execution status when the history selected in the history list occurred is displayed.

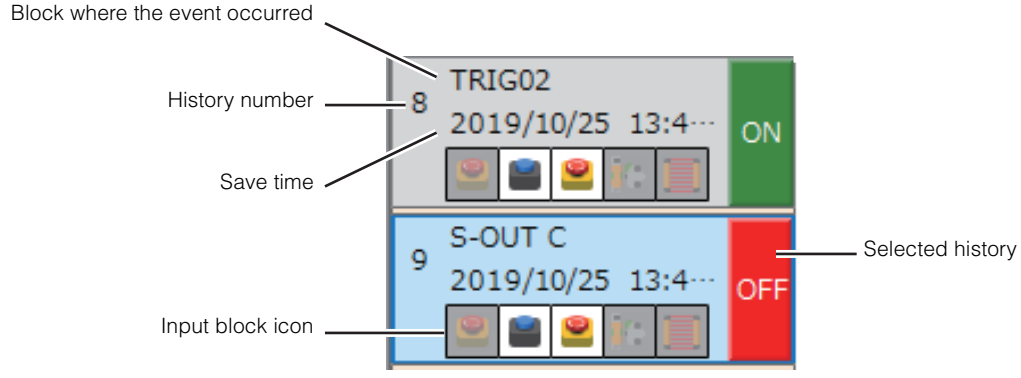


Reference

When you select a history you want to check from the history list, the status of the program when the history occurred is shown.
On the program screen, the status change (such as ON→OFF) of each block is shown, allowing you to promptly check the reason why the S-OUT was turned OFF.



List display



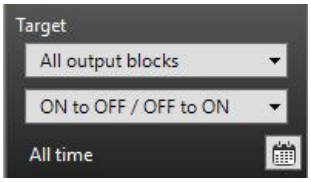
Item	Details
Block where the event occurred	Displays the label of the block where the event occurred.
History number	Number assigned to the read history data. It is assigned in order from newest data to oldest data, starting with the lowest number first.
Save time	Displays the time when the history was stored. [Full-time histories]: Displays the time when the history was stored, which is calculated based on the operation time from when the GC main controller started to when the history was saved and the time data of the PC that read out the history data. [Event histories]: Displays the trigger occurrence time as the operation time from when the GC main controller started to when the history was saved.
Input block icon	Displays the input block icons related to the history data. The highlighted input block icons indicate that the corresponding input block ON/OFF status has changed at the timing of that history event.
ON/OFF state	Displays the input/output status when the history was saved.
Selected history	Displays the currently selected history data (framed in blue).

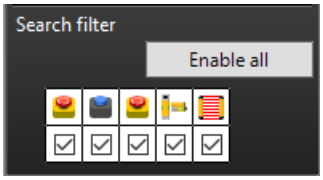
History operation buttons

Item	Details
	[Full-time histories]: Moves the focus to the last history in the history list. [Event histories]: Moves the focus to the event history trigger position or the beginning.
	Moves the focus to the last change point of the selected signal before the related block.
	Moves the focus to the first change point of the selected signal after the related block.
	[Full-time histories]: Moves the focus to the first history in the history list. [Event histories]: Moves the focus to the event history trigger position or the end.
	Moves back the current time by the interval specified in [step execution interval].
	Moves forward the current time by the interval specified in [step execution interval].
	Select the step execution interval. (Default: 100 ms) Setting range: 2 ms/10 ms/100 ms/1 s/10 s/30 s/1 min/10 min/30 min

Search filter

You can narrow down the target block, status change, and time using the filter function.





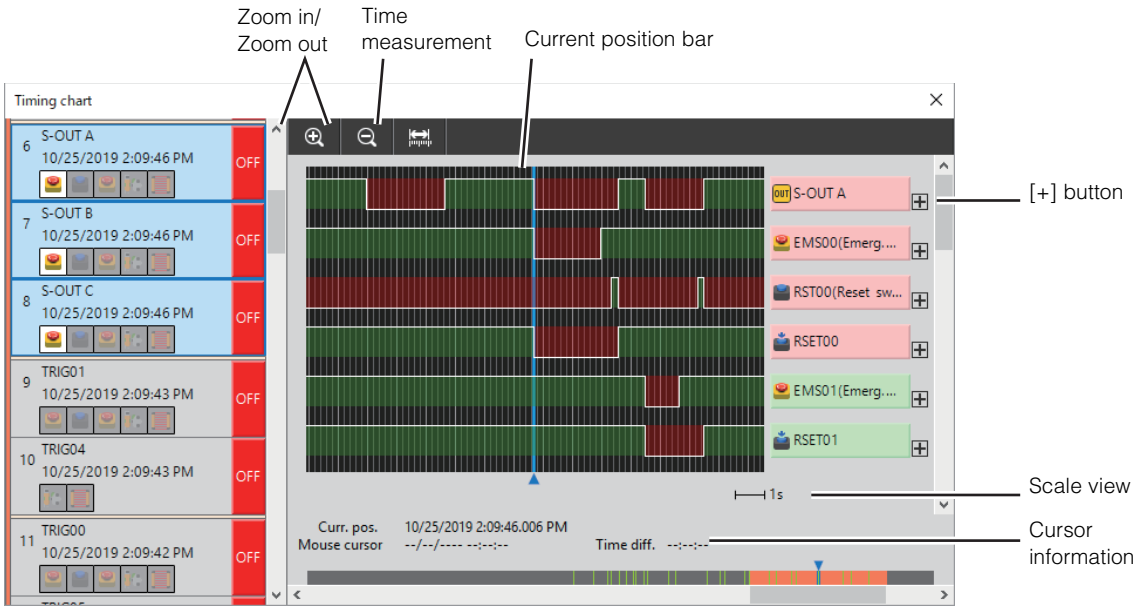
Item	Details
Target block	Select the filter target block.
Target change point	Select the filter target change point. (ON to OFF only, OFF to ON only, ON to OFF / OFF to ON)
Time	Select the filter target time. To specify the period, select the start date and the end date.
Search filter	Select the input block (input device) to display when [S-OUT] or [AUX-OUT] is selected for the target block.

Operation panel

On the operation panel, you can read out the history data from the GC Series and clear or save it to a file.

Item	Details
	• Reads out the history data from the GC Series. [Full-time histories]: Reads out the last 1,000 items. [Event histories]: Reads out the last 100 items. • Click the [▼] button and select the number of items to read. [Full-time histories]: Read out last 1,000 items/Read out last 10,000 items/Read out all history [Event histories]: Read out last 100 items/Read out all history
	Clears all the full-time histories and event histories stored in the GC Series main controller.
	• Saves the currently displayed history data to a file. • Click the [▼] button and select the content to save to a file. • Save histories currently displayed • Save all histories stored in GC (Setting range: Save histories currently displayed/Save full-time histories only/Save event histories only)

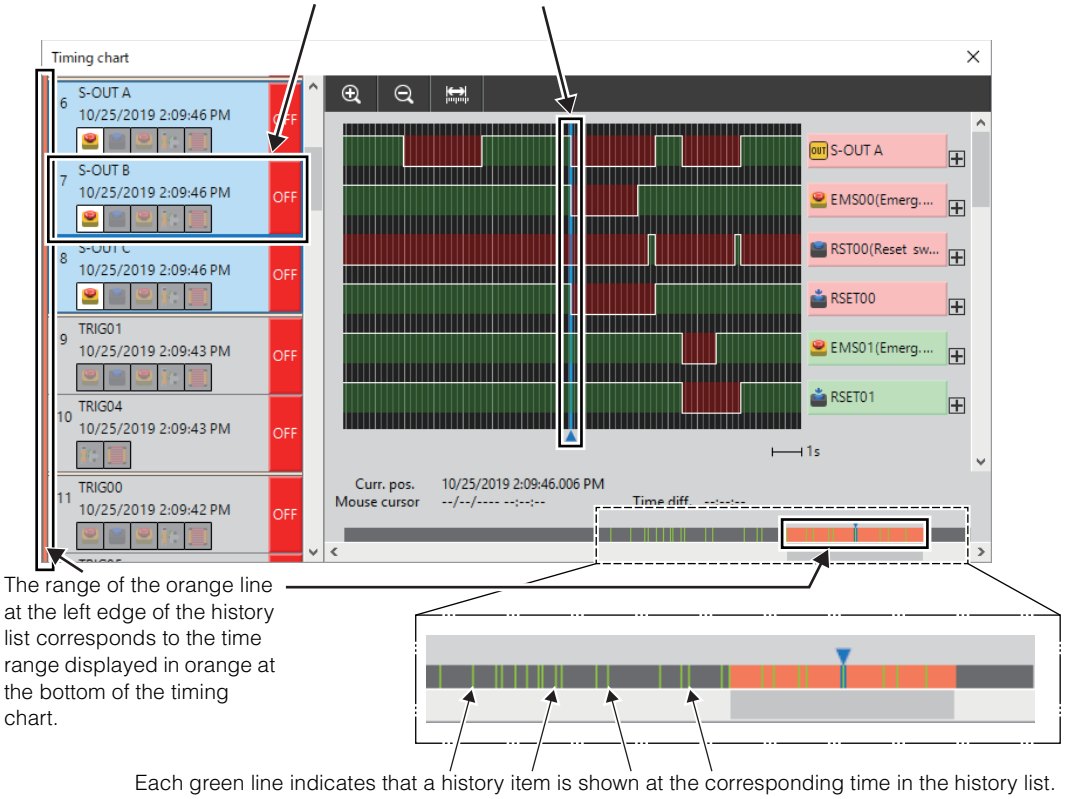
Timing chart



Item	Details
Zoom in/Zoom out	Zooms in or out on the time axis.
Time measurement	Displays the time difference between the current position bar and the mouse cursor position when clicked.
Current position bar	Displays the timing when the selected history occurred.
[+] button	Adds a detailed signal if it is available for the block when clicked.
Scale view	Displays the current time scale.
Cursor information	[Curr. pos.]: Displays the date and time data when the selected history occurred. [Mouse cursor]: Displays the date and time data at the position where the mouse cursor is located. [Time diff.]: Displays the time difference between the current position and the mouse cursor position.

■ How to check the timing chart

The history with the blue background in the history list corresponds to the timing of the current position bar.

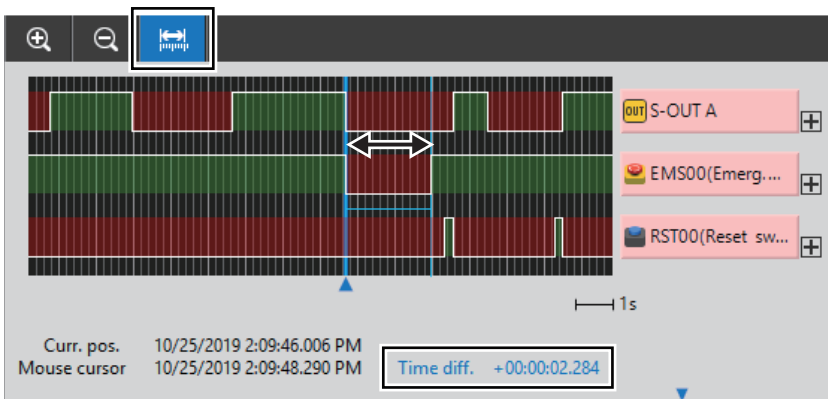


The range of the orange line at the left edge of the history list corresponds to the time range displayed in orange at the bottom of the timing chart.

Each green line indicates that a history item is shown at the corresponding time in the history list.

Time measurement

You can measure the time difference between blocks using the timing chart.
This is used to check the time from an input block change to safety output OFF or check a muting input signal timing.



MEMO

15

Ethernet Communication Function

This chapter describes the settings and functions of the Ethernet communication function.

15-1 Overview of the Ethernet Communication Function.....page 15-2
15-2 GC Configurator Settings.....page 15-3

15-1 Overview of the Ethernet Communication Function

This section describes the Ethernet communication function.

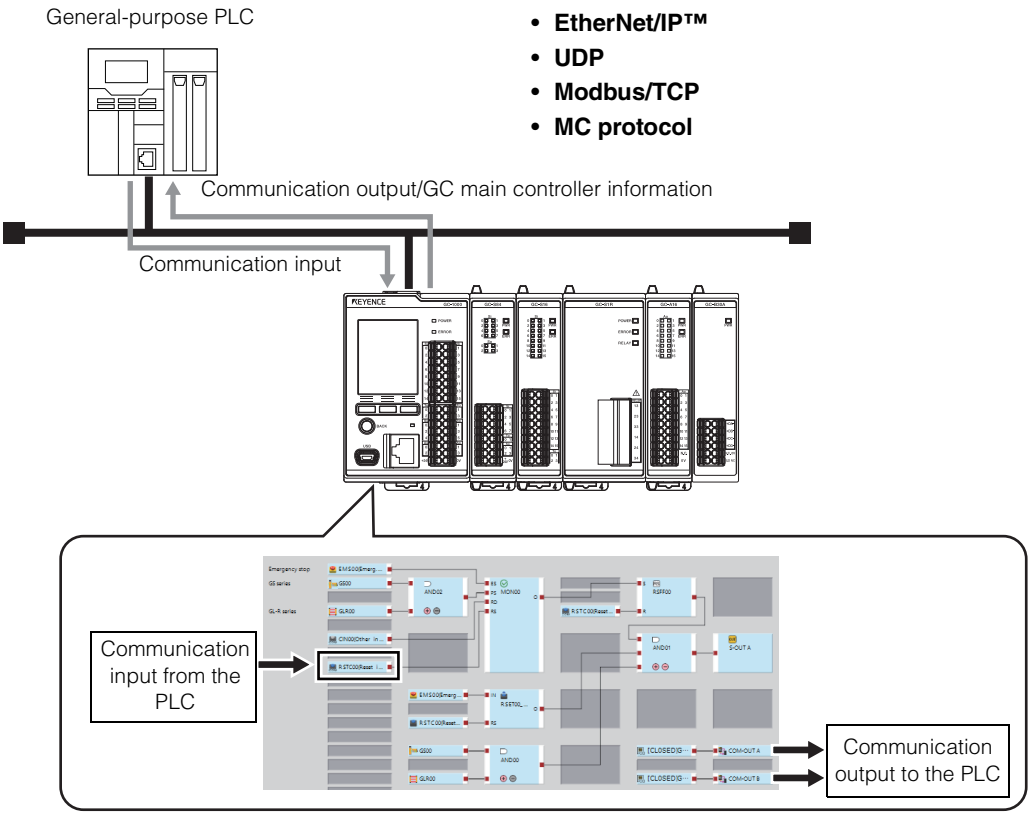
DANGER	**All of the data received from the communication of the EtherNet/IP™, PROFINET, UDP, Modbus/TCP, or MC protocol cannot be used for the safety related part of the control system. When used incorrectly, there is a possibility that the operator of the device may be threatened with major injury or even death.**

Point

The Ethernet communication function is available only on the main controller "GC-1000".

What You Can Do with the Ethernet Communication Function

The main controller GC-1000 is equipped with an Ethernet port to communicate signals with a general-purpose PLC using Ethernet protocols. You can transmit the status of a device controlled on a general-purpose PLC to the GC Series or transmit the operation status of the GC Series or the status of a safety sensor controlled by the GC Series to a general-purpose PLC.



Supported Protocols

The Ethernet communication function supports the following Ethernet protocols.

- **EtherNet/IP™** **"Chapter 16 EtherNet/IP™ Communication Function" (page16-1)**
- **PROFINET** **"Chapter 17 PROFINET Communication Function" (page17-1)**
- **UDP** **"Chapter 18 UDP Communication Function" (page18-1)**
- **Modbus/TCP** **"Chapter 19 Modbus/TCP Communication Function" (page19-1)**
- **MC protocol** **"Chapter 20 MC Protocol Communication Function" (page20-1)**

* EtherNet/IP™ is a registered trademark or trademark of ODVA, Inc.

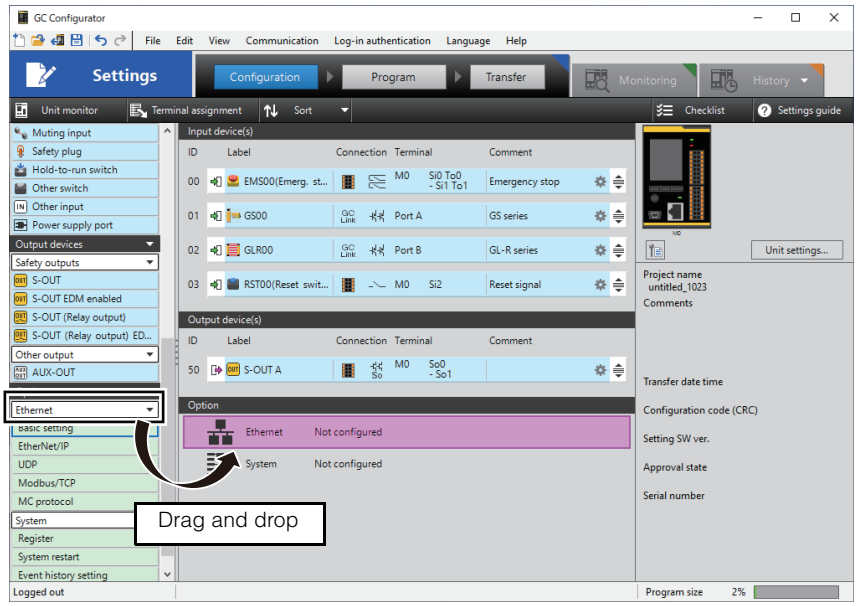
* The MC protocol is an abbreviation of the MELSEC communication protocol. MELSEC is a registered trademark of Mitsubishi Electric Corporation.

15-2 GC Configurator Settings

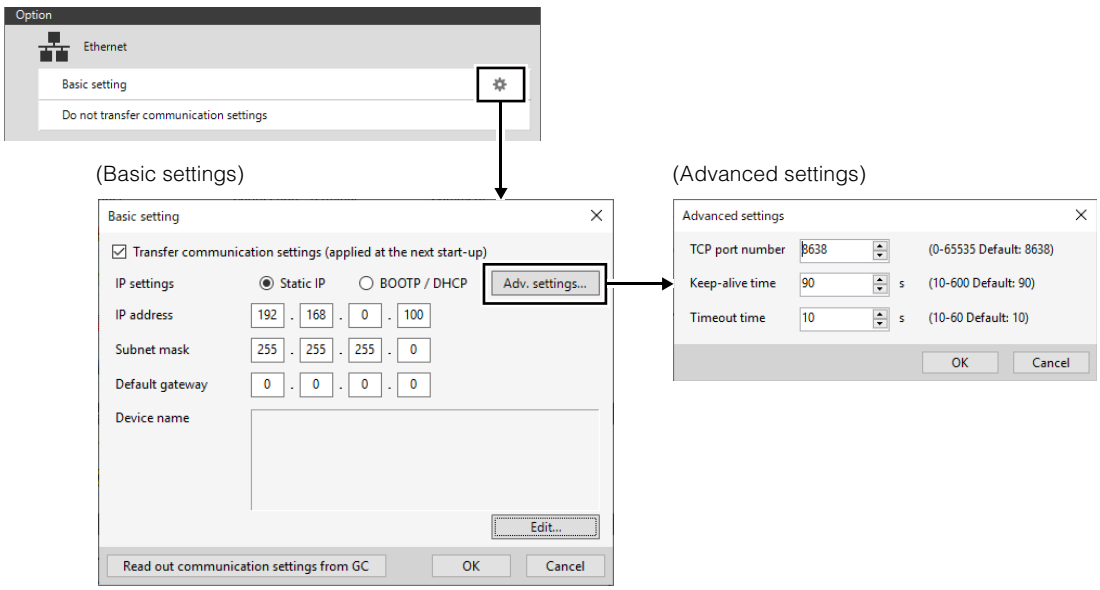
GC Configurator - Configuration Screen Settings

Basic Ethernet settings

In the device list, drag [Ethernet] from [Option] and drop it to the program registration area to register.



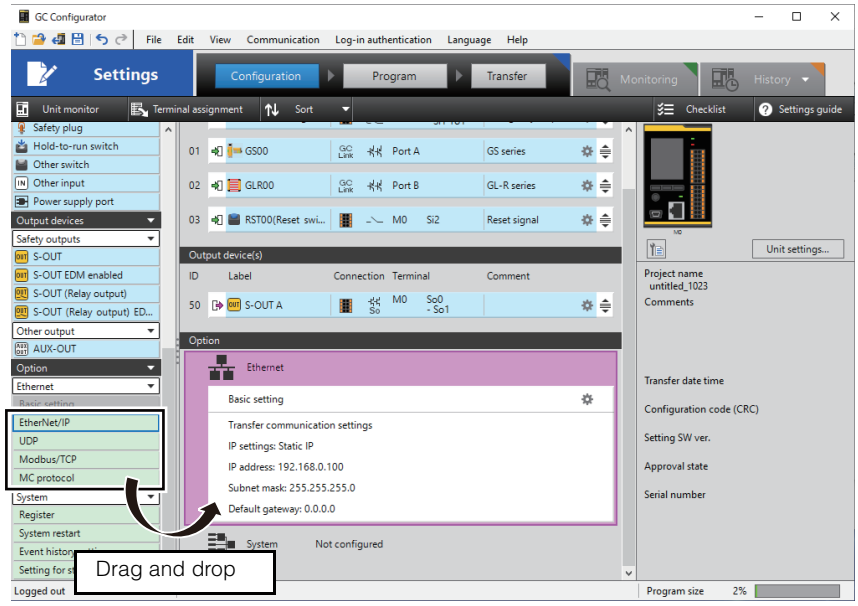
■ Detailed settings

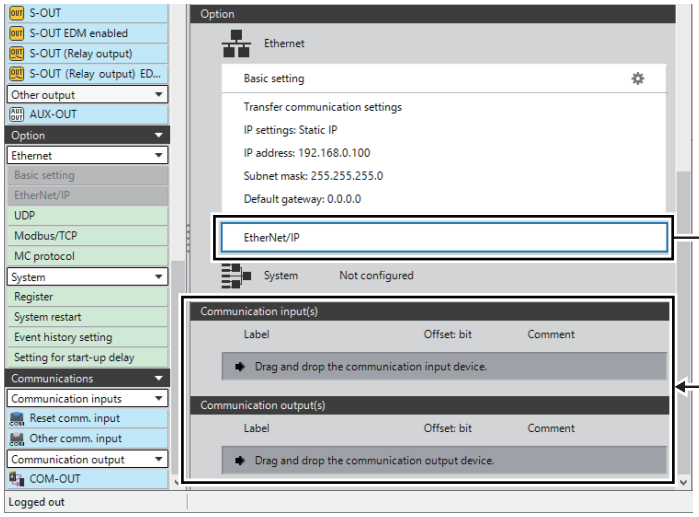


Reference For the basic Ethernet settings, refer to "10-7 Setting Options" (page 10-22).

Registering a communication protocol

In the device list, drag the target communication protocol from [Option] and drop it in the program creation area to register.
Example: Registering the communication protocol "EtherNet/IP"





Once a communication protocol to be used is registered, you can use communication inputs and communication outputs.

Reference

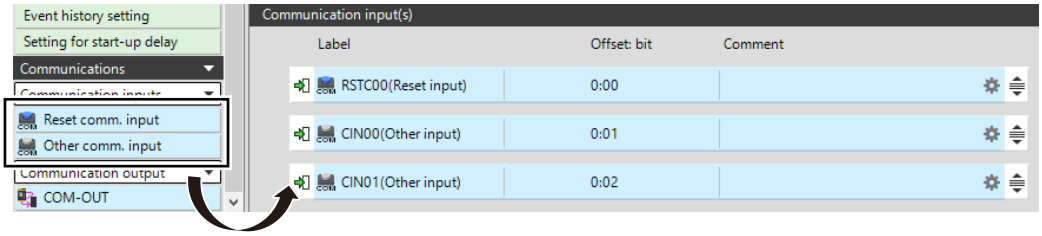
For the UDP settings and MC protocol settings, refer to the upcoming chapters.

"Chapter 18 UDP Communication Function" (page18-1)
"Chapter 20 MC Protocol Communication Function" (page20-1)

Communication input

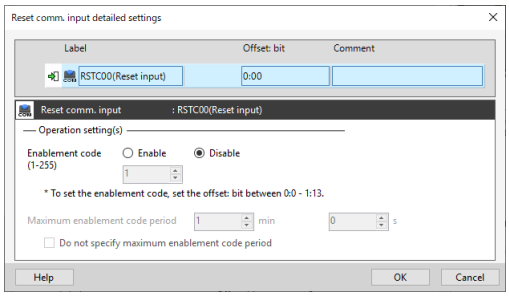
■ Registering communication inputs

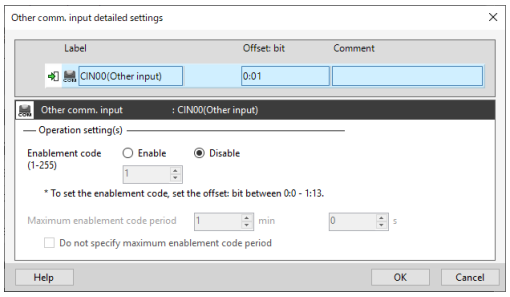
In the device list, drag communication inputs from [Communications] and drop them in the program registration area to register.



■ Reset input (COM)

■ Other input (COM)





Item	Details
Label	Label of the communication input block. (Editable: 1 to 22 characters)
Offset: bit	Refer to the below.
Comment	Enter a comment for the communication input block. (Maximum: 50 characters)
Enablement code	Enable or disable the enablement code function. When this is enabled, set the code number used for input permission. (Setting range: 1 to 255)
Maximum enablement code period	Limit the time to turn ON/OFF the communication input block when the enablement code matches the specified value if the enablement code function is enabled. • Unit (min): 1 to 10 (minutes) • Unit (s): 1 to 59 (seconds) (Default: 1 (min))
Do not specify maximum enablement code period	Does not limit the enablement code period when selected.

Point

When the enablement code is used, assign a value between "0:00" and "1:13" to [Offset: bit].

Reference

There are no differences in behavior when executing the GC main controller program between the communication inputs [Reset comm. input] and [Other comm. input]. During a simulation, however, there are the following differences:
[Reset comm. input] has the same behavior as " Reset switch".
[Other comm. input] has the same behavior as " Other switch".

Offset: bit

Communication inputs are assigned to the "communication input data" (4 addresses = 4 words = 64 bits) of each protocol.

Offset	bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0	0:15	0:14	0:13	0:12	0:11	0:10	0:09	0:08	0:07	0:06	0:05	0:04	0:03	0:02	0:01	0:00
1	1:15	1:14	1:13	1:12	1:11	1:10	1:09	1:08	1:07	1:06	1:05	1:04	1:03	1:02	1:01	1:00
2	2:15	2:14	2:13	2:12	2:11	2:10	2:09	2:08	2:07	2:06	2:05	2:04	2:03	2:02	2:01	2:00
3	3:15	3:14	3:13	3:12	3:11	3:10	3:09	3:08	3:07	3:06	3:05	3:04	3:03	3:02	3:01	3:00

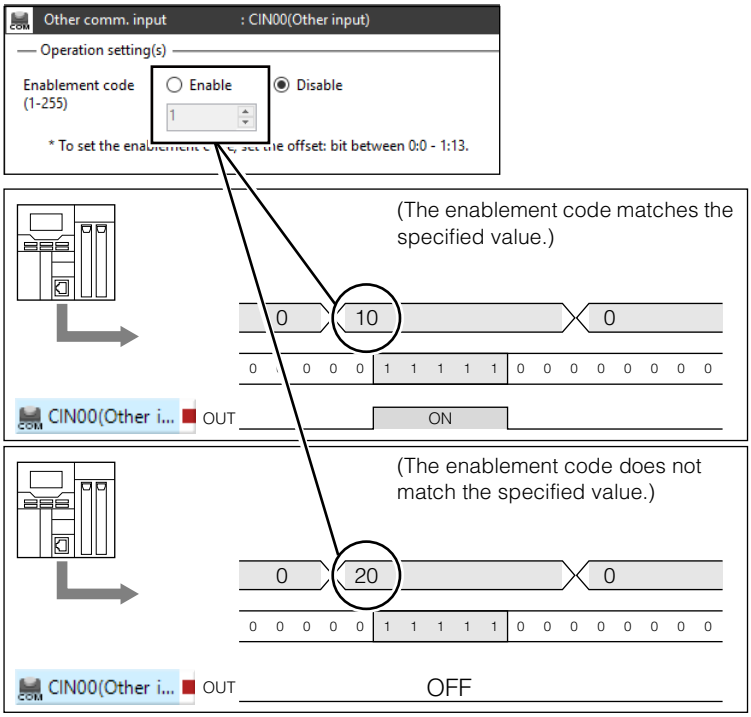
(Correspondence between [Offset: bit] and communication input data)

For the address of "communication input data", refer to the following:

- EtherNet/IP: "OUT Area Data Map" (page 16-15)
- UDP: "Word address" (page 18-13)
"Bit address" (page 18-22)
- Modbus/TCP: "Input Registers and Holding Registers" (page 19-13)
"Inputs and Coils" (page 19-21)
- MC protocol: "Word address" (page 20-17)
"Bit address" (page 20-25)

Enablement code

The enablement code is used to enhance the safety of signals specified via communications.
Send a code number called an enablement code, separately from a communication input, and only when the number matches the specified value, the signal of the communication input block is enabled.

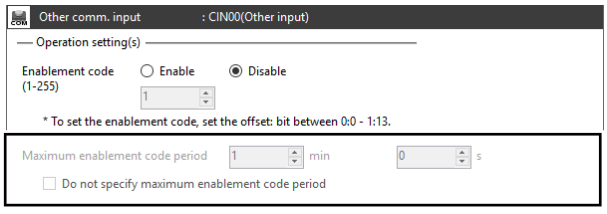


Point

- **When the enablement code is used, assign a value between "0:00" and "1:13" to [Offset: bit].**
- **You cannot set the same enablement code to multiple communication input blocks.**
- **The enablement code setting range is 1 to 255.**
- **After sending the enablement code, control (turn ON/OFF) the communication input bit.**

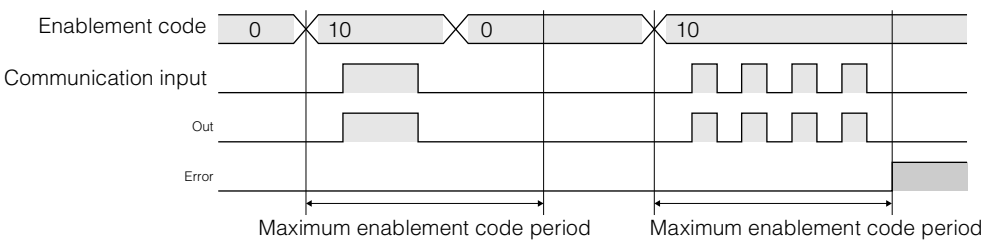
Maximum enablement code period

You can limit the time to turn ON/OFF the communication input block when the enablement code matches the specified value if the enablement code function is enabled.



[Setting range]
- Unit (min): 1 to 10 (minutes)
- Unit (s): 1 to 59 (seconds)
(Default: 1 (min))

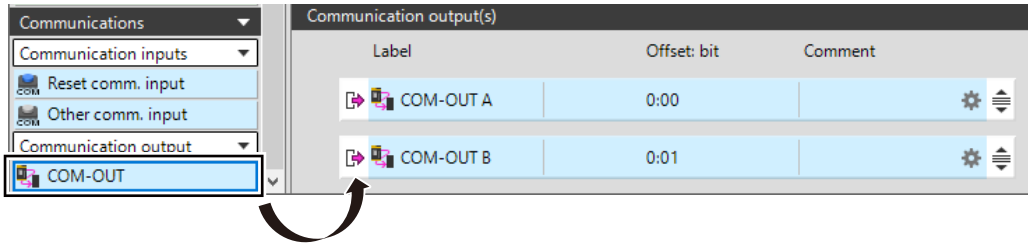
(Timing chart)



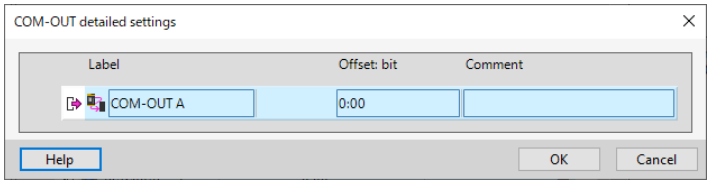
Communication output

■ Registering communication outputs

In the device list, drag communication outputs from [Communications] and drop them in the program registration area to register.



■ Communication output



Item	Details
Label	Label of the communication output block. (Editable: 1 to 22 characters)
Offset: bit	Refer to the below.
Comment	Enter a comment for the communication output block. (Maximum: 50 characters)

Offset: bit

Communication outputs are assigned to the "communication output data" (4 addresses = 4 words = 64 bits) of each protocol.

Offset	bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0	0:15	0:14	0:13	0:12	0:11	0:10	0:09	0:08	0:07	0:06	0:05	0:04	0:03	0:02	0:01	0:00
1	1:15	1:14	1:13	1:12	1:11	1:10	1:09	1:08	1:07	1:06	1:05	1:04	1:03	1:02	1:01	1:00
2	2:15	2:14	2:13	2:12	2:11	2:10	2:09	2:08	2:07	2:06	2:05	2:04	2:03	2:02	2:01	2:00
3	3:15	3:14	3:13	3:12	3:11	3:10	3:09	3:08	3:07	3:06	3:05	3:04	3:03	3:02	3:01	3:00

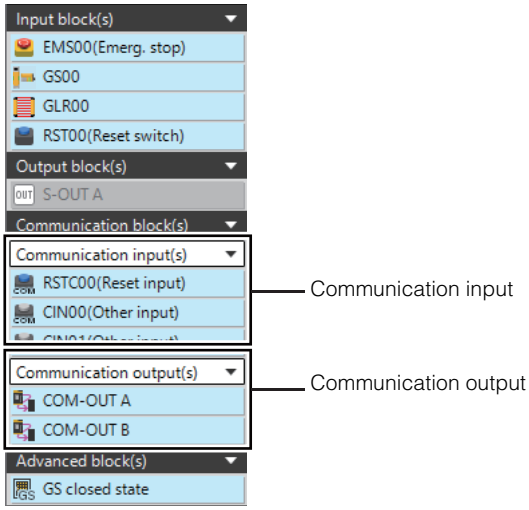
For the address of "communication output data", refer to the following:

- EtherNet/IP: "IN Area Data Map" (page 16-8)
- UDP: "Word address" (page 18-13)
"Bit address" (page 18-22)
- Modbus/TCP: "Input Registers and Holding Registers" (page 19-13)
"Inputs and Coils" (page 19-21)
- MC protocol: "Word address" (page 20-17)
"Bit address" (page 20-25)

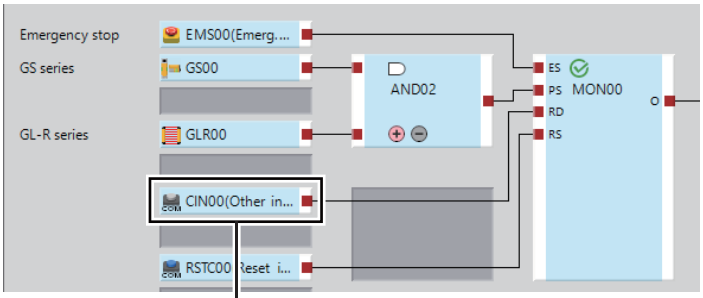
How to Use a Communication Block

A communication input and a communication output can be used in a program like an input block and an output block. Drag and drop them from the block list to the program to register.

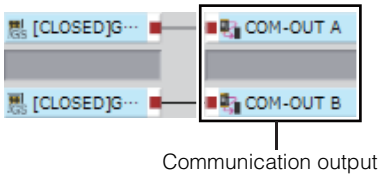
[Block list]



(Example: Communication input)



(Example: Communication output)



MEMO

16

EtherNet/IP™ Communication Function

This chapter describes the settings and functions of the EtherNet/IP™ communication function.

16-1 Overview of the EtherNet/IP™ Communication Function ..... page 16-2
16-2 EtherNet/IP™ Communication Specifications ..... page 16-3
16-3 EtherNet/IP™ Communication Settings ..... page 16-4
16-4 Cyclic Communication ..... page 16-6
16-5 Message Communication ..... page 16-16

16-1 Overview of the EtherNet/IP™ Communication Function

This section describes the EtherNet/IP™ communication function.

DANGER	**All of the data received from the communication of the EtherNet/IP™, PROFINET, UDP, Modbus/TCP, or MC protocol cannot be used for the safety related part of the control system. When used incorrectly, there is a possibility that the operator of the device may be threatened with major injury or even death.**

Point **The Ethernet communication function is available only for the main controller "GC-1000".**

Overview of the EtherNet/IP™ communication function

What is EtherNet/IP™ communication?

EtherNet/IP™ is an industrial communication network, whose specifications are published (open) and managed by ODVA (Open DeviceNet Vendor Association, Inc.). It was standardized as EtherNet/IP™ (Industrial Protocol), where an industrial protocol is integrated with Ethernet.
Communications are enabled by integrating a protocol called CIP (Common Industrial Protocol) with TCP/IP and Ethernet. This allows the use of both general Ethernet and the network at the same time.
The GC Series supports the following two communication methods: Cyclic communication (implicit message), which communicates at a fixed cycle, and message communication (explicit message), which communicates at a specific timing. Cyclic communication can update data without a ladder program.

What you can do with EtherNet/IP™ communication

The GC Series functions as an EtherNet/IP™ adapter, allowing you to perform the following:

Item	Cyclic communication	Message communication
Write a communication input.	✓	✓
Write an enablement code.	✓	✓
Write a character string that is stored into the history function.	✓	✓
Read out a communication output.	✓	✓
Read out an error code.	✓	✓
Read out the unit configuration and model information.	✓	✓
Read out the received-light-amount and ON/OFF state of the GL-R Series connected to a GC-Link port.	✓	✓
Read out the door open/close state and ON/OFF state of the GS Series connected to a GC-Link port.	✓	✓
Read out the ON/OFF status of the main controller, expansion unit, and remote I/O module.	--	✓
Read out the block status.	--	✓
Read out the error history.	--	✓

Reference EtherNet/IP™ opens a communication line called a "connection" when starting communications. A device that opens a connection is called a "scanner" while a device that is opened is called an "adapter". In cyclic communication, setting a "connection" to exchange data between the EtherNet/IP™ scanner and the GC Series allows data transmission without a program. A data communication cycle (RPI) can be set for each connection. However, if a heavy load is applied to the network when many devices are connected to the network, a delay or packet loss may occur. Verify the operation thoroughly before putting it into production.

16-2 EtherNet/IP™ Communication Specifications

EtherNet/IP™ Communication Specifications for the GC Series

Category	Item	Details
Ethernet specifications	Communication media	100BASE-TX
Basic specifications	Vendor name	Keyence Corporation
	Vendor ID	367
	Device type	43 (Generic Device)
	Product code	2601
	Product name	GC Series
Cyclic specifications	Transmission trigger	Cyclic only
	PRI specification	5 to 10000 ms (Default: 20 ms)
	Maximum number of connections	16
	Bandwidth restriction	Restricted to 3000 pps
	Supported connection type	Input-Only, Exclusive Owner
	Instance specification method	Logical instance (number specification) only. Tag specification (name specification) is not supported.
	Maximum cyclic size	1280 bytes (This applies to Class 1 Large Forward Open.)
EtherNet/IP™ conformance testing		Compliant with CT16

16-3 EtherNet/IP™ Communication Settings

EtherNet/IP™ Communication Settings

GC Configurator settings

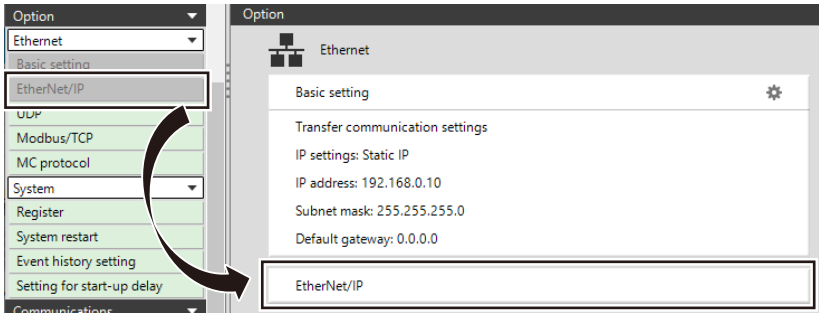
[Setting procedure]

■ Basic Ethernet settings

Open the configuration screen from [Settings] and configure the basic Ethernet settings. "15-2 GC Configurator Settings" (page 15-3)

■ EtherNet/IP™ settings

Open the configuration screen from [Settings] and drag and drop [EtherNet/IP] to the screen to register.



■ Registering communication inputs and communication outputs

Open the configuration screen from [Settings] and drag and drop [Communication input] and [Communication output] to the screen to register.

"15-2 GC Configurator Settings" (page 15-3)

■ Programming

Perform programming using the communication blocks.

" How to Use a Communication Block" (page 15-9)

EtherNet/IP™ scanner settings

Set the IP address and configure the EtherNet/IP™ communication settings as follows:

[Setting procedure]

■ Registering the EDS file

If you set the GC Series for the first time using the EtherNet/IP™ configuration software, install the GC Series EDS file on the configuration software.

The GC Series EDS file can be downloaded from the KEYENCE website.

www.keyence.com/glb

In order to use the KEYENCE configuration software, KV STUDIO, download the file with the extension ".EZ1". ".EZ1" refers to an EDS file with the KEYENCE-specific information added.

■ Communication settings

(1) Cyclic communication

Set a connection to exchange data between the EtherNet/IP™ scanner and the GC Series.

"16-4 Cyclic Communication" (page 16-6)

(2) Message communication

Create a program for the communications.

"16-5 Message Communication" (page 16-16)

16-4 Cyclic Communication

What is cyclic communication?

It is a function to exchange data between a PLC (EtherNet/IP™ scanner) and the GC Series at a fixed cycle. This is used to read out the program execution status of the GC Series and periodically read out the received-light-amount and door open/close state of the GL-R Series and GS Series connected to the GC-Link ports without a ladder program. Additionally, you are able to use a signal from a PLC in a program of the GC Series.

Available connections

The following connections are available for the GC Series cyclic communication.

No.	Connection name	Input/output	Assembly Instance		Size (byte)	Application type	RPI (ms)	
			HEX	DEC			Default	Minimum RPI
1	Comm. input/ Status data	Input (GC => Scanner)	64H	100	174	Exclusive Owner	20	5
		Output (Scanner => GC)	6EH	110	92		20	5
2	Status data	Input (GC => Scanner)	64H	100	174	Input-Only	20	5
3	GL-R Monitor data (GC-Link PortA)	Input (GC => Scanner)	65H	101	446	Input-Only	20	10
4	GS Monitor data (GC-Link PortA)	Input (GC => Scanner)	66H	102	72	Input-Only	20	10
5	GL-R Monitor data (GC-Link PortB)	Input (GC => Scanner)	67H	103	446	Input-Only	20	10
6	GS Monitor data (GC-Link PortB)	Input (GC => Scanner)	68H	104	72	Input-Only	20	10

*1 In the KEYENCE configuration software KV STUDIO, the connection name is shown as follows:
- Comm. input/Status data: Monitor data/Control data
- Status data: Monitor data

Reference

- Each connection is triggered at a cyclic timing. The supported connection types are point-to-point and multicast.
- The description of each application type is as follows:

- Input-Only:
  This connection allows you to only set the data transmission from the GC Series to the EtherNet/IP™ scanner. Multiple scanners can establish "Input-Only" connections simultaneously for a single adapter (the GC Series). To establish connections from multiple EtherNet/IP™ scanners simultaneously, set the connection type to multicast.
- Exclusive Owner:
  This connection allows you to set the data transmission from the EtherNet/IP™ scanner to the GC Series and the data transmission from the GC Series to the EtherNet/IP™ scanner simultaneously. Multiple "Exclusive Owner" connections cannot be established for the "Comm. input/Status data" of a single adapter (the GC Series).

- If you need to specify "Configuration" when using a third-party PLC, set the instance ID to "1" and the size to "0" in "Assembly Object".

Cyclic communication flow (example)

■ Communication input

The following describes how to use a signal from a general-purpose PLC for a GC Series program using a "communication input" block.

1 **Set a connection.**

Set the following connection in the EtherNet/IP™ scanner configuration software.

No.	Connection name	Input/output	Assembly Instance		Size (byte)	Application type	RPI (ms)	
			HEX	DEC			Default	Minimum RPI
1	Comm. input/ Status data	Input (GC => Scanner)	64H	100	174	Exclusive Owner	20	5
		Output (Scanner => GC)	6EH	110	92		20	5

2 **Assign a device used for cyclic communication.**

Assign a device that stores cyclic communication data. For more information about the setting method, refer to the scanner device manual.

When a KEYENCE PLC (EtherNet/IP™ scanner) is used, steps 1 to 2 are automatically set just by selecting the GC Series (You can also change the settings manually).

3 **Set a communication input in the GC Configurator.**

Open the configuration screen from [Settings] and drag and drop a [Communication input] to the screen to register.

"15-2 GC Configurator Settings" (page 15-3)

4 **Perform programming in the GC Configurator.**

Perform programming using the communication blocks.

"How to Use a Communication Block" (page 15-9)

IN Area Data Map

Data from the GC Series are assigned to the IN area of the EtherNet/IP™ scanner.

Assembly instance: 100 (64H)

Offset	Item	Details	Data type	Value
0	Number of connected units (expansion unit)	Indicates the number of connected expansion units.	UINT	0 to 65535
1	Number of connected units (remote I/O module)	Indicates the number of connected remote I/O modules.	UINT	0 to 65535
2	Model information (main controller)	Indicates the connected unit model.	WORD	bit 0 to 7: Unit model 1: GC-1000 2: GC-1000R 3: GC-S84 4: GC-S16 5: GC-S1R 6: GC-A16 bit 8: Positional relationship to the GC-B30 0: Unit positioned before the GC-B30 1: Unit positioned after the GC-B30 If the GC-B30 does not exist in the unit configuration, all units are set to 0. bit 9 to 15: System reserved (fixed to 0)
3	Model information (1st expansion unit)		WORD	
...	...		...	
12	Model information (10th expansion unit)		WORD	
13	Model information (1st remote I/O module)	Indicates the connected unit model.	WORD	bit 0 to 7: Unit model 7: GC-R45 8: GC-R48 bit 8 to 15: System reserved (fixed to 0)
...	...		...	
16	Model information (4th remote I/O module)		WORD	
17	System reserved			
18	Operation time	Indicates the time elapsed since the start of the unit in units of 10 ms.	DWORD	0 to FFFFFFFFH
19				
20	GC operating state	Indicates the operating state of the GC.	WORD	bit 0: RUN state 0: The unit is stopped. 1: The unit is running. bit 1: Abnormal state 0: Normal 1: Abnormal * An abnormal state means that at least one alert or error is occurring. bit 2 to 15: System reserved (fixed to 0)
21	Number of errors that occurred	Indicates the number of errors that are currently occurring.	UINT	0 to 30
22	Main code of the (1st) error code	Indicates the code of the error that is currently occurring. Error codes are sorted in the following order: (1) Errors are sorted in order of Error, Alert, and Info, starting from the first error. (2) Errors are sorted by error category in the order that they occurred. The high byte represents the main code while the low byte represents the detailed code.	UINT	0 to 65535
23	Detailed code of the (1st) error code		UINT	
...	...		...	
80	Main code of the (30th) error code		UINT	
81	Detailed code of the (30th) error code		UINT	
82	Communication output [0:00] to [0:15]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	WORD	bit 0: Communication output bit 0 bit 1: Communication output bit 1 ... bit 15: Communication output bit 15
...	...		...	
85	Communication output [3:00] to [3:15]		WORD	

Offset	Item	Details	Data type	Value
86	GC-Link port status	Indicates the GC-Link port status.	WORD	bit 0 to 3: GC-Link port A connection status 0000: Searching 0001: Not connected 0010: Connected bit 4 to 7: GC-Link port A error status 0000: No error 0001: Communication error bit 8 to 11: GC-Link port B connection status 0000: Searching 0001: Not connected 0010: Connected bit 12 to 15: GC-Link port B error status 0000: No error 0001: Communication error

Assembly instance: 101 (65H)

Offset	Item	Details	Data type	Value
0	GC-Link port A GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port A.	UINT	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2
1	System reserved			
2	GC-Link port A GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port A.	UINT	0: Not connected 1: Type F 2: Type H 3: Type L
3	GC-Link port A GL-R Sub unit 1 type		UINT	0: Not connected 1: Type F 2: Type H 3: Type L
4	GC-Link port A GL-R Sub unit 2 type		UINT	0: Not connected 1: Type F 2: Type H 3: Type L
5	GC-Link port A GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port A.	UINT	0 to 127
6	GC-Link port A GL-R Number of optical axes of sub unit 1		UINT	0 to 127
7	GC-Link port A GL-R Number of optical axes of sub unit 2		UINT	0 to 127
8	GC-Link port A GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	WORD	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6
9	System reserved			

Offset	Item	Details	Data type	Value
10	GC-Link port A GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port A. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
11	GC-Link port A GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
...	...		...	
73	GC-Link port A GL-R Received-light-amount, Main unit, 127th optical axis		WORD	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0
74	GC-Link port A GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
75	GC-Link port A GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
...	...		...	
137	GC-Link port A GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0
138	GC-Link port A GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
139	GC-Link port A GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
...	...		...	
201	GC-Link port A GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0
202	GC-Link port A GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis
203	GC-Link port A GL-R ON/OFF information of each optical axis [31:16]		WORD	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis
...	...		...	
216	GC-Link port A GL-R ON/OFF information of each optical axis [239:224]		WORD	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis
217	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	WORD	0: No error 1: Error occurring
218	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	WORD	0: OFF 1: ON
219	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	0: Disabled 1: Enabled
220	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	0: No alert 1: Alert occurring
221	GC-Link port A GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A in percentage.	UINT	0 to 100
222	GC-Link port A GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	UINT	0: No set 1: 5 sec 2: 30 sec 3: 5 min

Assembly instance: 102 (66H)

Offset	Item	Details	Data type	Value
0	GC-Link port A GS Number of connected units	Indicates the number of GS units connected to the GC-Link port A.	UINT	0 to 16
1	GC-Link port A GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port A.	WORD	bit 0 to 2: Model information 000: GS-10 001: GS-50 011: GS-70 100: GS-M5/9 101: GS-ML5 bit 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved
2	GC-Link port A GS Model information (2nd unit)		WORD	
...	...		...	
16	GC-Link port A GS Model information (16th unit)		WORD	
17	GC-Link port A GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	WORD	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved
18	GC-Link port A GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port A.	WORD	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close
19	GC-Link port A GS Lock status	Indicates the lock status of each GS connected to the GC-Link port A. This is always 0 for the non-contact type.	WORD	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked
20	GC-Link port A GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port A.	WORD	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved
21	GC-Link port A GS 2nd unit status		WORD	
...	...		...	
35	GC-Link port A GS 16th unit status		WORD	

Assembly instance: 103 (67H)

Offset	Item	Details	Data type	Value
0	GC-Link port B GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port B.	UINT	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2
1	System reserved			
2	GC-Link port B GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port B.	UINT	0: Not connected 1: Type F 2: Type H 3: Type L
3	GC-Link port B GL-R Sub unit 1 type		UINT	0: Not connected 1: Type F 2: Type H 3: Type L
4	GC-Link port B GL-R Sub unit 2 type		UINT	0: Not connected 1: Type F 2: Type H 3: Type L
5	GC-Link port B GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port B.	UINT	0 to 127
6	GC-Link port B GL-R Number of optical axes of sub unit 1		UINT	0 to 127
7	GC-Link port B GL-R Number of optical axes of sub unit 2		UINT	0 to 127
8	GC-Link port B GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	WORD	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6
9	System reserved			
10	GC-Link port B GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port B. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
11	GC-Link port B GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
...	...		...	
73	GC-Link port B GL-R Received-light-amount, Main unit, 127th optical axis		WORD	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0
74	GC-Link port B GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
75	GC-Link port B GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
...	...		...	
137	GC-Link port B GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0
138	GC-Link port B GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
139	GC-Link port B GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
...	...		...	
201	GC-Link port B GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0

Offset	Item	Details	Data type	Value
202	GC-Link port B GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis
203	GC-Link port B GL-R ON/OFF information of each optical axis [31:16]		WORD	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis
...	...		...	
216	GC-Link port B GL-R ON/OFF information of each optical axis [239:224]		WORD	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis
217	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	WORD	0: No error 1: Error occurring
218	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	WORD	0: OFF 1: ON
219	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	0: Disabled 1: Enabled
220	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	0: No alert 1: Alert occurring
221	GC-Link port B GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B in percentage.	UINT	0 to 100
222	GC-Link port B GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	UINT	0: No set 1: 5 sec 2: 30 sec 3: 5 min

Assembly instance: 104 (68H)

Offset	Item	Details	Data type	Value
0	GC-Link port B GS Number of connected units	Indicates the number of GS units connected to the GC-Link port B.	UINT	0 to 16
1	GC-Link port B GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port B.	WORD	bit 0 to 2: Model information 000: GS-10 001: GS-50 011: GS-70 100: GS-M5/9 101: GS-ML5 bit 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved
2	GC-Link port B GS Model information (2nd unit)		WORD	
...	...		...	
16	GC-Link port B GS Model information (16th unit)		WORD	
17	GC-Link port B GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port B.	WORD	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved

Offset	Item	Details	Data type	Value
18	GC-Link port B GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port B.	WORD	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close
19	GC-Link port B GS Lock status	Indicates the lock status of each GS connected to the GC-Link port B. This is always 0 for the non-contact type.	WORD	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked
20	GC-Link port B GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port B.	WORD	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved
21	GC-Link port B GS 2nd unit status		WORD	
...	...		...	
35	GC-Link port B GS 16th unit status		WORD	

OUT Area Data Map

Data to the GC Series are assigned to the OUT area of the EtherNet/IP™ scanner.

Assembly Instance: 110 (6EH)

Offset	Item	Details	Data type	Value
0	Communication input [0:00] to [0:15]	Indicates the status of the communication inputs. When a bit is turned ON, the corresponding communication input is turned ON.	WORD	bit 0: Communication input bit 0 0: OFF 1: ON bit 1: Communication input bit 1 0: OFF 1: ON ... bit 15: Communication input bit 15 0: OFF 1: ON
...	...		...	
3	Communication input [3:00] to [3:15]		WORD	
4	Enablement code of communication input [0:00]	Indicates the status of the enablement code. The upper eight bits are ignored. (Range: 1 to 255)	UINT	0000H to 00FFH
...	...		...	
33	Enablement code of communication input [1:13]		UINT	
34	System reserved			
35	System reserved			
36	PLC text	Displays the status of the PLC text. The first character is set in the low byte while the second character is set in the high byte in the ASCII code format. The end terminal is NULL (00H).	STRING	
...				
45				

16-5 Message Communication

What is message communication?

In message communication, data reading and writing are performed by exchanging commands and responses between the EtherNet/IP™ scanner and the GC Series. GC Series-specific object data and EtherNet/IP™-defined standard object data can be read and written.

Objects available in the GC Series

Object name	Class ID	Details
GC-specific object	115 (73H)	This object type allows data to be read and written with the GC Series.
Identity Object	1 (01H)	This object type provides the identification information, general information, and reset service.
Assembly Object	4 (04H)	This object type provides access to devices transmitted via cyclic communication. This is used for data transmission to devices that do not support cyclic communication.
Connection Manager Object	6 (06H)	This object type is used for connection-type communication.
TCP/IP Interface Object	245 (F5H)	This object type provides a framework to set a TCP/IP network interface. You can set the IP address, subnet mask, and gateway.
Ethernet Link Object	246 (F6H)	This object type provides the Ethernet status information.

Basic format and process flow of message communication

The EtherNet/IP™ scanner communicates with the machine by transmitting explicit messages. The following basic example shows the command format of explicit messages transmitted by the EtherNet/IP™ scanner and the response formats returned from the machine to the EtherNet/IP™ scanner.

■ Command format

Item	Details
Service code	Specify the service code to use. 0EH: Parameter read (Get_Attribute_Single) 10H: Parameter write (Set_Attribute_Single)*1
Class ID	Specify the class ID according to the service to be used.
Instance ID	Specify the instance ID according to the service to be used.
Attribute ID	Specify the attribute ID according to the service to be used.
Service data	Specify the service data according to the service to be used.

*1 When cyclic communication is performed, data cannot be written by message communication.

■ Response format

Item	Details
General status	Returns the general status as a response to the command. 00H is returned when in a normal state.
Service response data	Returns the service response data as a response to the command.

■ Response format on errors

The general status data is set as follows when an error occurs. There is no service response data.

General status	Details
00H	Normal end
05H	The instance ID is outside the valid range.
08H	This service is not supported or cannot be executed by the specified instance ID.
09H	The written data is outside the valid range.
0EH	You tried to write to a non-writable attribute ID.
10H	The system is starting up. Try again later.
13H	The service data size is less than the specified value.
14H	The attribute ID is outside the valid range.
1FH	This service is supported by the specified instance ID but cannot be used with the specified attribute ID.
FEH	System error. Contact your nearest KEYENCE office.

Parameter list

■ GC-specific object (Class ID:115 (73H))

Word address

Instance ID	Attribute ID		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	DEC	HEX						
0	256	100H	Communication input [0:00] to [0:15]	Indicates the status of the communication inputs. When a bit is turned ON, the corresponding communication input is turned ON.	WORD	R/W	bit 0: Communication input bit 0 0: OFF 1: ON bit 1: Communication input bit 1 0: OFF 1: ON ... bit 15: Communication input bit 15 0: OFF 1: ON	○
...	...	...	...		...	...		
0	259	103H	Communication input [3:00] to [3:15]		WORD	R/W		○
0	260	104H	Enablement code of communication input [0:00]	Indicates the status of the enablement code. The upper eight bits are ignored. (Range: 1 to 255)	UINT	R/W	0000H to 00FFH	
...	...	...	...		...	...		
0	289	121H	Enablement code of communication input [1:13]		UINT	R/W		
0	290	122H	System reserved					
0	291	123H	System reserved					
0	292	124H	PLC text	Displays the status of the PLC text. The first character is set in the low byte while the second character is set in the high byte in the ASCII code format.	STRING	R/W	0000H to FFFFH	
0	512	200H	Number of connected units (expansion unit)	Indicates the number of connected expansion units.	UINT	R	0 to 65535	
0	513	201H	Number of connected units (remote I/O module)	Indicates the number of connected remote I/O modules.	UINT	R	0 to 65535	
0	514	202H	Model information (main controller)	Indicates the connected unit model.	WORD	R	bit 0 to 7: Unit model 1: GC-1000 2: GC-1000R 3: GC-S84 4: GC-S16 5: GC-S1R 6: GC-A16 bit 8: Positional relationship to the GC-B30 0: Unit positioned before the GC-B30 1: Unit positioned after the GC-B30 If the GC-B30 does not exist in the unit configuration, all units are set to 0. bit 9 to 15: System reserved (fixed to 0)	
0	515	203H	Model information (1st expansion unit)		WORD	R		
...	...	...	...		...	...		
0	524	20CH	Model information (10th expansion unit)		WORD	R		
0	525	20DH	Model information (1st remote I/O module)	Indicates the connected unit model.	WORD	R	bit 0 to 7: Unit model 7: GC-R45 8: GC-R48 bit 8 to 15: System reserved (fixed to 0)	
...	...	...	...		...	...		
0	528	210H	Model information (4th remote I/O module)		WORD	R		
0	529	211H	System reserved					
0	530	212H	Operation time	Indicates the time elapsed since the start of the unit in units of 10 ms.	DWORD	R	0 to FFFFFFFFH	

Instance ID	Attribute ID		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	DEC	HEX						
0	532	214H	GC operating state	Indicates the operating state of the GC.	WORD	R	bit 0: RUN state 0: The unit is stopped. 1: The unit is running. bit 1: Abnormal state 0: Normal 1: Abnormal * An abnormal state means that at least one alert or error is occurring. bit 2 to 15: System reserved (fixed to 0)	O
0	533	215H	Number of errors that occurred	Indicates the number of errors that are currently occurring.	UINT	R	0 to 30	
0	534	216H	Main code of the (1st) error code	Indicates the code of the error that is currently occurring. Error codes are sorted in the following order: (1) Errors are sorted in order of Error, Alert, and Info, starting from the first error. (2) Errors are sorted by error category in the order that they occurred. The high byte represents the main code while the low byte represents the detailed code. "Alert/Error list" (page A-7)	UINT	R	0 to 65535	
0	535	217H	Detailed code of the (1st) error code		UINT	R		
...	...	...	...		...	...		
0	592	250H	Main code of the (30th) error code		UINT	R		
0	593	251H	Detailed code of the (30th) error code		UINT	R		
0	594	252H	Communication output [0:00] to [0:15]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Communication output bit 0 bit 1: Communication output bit 1 ... bit 15: Communication output bit 15	O
0	...	...	...		...	...		
0	597	255H	Communication output [3:00] to [3:15]		WORD	R		O
0	598	256H	GC-Link port status	Indicates the GC-Link port status.	WORD	R	bit 0 to 3: GC-Link port A connection status 0000: Searching 0001: Not connected 0010: Connected bit 4 to 7: GC-Link port A error status 0000: No error 0001: Communication error bit 8 to 11: GC-Link port B connection status 0000: Searching 0001: Not connected 0010: Connected bit 12 to 15: GC-Link port B error status 0000: No error 0001: Communication error	
0	768	300H	GC-Link port A GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port A.	UINT	R	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2	
0	769	301H	System reserved					

Instance ID	Attribute ID		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	DEC	HEX						
0	770	302H	GC-Link port A GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port A.	UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
0	771	303H	GC-Link port A GL-R Sub unit 1 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
0	772	304H	GC-Link port A GL-R Sub unit 2 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
0	773	305H	GC-Link port A GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port A.	UINT	R	0 to 127	
0	774	306H	GC-Link port A GL-R Number of optical axes of sub unit 1		UINT	R	0 to 127	
0	775	307H	GC-Link port A GL-R Number of optical axes of sub unit 2		UINT	R	0 to 127	
0	776	308H	GC-Link port A GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6	○
0	777	309H	System reserved					
0	778	30AH	GC-Link port A GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port A. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
0	779	30BH	GC-Link port A GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
0	...	...	...		...	...		
0	841	349H	GC-Link port A GL-R Received-light-amount, Main unit, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
0	842	34AH	GC-Link port A GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
0	843	34BH	GC-Link port A GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
0	...	...	...		...	...		
0	905	389H	GC-Link port A GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
0	906	38AH	GC-Link port A GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
0	907	38BH	GC-Link port A GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
0	...	...	...		...	...		
0	969	3C9H	GC-Link port A GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	

Instance ID	Attribute ID		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	DEC	HEX						
0	970	3CAH	GC-Link port A GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	R	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis	O
0	971	3CBH	GC-Link port A GL-R ON/OFF information of each optical axis [31:16]		WORD	R	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis	O
0	...	...	...		...	...		
0	984	3D8H	GC-Link port A GL-R ON/OFF information of each optical axis [239:224]		WORD	R	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis	O
0	985	3D9H	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	WORD	R	0: No error 1: Error occurring	O
0	986	3DAH	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	WORD	R	0: OFF 1: ON	O
0	987	3DBH	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	R	0: Disabled 1: Enabled	O
0	988	3DCH	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	R	0: No alert 1: Alert occurring	O
0	989	3DDH	GC-Link port A GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A in percentage.	UINT	R	0 to 100	
0	990	3DEH	GC-Link port A GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	UINT	R	0: No set 1: 5 sec 2: 30 sec 3: 5 min	
0	1024	400H	GC-Link port A GS Number of connected units	Indicates the number of GS units connected to the GC-Link port A.	UINT	R	0 to 16	
0	1025	401H	GC-Link port A GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port A.	WORD	R	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved	O
0	1026	402H	GC-Link port A GS Model information (2nd unit)		WORD	R		O
0	...	...	...		...	...		
0	1040	410H	GC-Link port A GS Model information (16th unit)		WORD	R		O

Instance ID	Attribute ID		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	DEC	HEX						
0	1041	411H	GC-Link port A GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	WORD	R	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved	O
0	1042	412H	GC-Link port A GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port A.	WORD	R	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close	O
0	1043	413H	GC-Link port A GS Lock status	Indicates the lock status of each GS connected to the GC-Link port A. This is always 0 for the non-contact type.	WORD	R	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked	O
0	1044	414H	GC-Link port A GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port A.	WORD	R	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved	O
0	1045	415H	GC-Link port A GS 2nd unit status		WORD	R		O
0	...	...	...		...	...		
0	1059	423H	GC-Link port A GS 16th unit status		WORD	R		O
0	1280	500H	GC-Link port B GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port B.	UINT	R	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2	
0	1281	501H	System reserved					
0	1282	502H	GC-Link port B GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port B.	UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
0	1283	503H	GC-Link port B GL-R Sub unit 1 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
0	1284	504H	GC-Link port B GL-R Sub unit 2 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	

Instance ID	Attribute ID		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	DEC	HEX						
0	1285	505H	GC-Link port B GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port B.	UINT	R	0 to 127	
0	1286	506H	GC-Link port B GL-R Number of optical axes of sub unit 1		UINT	R	0 to 127	
0	1287	507H	GC-Link port B GL-R Number of optical axes of sub unit 2		UINT	R	0 to 127	
0	1288	508H	GC-Link port B GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6	○
0	1289	509H	System reserved					
0	1290	50AH	GC-Link port B GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port B. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
0	1291	50BH	GC-Link port B GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
0	...	...	...		...	...		
0	1353	549H	GC-Link port B GL-R Received-light-amount, Main unit, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
0	1354	54AH	GC-Link port B GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
0	1355	54BH	GC-Link port B GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
0	...	...	...		...	...		
0	1417	589H	GC-Link port B GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
0	1418	58AH	GC-Link port B GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
0	1419	58BH	GC-Link port B GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
0	...	...	...		...	...		
0	1481	5C9H	GC-Link port B GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	

Instance ID	Attribute ID		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	DEC	HEX						
0	1482	5CAH	GC-Link port B GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	R	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis	○
0	1483	5CBH	GC-Link port B GL-R ON/OFF information of each optical axis [31:16]		WORD	R	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis	○
0	...	...	...		...	...	...	
0	1496	5D8H	GC-Link port B GL-R ON/OFF information of each optical axis [239:224]		WORD	R	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis	○
0	1497	5D9H	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	WORD	R	0: No error 1: Error occurring	○
0	1498	5DAH	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	WORD	R	0: OFF 1: ON	○
0	1499	5DBH	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	R	0: Disabled 1: Enabled	○
0	1500	5DCH	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	R	0: No alert 1: Alert occurring	○
0	1501	5DDH	GC-Link port B GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B in percentage.	UINT	R	0 to 100	
0	1502	5DEH	GC-Link port B GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	UINT	R	0: No set 1: 5 sec 2: 30 sec 3: 5 min	
0	1536	600H	GC-Link port B GS Number of connected units	Indicates the number of GS units connected to the GC-Link port B.	UINT	R	0 to 16	
0	1537	601H	GC-Link port B GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port B.	WORD	R	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved	○
0	1538	602H	GC-Link port B GS Model information (2nd unit)		WORD	R		○
0	...	...	...		...	...		
0	1552	610H	GC-Link port B GS Model information (16th unit)		WORD	R		○

Instance ID	Attribute ID		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	DEC	HEX						
0	1553	611H	GC-Link port B GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port B.	WORD	R	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved	O
0	1554	612H	GC-Link port B GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port B.	WORD	R	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close	O
0	1555	613H	GC-Link port B GS Lock status	Indicates the lock status of each GS connected to the GC-Link port B. This is always 0 for the non-contact type.	WORD	R	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked	O
0	1556	614H	GC-Link port B GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port B.	WORD	R	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved	O
0	1557	615H	GC-Link port B GS 2nd unit status		WORD	R		O
0	...	...	...		...	...		
0	1571	623H	GC-Link port B GS 16th unit status		WORD	R		O
0	1792	700H	Project name	Indicates the project name of the configuration file (UTF-16).	STRING	R		
0	1857	741H	Configuration CRC	Indicates the configuration CRC of the configuration file (UTF-16).	STRING	R		
0	1866	74A	Date and time of transfer	Indicates the date and time of transfer of the configuration file (UTF-16).	STRING	R		

Instance ID	Attribute ID		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	DEC	HEX						
0	2048	800H	Input status (GC-Link port)	Indicates the input/output status of each unit.*1	WORD	R		O
0	2049	801H	Input status (main controller)		WORD	R		O
0	2050	802H	Input status (1st expansion unit)		WORD	R		O
0	...	...	...		...	...		
0	2059	80BH	Input status (10th expansion unit)		WORD	R		O
0	2060	80CH	Input status (1st remote I/O module)		WORD	R		O
0	...	...	...		...	...		
0	2063	80FH	Input status (4th remote I/O module)		WORD	R		O
0	2064	810H	Output status (GC-Link port)		WORD	R		O
0	2065	811H	Output status (main controller)		WORD	R		O
0	2066	812H	Output status (1st expansion unit)		WORD	R		O
0	...	...	...		...	...		
0	2075	81BH	Output status (10th expansion unit)		WORD	R		O
0	2076	81CH	Output status (1st remote I/O module)		WORD	R		O
0	...	...	...		...	...		
0	2079	81FH	Output status (4th remote I/O module)		WORD	R		O
0	2304	900H	Number of used blocks	Indicates the number of blocks used by the program.	UINT	R	0 to 500	
0	2305	901H	Block output status (Block ID 1)	Indicates the output status of each block used by the program.*2	WORD	R		O
0	...	...	...		...	...		
0	2804	AF4H	Block output status (Block ID 500)		WORD	R		O
0	2816	B00H	Number of error histories	Indicates the number of error histories.	UINT	R	0 to 100	
0	2817	B01H	1st error history, Error code, Main code	Indicates the error code of the 1st error history. Error histories are sorted in newest-first chronological order. "Alert/Error list" (page A-7)	UINT	R	0 to 99	
0	2818	B02H	1st error history, Error code, Detailed code		UINT	R	0 to 9999	
0	2819	B03H	1st error history, Operation time on error	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	DWORD	R	0 to FFFFFFFFH	
0	...	...	...	...	...	...		
0	3213	C8DH	100th error history, Error code, Main code	Indicates the error code of the 100th error history.	UINT	R	0 to 99	
0	3214	C8EH	100th error history, Error code, Detailed code		UINT	R	0 to 9999	
0	3215	C8FH	100th error history, Operation time on error	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	DWORD	R	0 to FFFFFFFFH	

*1 For the bit assignment of each unit, refer to "Input/output status assignment by unit" (page 16-35).

*2 Check the block ID in the GC Configurator report. For the bit assignment of each block, refer to "Output status assignment by block" (page 16-37).

Bit address

Instance ID	Attribute ID		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	DEC	HEX		Bit position					
0	4096	1000H	Communication input [0:00] to [0:15]	0	[0:00]	Indicates the status of the communication inputs. When a bit is turned ON, the corresponding communication input is turned ON.	Bit	R/W	0: OFF 1: ON
0	...	...		...	...		Bit	R/W	
0	4111	100FH		15	[0:15]		Bit	R/W	
0	...	...	...	...	...		Bit	R/W	
0	4144	1030H	Communication input [3:00] to [3:15]	0	[3:00]		Bit	R/W	
0	...	...		...	...		Bit	R/W	
0	4159	103FH		15	[3:15]		Bit	R/W	
0	8512	2140H	GC operating state	0	RUN state	Indicates the RUN state of the GC.	Bit	R	0: The unit is stopped. 1: The unit is running.
0	8513	2141H		1	Abnormal state	Indicates the abnormal state of the GC. An abnormal state means that at least one alert or error is occurring.	Bit	R	0: Normal 1: Abnormal
0	9504	2520H	Communication output [0:00] to [0:15]	0	Communication output [0:00]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	9519	252FH		15	Communication output [0:15]		Bit	R	
0	...	...	...	...	...		Bit	R	
0	9552	2550H	Communication output [3:00] to [3:15]	0	Communication output [3:00]		Bit	R	
0	...	...		...	...		Bit	R	
0	9567	255FH		15	Communication output [3:15]		Bit	R	
0	12416	3080H	GC-Link port A GL-R Main controller setting switch settings	0	GC-Link port A GL-R Main controller setting switch settings, Switch 1	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
0	12417	3081H		1	GC-Link port A GL-R Main controller setting switch settings, Switch 2		Bit	R	
0	12418	3082H		2	GC-Link port A GL-R Main controller setting switch settings, Switch 3		Bit	R	
0	12419	3083H		3	GC-Link port A GL-R Main controller setting switch settings, Switch 4		Bit	R	
0	12420	3084H		4	GC-Link port A GL-R Main controller setting switch settings, Switch 5		Bit	R	
0	12421	3085H		5	GC-Link port A GL-R Main controller setting switch settings, Switch 6		Bit	R	

Instance ID	Attribute ID		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	DEC	HEX		Bit position					
0	15520	3CA0H	GC-Link port A GL-R ON/OFF information of each optical axis [15:0]	0	GC-Link port A GL-R ON/OFF information of each optical axis, 1st optical axis	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the offset following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	15535	3CAFH		15	GC-Link port A GL-R ON/OFF information of each optical axis, 16th optical axis		Bit	R	
0	...	...	...	...	...		Bit	R	
0	15744	3D80H	GC-Link port A GL-R ON/OFF information of each optical axis [239:224]	0	GC-Link port A GL-R ON/OFF information of each optical axis, 225th optical axis		Bit	R	
0	...	...		...	...		Bit	R	
0	15759	3D8FH		15	GC-Link port A GL-R ON/OFF information of each optical axis, 240th optical axis		Bit	R	
0	15760	3D90H	GC-Link port A GL-R Error status	0	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	Bit	R	0: No error 1: Error occurring
0	15776	3DA0H	GC-Link port A GL-R OSSD output status	0	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
0	15792	3DB0H	GC-Link port A GL-R Received-light-amount decrease alert enablement status	0	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	Bit	R	0: Disabled 1: Enabled
0	15808	3DC0H	GC-Link port A GL-R Received-light-amount decrease alert detection status	0	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	Bit	R	0: No alert 1: Alert occurring
0	16400	4010H	GC-Link port A GS Model information (1st unit)	0	GC-Link port A GS 1st GS model information	Indicates the model information of the 1st GS connected to the GC-Link port A.	Bit	R	0: Non-contact type 1: Lock type
0	16401	4011H		1	GC-Link port A GS 1st GS lock type information	Indicates the lock type information of the 1st GS connected to the GC-Link port A.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
0	16402	4012H		2	System reserved	System reserved	Bit	R	
0	16403	4013H		3	System reserved	System reserved	Bit	R	
0	16404	4014H		4	System reserved	System reserved	Bit	R	
0	16405	4015H		5	System reserved	System reserved	Bit	R	
0	16406	4016H		6	GC-Link port A GS 1st GS coding level settings	Indicates the coding level settings of the 1st GS connected to the GC-Link port A.	Bit	R	0: Low (multi operation) 1: High (unique operation)
0	...	...	...	...	...	...	Bit	R	...

Instance ID	Attribute ID		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	DEC	HEX		Bit position					
0	16640	4100H	GC-Link port A GS Model information (16th unit)	0	GC-Link port A GS 16th GS model information	Indicates the model information of the 16th GS connected to the GC-Link port A.	Bit	R	0: Non-contact type 1: Lock type
0	16641	4101H		1	GC-Link port A GS 16th GS lock type information	Indicates the lock type information of the 16th GS connected to the GC-Link port A.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
0	16642	4102H		2	System reserved	System reserved	Bit	R	
0	16643	4103H		3	System reserved	System reserved	Bit	R	
0	16644	4104H		4	System reserved	System reserved	Bit	R	
0	16645	4105H		5	System reserved	System reserved	Bit	R	
0	16646	4106H		6	GC-Link port A GS 16th GS coding level settings	Indicates the coding level settings of the 16th GS connected to the GC-Link port A.	Bit	R	0: Low (multi operation) 1: High (unique operation)
0	16656	4110H	GC-Link port A GS OSSD/lock control status	0	GC-Link port A GS OSSD status	Indicates the OSSD status of the GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
0	16657	4111H		1	GC-Link port A GS Lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	Bit	R	0: Unlocked 1: Locked
0	16672	4120H	GC-Link port A GS Open/close state	0	GC-Link port A 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
0	...	...		...	...	...	Bit	R	...
0	16687	412FH		15	GC-Link port A 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
0	16688	4130H	GC-Link port A GS Lock status	0	GC-Link port A 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
0	...	...		...	...	...	Bit	R	...
0	16703	413FH		15	GC-Link port A 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
0	16704	4140H	GC-Link port A GS 1st unit status	0	GC-Link port A 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
0	16705	4141H		1	GC-Link port A 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
0	16706	4142H		2	GC-Link port A 1st GS Red LED display status	Indicates the red LED display status of the 1st GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
0	16707	4143H		3	GC-Link port A 1st GS Green LED display status	Indicates the green LED display status of the 1st GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON

Instance ID	Attribute ID		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	DEC	HEX		Bit position					
0	...	...	...	...	...	...	Bit	R	...
0	16944	4230H	GC-Link port A GS 16th unit status	0	GC-Link port A 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
0	16945	4231H		1	GC-Link port A 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
0	16946	4232H		2	GC-Link port A 15th GS Red LED display status	Indicates the red LED display status of the 15th GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
0	16947	4233H		3	GC-Link port A 15th GS Green LED display status	Indicates the green LED display status of the 15th GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
0	20608	5080H	GC-Link port B GL-R Main controller setting switch settings	0	GC-Link port B GL-R Main controller setting switch settings, Switch 1	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
0	20609	5081H		1	GC-Link port B GL-R Main controller setting switch settings, Switch 2		Bit	R	
0	20610	5082H		2	GC-Link port B GL-R Main controller setting switch settings, Switch 3		Bit	R	
0	20611	5083H		3	GC-Link port B GL-R Main controller setting switch settings, Switch 4		Bit	R	
0	20612	5084H		4	GC-Link port B GL-R Main controller setting switch settings, Switch 5		Bit	R	
0	20613	5085H		5	GC-Link port B GL-R Main controller setting switch settings, Switch 6		Bit	R	
0	23712	5CA0H	GC-Link port B GL-R ON/OFF information of each optical axis [15:0]	0	GC-Link port B GL-R ON/OFF information of each optical axis, 1st optical axis	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the offset following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	23727	5CAFH		15	GC-Link port B GL-R ON/OFF information of each optical axis, 16th optical axis		Bit	R	
0	...	...	...	...	...		Bit	R	
0	23936	5D80H	GC-Link port B GL-R ON/OFF information of each optical axis [239:224]	0	GC-Link port B GL-R ON/OFF information of each optical axis, 225th optical axis		Bit	R	
0	...	...		...	...		Bit	R	
0	23951	5D8FH		15	GC-Link port B GL-R ON/OFF information of each optical axis, 240th optical axis		Bit	R	
0	23952	5D90H	GC-Link port B GL-R Error status	0	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	Bit	R	0: No error 1: Error occurring
0	23968	5DA0H	GC-Link port B GL-R OSSD output status	0	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	Bit	R	0: OFF 1: ON

Instance ID	Attribute ID		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	DEC	HEX		Bit position					
0	23984	5DB0H	GC-Link port B GL-R Received-light-amount decrease alert enablement status	0	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	Bit	R	0: Disabled 1: Enabled
0	24000	5DC0H	GC-Link port B GL-R Received-light-amount decrease alert detection status	0	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	Bit	R	0: No alert 1: Alert occurring
0	24592	6010H	GC-Link port B GS Model information (1st unit)	0	GC-Link port B GS 1st GS model information	Indicates the model information of the 1st GS connected to the GC-Link port B.	Bit	R	0: Non-contact type 1: Lock type
0	24593	6011H		1	GC-Link port B GS 1st GS lock type information	Indicates the lock type information of the 1st GS connected to the GC-Link port B.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
0	24594	6012H		2	System reserved	System reserved	Bit	R	
0	24595	6013H		3	System reserved	System reserved	Bit	R	
0	24596	6014H		4	System reserved	System reserved	Bit	R	
0	24597	6015H		5	System reserved	System reserved	Bit	R	
0	24598	6016H		6	GC-Link port B GS 1st GS coding level settings	Indicates the coding level settings of the 1st GS connected to the GC-Link port B.	Bit	R	0: Low (multi operation) 1: High (unique operation)
0	...	...	...	...	...	...	Bit	R	...
0	24832	6100H	GC-Link port B GS Model information (16th unit)	0	GC-Link port B GS 16th GS model information	Indicates the model information of the 16th GS connected to the GC-Link port B.	Bit	R	0: Non-contact type 1: Lock type
0	24833	6101H		1	GC-Link port B GS 16th GS lock type information	Indicates the lock type information of the 16th GS connected to the GC-Link port B.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
0	24834	6102H		2	System reserved	System reserved	Bit	R	
0	24835	6103H		3	System reserved	System reserved	Bit	R	
0	24836	6104H		4	System reserved	System reserved	Bit	R	
0	24837	6105H		5	System reserved	System reserved	Bit	R	
0	24838	6106H		6	GC-Link port B GS 16th GS coding level settings	Indicates the coding level settings of the 16th GS connected to the GC-Link port B.	Bit	R	0: Low (multi operation) 1: High (unique operation)
0	24848	6110H	GC-Link port B GS OSSD/lock control status	0	GC-Link port B GS OSSD status	Indicates the OSSD status of the GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
0	24849	6111H		1	GC-Link port B GS Lock control status	Indicates the lock control status of the GS connected to the GC-Link port B.	Bit	R	0: Unlocked 1: Locked
0	24864	6120H	GC-Link port B GS Open/close state	0	GC-Link port B 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
0	...	...		...	...	...	Bit	R	...
0	24879	612FH		15	GC-Link port B 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close

Instance ID	Attribute ID		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	DEC	HEX		Bit position					
0	24880	6130H	GC-Link port B GS Lock status	0	GC-Link port B 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
0	...	...		...	...	...	Bit	R	...
0	24895	613FH		15	GC-Link port B 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
0	24896	6140H	GC-Link port B GS 1st unit status	0	GC-Link port B 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
0	24897	6141H		1	GC-Link port B 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
0	24898	6142H		2	GC-Link port B 1st GS Red LED display status	Indicates the red LED display status of the 1st GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
0	24899	6143H		3	GC-Link port B 1st GS Green LED display status	Indicates the green LED display status of the 1st GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
0	...	...	...	...	...	...	Bit	R	...
0	25136	6230H	GC-Link port B GS 16th unit status	0	GC-Link port B 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
0	25137	6231H		1	GC-Link port B 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
0	25138	6232H		2	GC-Link port B 15th GS Red LED display status	Indicates the red LED display status of the 15th GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
0	25139	6233H		3	GC-Link port B 15th GS Green LED display status	Indicates the green LED display status of the 15th GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
0	32768	8000H	Input status (GC-Link port)	0	Input status (GC-Link port) bit 0	Indicates the input status of the GC-Link port.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	32783	800FH		15	Input status (GC-Link port) bit 15		Bit	R	
0	32784	8010H	Input status (main controller)	0	Input status (main controller) bit 0	Displays the input status of the main controller.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	32799	801FH		15	Input status (main controller) bit 15		Bit	R	
0	32800	8020H	Input status (1st expansion unit)	0	Input status (1st expansion unit) bit 0	Indicates the input status of the 1st expansion unit.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	32815	802FH		15	Input status (1st expansion unit) bit 15		Bit	R	

Instance ID	Attribute ID		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	DEC	HEX		Bit position					
0	...	...	...	...	...	...	Bit	R	...
0	32944	80B0H	Input status (10th expansion unit)	0	Input status (10th expansion unit) bit 0	Indicates the input status of the 10th expansion unit.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	32959	80BFH		15	Input status (10th expansion unit) bit 15		Bit	R	
0	32960	80C0H	Input status (1st remote I/O module)	0	Input status (1st remote I/O module) bit 0	Indicates the input status of the 1st remote I/O module.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	32975	80CFH		15	Input status (1st remote I/O module) bit 15		Bit	R	
0	...	...	...	...	...	...	Bit	R	...
0	33008	80F0H	Input status (4th remote I/O module)	0	Input status (4th remote I/O module) bit 0	Indicates the input status of the 4th remote I/O module.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	33023	80FFH		15	Input status (4th remote I/O module) bit 15		Bit	R	
0	33024	8100H	Output status (GC-Link port)	0	Output status (GC-Link port) bit 0	Indicates the output status of the GC-Link port.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	33039	810FH		15	Output status (GC-Link port) bit 15		Bit	R	
0	33040	8110H	Output status (main controller)	0	Output status (main controller) bit 0	Displays the output status of the main controller.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	33055	811FH		15	Output status (main controller) bit 15		Bit	R	
0	33056	8120H	Output status (1st expansion unit)	0	Output status (1st expansion unit) bit 0	Indicates the output status of the 1st expansion unit.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	33071	812FH		15	Output status (1st expansion unit) bit 15		Bit	R	
0	...	...	...	...	...	...	Bit	R	...
0	33200	81B0H	Output status (10th expansion unit)	0	Output status (10th expansion unit) bit 0	Indicates the output status of the 10th expansion unit.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	33215	81BFH		15	Output status (10th expansion unit) bit 15		Bit	R	
0	33216	81C0H	Output status (1st remote I/O module)	0	Output status (1st remote I/O module) bit 0	Indicates the output status of the 1st remote I/O module.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	33231	81CFH		15	Output status (1st remote I/O module) bit 15		Bit	R	
0	...	...	...	...	...	...	Bit	R	...
0	33264	81F0H	Output status (4th remote I/O module)	0	Output status (4th remote I/O module) bit 0	Indicates the output status of the 4th remote I/O module.*1	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	33279	81FFH		15	Output status (4th remote I/O module) bit 15		Bit	R	

Instance ID	Attribute ID		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	DEC	HEX		Bit position					
0	36880	9010H	Block output status (Block ID 1)	0	Block output status (Block ID 1) bit 0	Indicates the output status of the Block ID 1 block.*2	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	36895	901FH		15	Block output status (Block ID 1) bit 15		Bit	R	
0	...	...	...	...	...	...	Bit	R	...
0	44864	AF40H	Block output status (Block ID 500)	0	Block output status (Block ID 500) bit 0	Indicates the output status of the Block ID 500 block.*2	Bit	R	0: OFF 1: ON
0	...	...		...	...		Bit	R	
0	44879	AF4FH		15	Block output status (Block ID 500) bit 15		Bit	R	

*1 For the bit assignment of each unit, refer to "Input/output status assignment by unit" (page 16-35).

*2 Check the block ID in the GC Configurator report. For the bit assignment of each block, refer to "Output status assignment by block" (page 16-37).

● Input/output status assignment by unit

◆Input status (GC-Link port)

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved										Port B	Port A	Port B		Port A	
										Ai	Ai	Si1	Si0	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (main controller)

GC-1000

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Si15	Si14	Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

GC-1000R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved		Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (nth expansion unit)

GC-S84

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved								Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

GC-S16

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Si15	Si14	Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (nth remote I/O module)

GC-R45/R48

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved				CN4	CN3	CN2	CN1	CN4		CN3		CN2		CN1	
				Ai	Ai	Ai	Ai	Si1	Si0	Si1	Si0	Si1	Si0	Si1	Si0

Input status 0: OFF, 1: ON

◆Output status (GC-Link port)

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												Port B		Port A	
												Ao1	Ao0	Ao1	Ao0

Output status 0: OFF, 1: ON

◆Output status (main controller)

GC-1000

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved						Ao3	Ao2	Ao1	Ao0	So5	So4	So3	So2	So1	So0

Output status 0: OFF, 1: ON

GC-1000R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved							Ao3	Ao2	Ao1	Ao0	SRo	So3	So2	So1	So0

Output status 0: OFF, 1: ON

◆Output status (nth expansion unit)

GC-S84

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												So3	So2	So1	So0

Output status 0: OFF, 1: ON

GC-S1R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved															SRo

Output status 0: OFF, 1: ON

GC-A16

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Ao15	Ao14	Ao13	Ao12	Ao11	Ao10	Ao9	Ao8	Ao7	Ao6	Ao5	Ao4	Ao3	Ao2	Ao1	Ao0

Output status 0: OFF, 1: ON

◆Output status (nth remote I/O module)

GC-R45

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												CN4	CN3	CN2	CN1
												Ao	Ao	Ao	Ao

Output status 0: OFF, 1: ON

GC-R48

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												CN4	CN3	CN2	CN1
												So	So	So	So

Output status 0: OFF, 1: ON

● Output status assignment by block

		Block name	Bit assignment
Input devices	Safety input devices	Emergency stop switch	bit 0: Output
		Limit switch	
		Interlock switch	
		Guard locking switch	
		GS Series [KEYENCE]	
		Light curtain	
		GL-R Series [KEYENCE]	
		GL-S Series [KEYENCE]	
		Laser scanner	
		SZ-V Series [KEYENCE]	
		SZ Series [KEYENCE]	
		Rope pull switch	
		Safety mat	
		Two hand control device	
		Enabling device	
		Other safety switch	
		Other safety input	
	Other input devices	Reset switch	bit 0: Output
		Mode selecting switch	bit 0: Mode Output 1 bit 1: Mode Output 2 bit 2: Error
		EDM input	bit 0: Output
		Muting input	
		Safety plug	
		Hold-to-run switch	
		Other switch	
		Other input	

		Block name		Bit assignment
Output devices	Safety outputs	S-OUT S-OUT EDM enabled	Safety 1 output	bit 0: Output bit 1: Reserved bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
			Safety 2 output	bit 0: Output1 bit 1: Output2 bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
		S-OUT (Relay output) S-OUT (Relay output) EDM enabled		bit 0: Output bit 1: Reserved bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
	Other outputs	AUX-OUT		bit 0: Output bit 1: Reserved bit 2: Error
Communications	Communication input	Reset input (COM) Other input (COM)	Enablement code disabled	bit 0: Output
			Enablement code enabled	bit 0: Output bit1: Ready bit 2: Error
	Communication output	Communication output		bit 0: Output bit 1: Reserved bit 2: Error
Register		Register (Load)		bit 0: Output
		Register (Store)		
Expansion blocks	None	GS closed state		bit 0: Output
		GS locked state		
		GS indicator control output		bit 0: Red bit 1: Green bit 2: Output Error
Other input blocks		GL-R received-light-amount decrease alert		bit 0: Output
		AUX-IN		
		OSSD 3/4		
		IN		

		Block name		Bit assignment
Other output blocks		Unlock output	Lock control 1 output	bit 0: Output bit 1: Reserved bit 2: DIAG Error bit 3: Wait OFF
			Lock control 2 output	bit 0: Output1 bit 1: Output2 bit 2: DIAG Error bit 3: Wait OFF
		Indicator control output		bit 0: Red bit 1: Green bit 2: Output Error
		Bank switching output	Independent bank	bit 0: Bank Output A bit 1: Bank Output a bit 2: Input Mismatch bit 3: Output Error
			Single	bit 0: Bank Output A bit 1: Bank Output a bit 2: Bank Output B bit 3: Bank Output b bit 4: Bank Output C bit 5: Bank Output c bit 6: Input Mismatch bit 7: Output Error
			Binary	bit 0: Bank Output A bit 1: Bank Output a bit 2: Bank Output B bit 3: Bank Output b bit 4: Bank Output C bit 5: Bank Output c bit 6: Bank Output D bit 7: Bank Output d bit 8: Bank Output E bit 9: Bank Output e bit 10: Input Mismatch bit 11: Output Error
		OUT		bit 0: Output bit 1: Reserved bit 2: Error
Function blocks	Logic	AND		bit 0: Output
		AND (6-10 inputs)		
		OR		
		NOT		
		NAND		
		NOR		
		XOR		
		SR Flip-Flop (Set has priority)		
		RS Flip-Flop (Reset has priority)		
		JK Flip-Flop		

		Block name	Bit assignment
Function blocks	Reset	Reset	bit 0: Output bit 1: Reset Required
		Reset (with AND)	bit 0: Output bit 1: Reset Required
		Dual reset	bit 0: Output bit 1: Reset Required1 bit 2: Reset Required2
		Existence detection reset	bit 0: Output bit 1: Reset Required
	Muting	Sequential muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Parallel muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Cross-muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Muting for exit	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Position detection muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout

		Block name	Bit assignment
Function blocks	Application	Master ON	bit 0: Master ON Ready bit 1: Reset Required
		Unlock control	bit 0: Unlock Output bit 1: Unlock Required
		Bypass	bit 0: Output bit 1: Bypass Active
		Control guard	bit 0: Output bit 1: Reset Required
		PSDI control	bit 0: Output bit 1: Output2 bit 2: Break Required bit 3: Reset Required bit 4: Normal Operation bit 5: PSDI Error bit 6: PSDI Timeout
	Manual mode	Manual mode control (MMC)	bit 0: Input Bypass bit 1: Output Enable bit 2: Restart Required bit 3: Manual Mode Active
		MMC input bypass	bit 0: Output
		MMC input bypass_	bit 0: Output
		MMC output enable	bit 0: Output
	Timers / Counters	OFF-delay	bit 0: Output bit 1: Delay Active
		ON-delay	bit 0: Output bit 1: Delay Active
		Pulse generator	bit 0: Output
		Up-down counter	bit 0: Reached Upper Limit bit 1: Reached Zero
		Up-down counter (with binary output)	bit 0: Reached Upper Limit bit 1: Reached Zero bit 2: Output bit 0 bit 3: Output bit 1 bit 4: Output bit 2 bit 5: Output bit 3 bit 6: Output bit 4 bit 7: Output bit 5 bit 8: Output bit 6 bit 9: Output bit 7

		Block name	Bit assignment
Function blocks	Others	Edge detection	bit 0: Rising Edge bit 1: Falling Edge
		Binary decoder	bit 0: Output1 bit 1: Output2 bit 2: Output3 bit 3: Output4 bit 4: Output5 bit 5: Output6 bit 6: Output7 bit 7: Output8
		Binary encoder	bit 0: Output bit 0 bit 1: Output bit 1 bit 2: Output bit 2 bit 3: Error
		Mode changing control	bit 0: Mode Output1 bit 1: Mode Output2 bit 2: Mode Output3 bit 3: Mode Output4 bit 4: Mode Output5 bit 5: Mode Output6 bit 6: Mode Output7 bit 7: Mode Output8 bit 8: Mode Error bit 9: Trigger Required
		Selector (2 inputs) Selector (4 inputs)	bit 0: Output bit 1: Mode Error
System blocks	None	Always ON	bit 0: Output
		Always OFF	
		1 scan ON upon start-up	
		System Information	
		Block information	
		Jump (Load)	
		Jump (Store)	
		Event history trigger	
Other functions	Recipe block	AND (with connection constraint function)	bit 0: Output

17

PROFINET Communication Function

This chapter describes the settings and functions of the PROFINET communication function.

17-1 Overview of the PROFINET Communication Function ..... page 17-2
17-2 PROFINET Communication Specifications ..... page 17-3
17-3 PROFINET Communication Settings ..... page 17-4
17-4 Cyclic Communication ..... page 17-6
17-5 Acyclic Communication ..... page 17-20
17-6 Diagnostic Function ..... page 17-38

17-1 Overview of the PROFINET Communication Function

This section describes the PROFINET communication function.

DANGER	**All of the data received from the communication of the EtherNet/IP™, PROFINET, UDP, Modbus/TCP, or MC protocol cannot be used for the safety related part of the control system. When used incorrectly, there is a possibility that the operator of the device may be threatened with major injury or even death.**

Point **The Ethernet communication function is available only for the main controller "GC-1000".**

Overview of the PROFINET Communication Function

The GC Series functions as a PROFINET IO device, allowing you to perform the following:

Item	Cyclic communication	Acyclic communication
Write a communication input.	✓	--
Write an enablement code.	✓	--
Write a character string that is stored into the history function.	✓	--
Read out a communication output.	✓	✓
Read out an error code.	✓	✓
Read out the unit configuration and model information.	✓	✓
Read out the received-light-amount and ON/OFF state of the GL-R Series connected to a GC-Link port.	✓	✓
Read out the door open/close state and ON/OFF state of the GS Series connected to a GC-Link port.	✓	✓
Read out the ON/OFF status of the main controller, expansion unit, and remote I/O module.	--	✓
Read out the block status.	--	✓
Read out the error history.	--	✓

17-2 PROFINET Communication Specifications

PROFINET Communication Specifications for the GC Series

Category	Item	Details
Ethernet specifications	Communication media	100BASE-TX full-duplex
Basic specifications	Applicable network	PROFINET IO communication
	Supported function	Cyclic communication (data I/O communication)
		Acyclic communication (record data communication)
	Conformance class	Conformance class B
	GSDML version	Version 2.35
	Conformance test version	Based on version 2.35
	Applicable protocol	LLDP, SNMP, DCP
	Netload	Class 3
Cyclic communication specifications	Update time	1 to 512 ms

17-3 PROFINET Communication Settings

PROFINET Communication Settings

GC Configurator settings

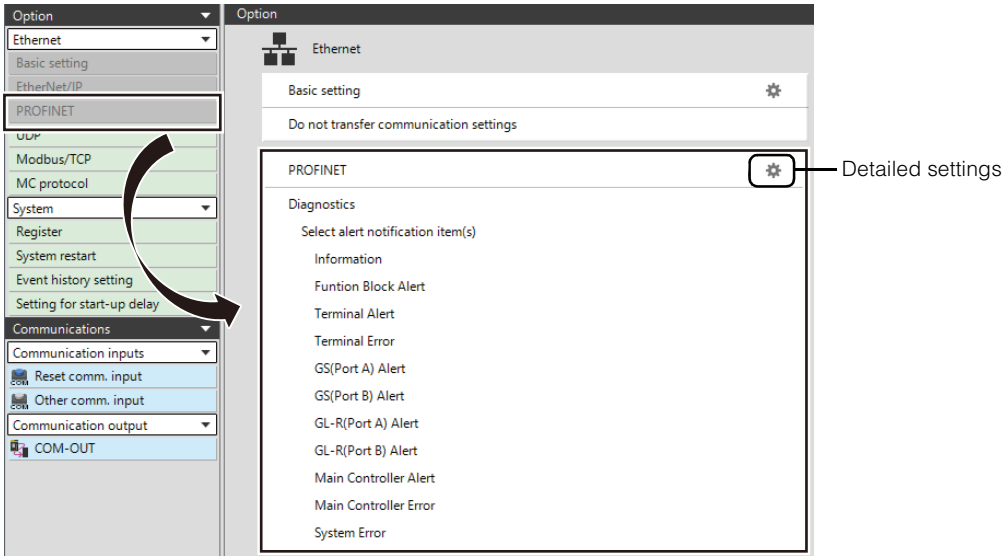
[Setting procedure]

■ Basic Ethernet settings

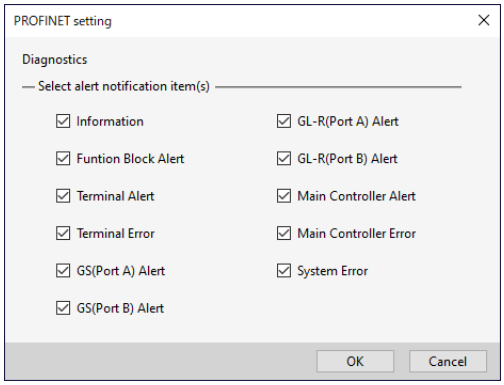
Open the configuration screen from [Settings] and configure the basic Ethernet settings."15-2 GC Configurator Settings" (page 15-3)

■ PROFINET settings

Open the configuration screen from [Settings] and drag and drop [PROFINET] to the screen to register.



Detailed settings



Item	Details
Diagnostics	Set the error/alert and information items to be notified by the PROFINET Diagnostics function.

■ Registering communication inputs and communication outputs

Open the configuration screen from [Settings] and drag and drop [Communication input] and [Communication output] to the screen to register.

"15-2 GC Configurator Settings" (page 15-3)

■ Programming

Perform programming using the communication blocks.

" How to Use a Communication Block" (page 15-9)

PROFINET IO controller settings

Set the IP address and configure the PROFINET communication settings as follows:

[Setting procedure]

1 **Register the GSDML file.**

The GC Series functions which can be used with the PROFINET IO communication are defined in the GSDML file. If you set the GC Series for the first time using the PROFINET IO controller configuration software, install the GC Series GSDML file on the configuration software.

The GC Series GSDML file can be downloaded from the KEYENCE website.

www.keyence.com/glb

2 **Add the GC Series to the PROFINET IO system.**

Installing the GSDML file on the configuration software adds the GC Series to the hardware catalog of the configuration software. Select the GC Series from the hardware catalog and add it to the PROFINET IO system.

3 **Enter a device name.**

Set a device name for the added GC Series.

4 **Assign a communication module.**

Select a communication module to use from the hardware catalog and assign it to the GC Series slot. For the communication modules which can be assigned to each slot, refer to "17-4 Cyclic Communication" (page 17-6).

17-4 Cyclic Communication

Cyclic communication is a function to exchange data between a PLC (PROFINET IO controller) and the GC Series at a fixed cycle. Programming on the PLC side is not necessary to execute cyclic communication.
For what you can do with cyclic communication, refer to "17-1 Overview of the PROFINET Communication Function" (page 17-2).

Communication Module List

Available communication modules

The following communication module are available for the GC Series cyclic communication.

Communication module name	Input	Output	Assignable slot number
Communication input/output	8 bytes	60 bytes	Slot 1
GC-1000 Status Data	160 bytes	0 byte	Slot 2
GL-R (GC-Link Port A)	425 bytes	0 byte	Slot 3
GS (GC-Link Port A)	38 bytes	0 byte	Slot 3
GL-R (GC-Link Port B)	425 bytes	0 byte	Slot 4
GS (GC-Link Port B)	38 bytes	0 byte	Slot 4

Communication Module: Communication Input/Output

Input (from the GC Series to the PROFINET IO controller)

Byte offset	Item	Description	Data type	Value
0	Communication output [0:00] to [0:07]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	1 byte BYTE	bit0: Communication output bit 0 bit1: Communication output bit 1 ... bit7: Communication output bit 7
1	Communication output [0:08] to [0:15]		1 byte BYTE	bit0: Communication output bit 8 bit1: Communication output bit 9 ... bit7: Communication output bit 15
...				
6	Communication output [3:00] to [3:07]		1 byte BYTE	bit0: Communication output bit 0 bit1: Communication output bit 1 ... bit7: Communication output bit 7
7	Communication output [3:08] to [3:15]		1 byte BYTE	bit0: Communication output bit 8 bit1: Communication output bit 9 ... bit7: Communication output bit 15

Output (from the PROFINET IO controller to the GC Series)

Byte offset	Item	Description	Data type	Value
0	Communication input [0:00] to [0:07]	Indicates the input status of the communication inputs. When a communication input is turned ON, the corresponding bit is turned ON.	1 byte BYTE	bit0: Communication input bit 0 bit1: Communication input bit 1 ... bit7: Communication input bit 7
1	Communication input [0:08] to [0:15]		1 byte BYTE	bit0: Communication input bit 8 bit1: Communication input bit 9 ... bit7: Communication input bit 15
...				
6	Communication input [3:00] to [3:07]		1 byte BYTE	bit0: Communication input bit 0 bit1: Communication input bit 1 ... bit7: Communication input bit 7
7	Communication input [3:08] to [3:15]		1 byte BYTE	bit0: Communication input bit 8 bit1: Communication input bit 9 ... bit7: Communication input bit 15
8	Enablement code of communication input [0:00]	Indicates the status of the enablement code.	1 byte USINT	00H to FFH
9	Enablement code of communication input [0:01]			
...				
37	Enablement code of communication input [1:13]			
38	System reserved			
39	System reserved			
40	PLC text, 1st character	Displays the status of the PLC text. The ASCII code format is used for setting. The end terminal is NULL (00H).	1 byte CHAR	
41	PLC text, 2nd character		1 byte CHAR	
...				
59	PLC text, 20th character		1 byte CHAR	

Communication Module: GC-1000 Operating State

Input (from the GC Series to the PROFINET IO controller)

Byte offset	Item	Description	Data type	Value
0	Number of connected units (expansion unit)	Indicates the number of connected expansion units.	1 byte USINT	0 to 10
1	Number of connected units (remote I/O module)	Indicates the number of connected remote I/O modules.	1 byte USINT	0 to 4
2	Model information (main controller)	Indicates the connected unit model.	1 byte USINT	1: GC-1000 2: GC-1000R
3	System reserved			
4	Model information (1st expansion unit)	Indicates the connected unit model.	1 byte USINT	3: GC-S84 4: GC-S16 5: GC-S1R 6: GC-A16
5	Positional relationship to the GC-B30 (1st expansion unit)	Indicates the positional relationship between the connected unit and the GC-B30.	1 byte USINT	0: Unit positioned before the GC-B30 1: Unit positioned after the GC-B30
...				
22	Model information (10th expansion unit)	Indicates the connected unit model.	1 byte USINT	3: GC-S84 4: GC-S16 5: GC-S1R 6: GC-A16
23	Positional relationship to the GC-B30 (10th expansion unit)	Indicates the positional relationship between the connected unit and the GC-B30.	1 byte USINT	0: Unit positioned before the GC-B30 1: Unit positioned after the GC-B30
24	Model information (1st remote I/O module)	Indicates the connected unit model.	1 byte USINT	7: GC-R45 8: GC-R48
25	System reserved			
26	Model information (2nd remote I/O module)	Indicates the connected unit model.	1 byte USINT	7: GC-R45 8: GC-R48
27	System reserved			
...				
30	Model information (4th remote I/O module)	Indicates the connected unit model.	1 byte USINT	7: GC-R45 8: GC-R48
31	System reserved			
32	Operation time	Indicates the time elapsed since the start of the unit in units of 10 ms.	4 bytes UDINT	0 to 4294967295
36	GC operating state	Indicates the operating state of the GC.	1 byte BYTE	bit 0: RUN state 0: The unit is stopped. 1: The unit is running. bit 1: Abnormal state 0: Normal 1: Abnormal * An abnormal state means that at least one alert or error is occurring.

Byte offset	Item	Description	Data type	Value
37	Number of errors that occurred	Indicates the number of errors that are currently occurring.	1 byte USINT	0 to 30
38	Main code of the (1st) error code	Indicates the main code of the error that is currently occurring. Error codes are sorted in the following order: (1) Errors are sorted in order of Error, Alert, and Info, starting from the first error. (2) Errors are sorted by error category in (1) in order that they occurred.	2 bytes UINT	
40	Detailed code of the (1st) error code		2 bytes UINT	
...				
154	Main code of the (30th) error code		2 bytes UINT	
156	Detailed code of the (30th) error code		2 bytes UINT	
158	GC-Link port status (port A)	Indicates the GC-Link port status.	1 byte BYTE	bit 0 to 3: GC-Link connection status 0000: Searching 0001: Not connected 0010: Connected bit 4 to 7: GC-Link error status 0000: No error 0001: Communication error
159	GC-Link port status (port B)		1 byte BYTE	

Communication Module: GL-R (GC-Link Port A)

Input (from the GC Series to the PROFINET IO controller)

Byte offset	Item	Description	Data type	Value
0	GC-Link port A GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port A.	1 byte USINT	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2
1	GC-Link port A GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port A.	1 byte USINT	0: Not connected 1: Type F 2: Type H 3: Type L
2	GC-Link port A GL-R Sub unit 1 type		1 byte USINT	
3	GC-Link port A GL-R Sub unit 2 type		1 byte USINT	
4	GC-Link port A GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port A.	1 byte USINT	0 to 127
5	GC-Link port A GL-R Number of optical axes of sub unit 1		1 byte USINT	
6	GC-Link port A GL-R Number of optical axes of sub unit 2		1 byte USINT	
7	GC-Link port A GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	1 byte BYTE	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6

Byte offset	Item	Description	Data type	Value
8	GC-Link port A GL-R Received-light-amount, Main unit, 1st optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port A. The received-light-amount range is 0 to 63.	1 byte USINT	0 to 63
9	GC-Link port A GL-R Received-light-amount, Main unit, 2nd optical axis		1 byte USINT	
...				
134	GC-Link port A GL-R Received-light-amount, Main unit, 127th optical axis		1 byte USINT	
135	GC-Link port A GL-R Received-light-amount, Sub unit 1, 1st optical axis		1 byte USINT	
136	GC-Link port A GL-R Received-light-amount, Sub unit 1, 2nd optical axis		1 byte USINT	
...				
261	GC-Link port A GL-R Received-light-amount, Sub unit 1, 127th optical axis		1 byte USINT	
262	GC-Link port A GL-R Received-light-amount, Sub unit 2, 1st optical axis		1 byte USINT	
263	GC-Link port A GL-R Received-light-amount, Sub unit 2, 2nd optical axis		1 byte USINT	
...				
388	GC-Link port A GL-R Received-light-amount, Sub unit 2, 127th optical axis		1 byte USINT	

Byte offset	Item	Description	Data type	Value
389	GC-Link port A GL-R ON/OFF information of each optical axis [7:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	1 byte BYTE	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 7: ON/OFF information of the 8th optical axis
390	GC-Link port A GL-R ON/OFF information of each optical axis [15:8]		1 byte BYTE	bit0: ON/OFF information of the 9th optical axis bit1: ON/OFF information of the 10th optical axis ... bit7: ON/OFF information of the 16th optical axis
...				
418	GC-Link port A GL-R ON/OFF information of each optical axis [239:232]		1 byte BYTE	bit0: ON/OFF information of the 233th optical axis bit1: ON/OFF information of the 234th optical axis ... Bit7: ON/OFF information of the 240th optical axis
419	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	1 byte USINT	0: No error 1: Error occurring
420	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	1 byte USINT	0: OFF 1: ON
421	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	1 byte USINT	0: Disabled 1: Enabled
422	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	1 byte USINT	0: No alert 1: Alert occurring
423	GC-Link port A GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A in percentage.	1 byte USINT	0 to 100
424	GC-Link port A GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	1 byte USINT	0: No set 1: 5 sec 2: 30 sec 3: 5 min

Communication Module: GS (GC-Link Port A)

Input (from the GC Series to the PROFINET IO controller)

Byte offset	Item	Description	Data type	Value
0	GC-Link port A GS Number of connected units	Indicates the number of GS units connected to the GC-Link port A.	1 byte USINT	0 to 16
1	GC-Link port A GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port A.	1 byte BYTE	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation)
2	GC-Link port A GS Model information (2nd unit)		1 byte BYTE	
...				
16	GC-Link port A GS Model information (16th unit)		1 byte BYTE	
17	GC-Link port A GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	1 byte BYTE	bit 0: OSSD state 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked
18	GC-Link port A GS Open/close state (1st to 8th units)	Indicates the open/close state of each GS connected to the GC-Link port A.	1 byte BYTE	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 7: Open/close state of the 8th unit 0: Open 1: Close
19	GC-Link port A GS Open/close state (9th to 16th units)		1 byte BYTE	bit 0: Open/close state of the 9th unit 0: Open 1: Close bit 1: Open/close state of the 10th unit 0: Open 1: Close ... bit 7: Open/close state of the 16th unit 0: Open 1: Close

Byte offset	Item	Description	Data type	Value
20	GC-Link port A GS Lock status (1st to 8th units)	Indicates the lock status of each GS connected to the GC-Link port A. This is always 0 for the non-contact type.	1 byte BYTE	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 7: Lock status of the 8th unit 0: Unlocked 1: Locked
21	GC-Link port A GS Lock status (9th to 16th units)		1 byte BYTE	bit 0: Lock status of the 9th unit 0: Unlocked 1: Locked bit 1: Lock status of the 10th unit 0: Unlocked 1: Locked ... bit 7: Lock status of the 16th unit 0: Unlocked 1: Locked
22	GC-Link port A GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port A.	1 byte BYTE	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON
23	GC-Link port A GS 2nd unit status		1 byte BYTE	
...				
37	GC-Link port A GS 16th unit status		1 byte BYTE	

Communication Module: GL-R (GC-Link Port B)

Input (from the GC Series to the PROFINET IO controller)

Byte offset	Item	Description	Data type	Value
0	GC-Link port B GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port B.	1 byte USINT	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2
1	GC-Link port B GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port B.	1 byte USINT	0: Not connected 1: Type F 2: Type H 3: Type L
2	GC-Link port B GL-R Sub unit 1 type		1 byte USINT	
3	GC-Link port B GL-R Sub unit 2 type		1 byte USINT	
4	GC-Link port B GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port B.	1 byte USINT	0 to 127
5	GC-Link port B GL-R Number of optical axes of sub unit 1		1 byte USINT	
6	GC-Link port B GL-R Number of optical axes of sub unit 2		1 byte USINT	
7	GC-Link port B GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	1 byte BYTE	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6

Byte offset	Item	Description	Data type	Value
8	GC-Link port B GL-R Received-light-amount, Main unit, 1st optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port B. The received-light-amount range is 0 to 63.	1 byte USINT	0 to 63
9	GC-Link port B GL-R Received-light-amount, Main unit, 2nd optical axis		1 byte USINT	
...				
134	GC-Link port B GL-R Received-light-amount, Main unit, 127th optical axis		1 byte USINT	
135	GC-Link port B GL-R Received-light-amount, Sub unit 1, 1st optical axis		1 byte USINT	
136	GC-Link port B GL-R Received-light-amount, Sub unit 1, 2nd optical axis		1 byte USINT	
...				
261	GC-Link port B GL-R Received-light-amount, Sub unit 1, 127th optical axis		1 byte USINT	
262	GC-Link port B GL-R Received-light-amount, Sub unit 2, 1st optical axis		1 byte USINT	
263	GC-Link port B GL-R Received-light-amount, Sub unit 2, 2nd optical axis		1 byte USINT	
...				
388	GC-Link port B GL-R Received-light-amount, Sub unit 2, 127th optical axis		1 byte USINT	

Byte offset	Item	Description	Data type	Value
389	GC-Link port B GL-R ON/OFF information of each optical axis [7:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	1 byte BYTE	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 7: ON/OFF information of the 8th optical axis
390	GC-Link port B GL-R ON/OFF information of each optical axis [15:8]		1 byte BYTE	bit0: ON/OFF information of the 9th optical axis bit1: ON/OFF information of the 10th optical axis ... bit7: ON/OFF information of the 16th optical axis
...				
418	GC-Link port B GL-R ON/OFF information of each optical axis [239:232]		1 byte BYTE	bit0: ON/OFF information of the 233th optical axis bit1: ON/OFF information of the 234th optical axis ... Bit7: ON/OFF information of the 240th optical axis
419	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	1 byte USINT	0: No error 1: Error occurring
420	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	1 byte USINT	0: OFF 1: ON
421	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	1 byte USINT	0: Disabled 1: Enabled
422	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	1 byte USINT	0: No alert 1: Alert occurring
423	GC-Link port B GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B in percentage.	1 byte USINT	0 to 100
424	GC-Link port B GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	1 byte USINT	0: No set 1: 5 sec 2: 30 sec 3: 5 min

Communication Module: GS (GC-Link Port B)

Input (from the GC Series to the PROFINET IO controller)

Byte offset	Item	Description	Data type	Value
0	GC-Link port B GS Number of connected units	Indicates the number of GS units connected to the GC-Link port B.	1 byte USINT	0 to 16
1	GC-Link port B GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port B.	1 byte BYTE	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation)
2	GC-Link port B GS Model information (2nd unit)		1 byte BYTE	
...				
16	GC-Link port B GS Model information (16th unit)		1 byte BYTE	
17	GC-Link port B GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port B.	1 byte BYTE	bit 0: OSSD state 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked
18	GC-Link port B GS Open/close state (1st to 8th units)	Indicates the open/close state of each GS connected to the GC-Link port B.	1 byte BYTE	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 7: Open/close state of the 8th unit 0: Open 1: Close
19	GC-Link port B GS Open/close state (9th to 16th units)		1 byte BYTE	bit 0: Open/close state of the 9th unit 0: Open 1: Close bit 1: Open/close state of the 10th unit 0: Open 1: Close ... bit 7: Open/close state of the 16th unit 0: Open 1: Close

Byte offset	Item	Description	Data type	Value
20	GC-Link port B GS Lock status (1st to 8th units)	Indicates the lock status of each GS connected to the GC-Link port B. This is always 0 for the non-contact type.	1 byte BYTE	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 7: Lock status of the 8th unit 0: Unlocked 1: Locked
21	GC-Link port B GS Lock status (9th to 16th units)		1 byte BYTE	bit 0: Lock status of the 9th unit 0: Unlocked 1: Locked bit 1: Lock status of the 10th unit 0: Unlocked 1: Locked ... bit 7: Lock status of the 16th unit 0: Unlocked 1: Locked
22	GC-Link port B GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port B.	1 byte BYTE	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON
23	GC-Link port B GS 2nd unit status		1 byte BYTE	
...				
37	GC-Link port B GS 16th unit status		1 byte BYTE	

17-5 Acyclic Communication

Acyclic communication is a function to read data through exchange of commands and responses between a PLC (PROFINET IO controller) and the GC Series.

Parameter List

Slot*1	Sub Slot*1	Index		Item	Details	Data type	Attribute	Value
		DEC	HEX					
0	1	256	100H	Communication input [0:00] to [0:15]	Indicates the status of the communication inputs. When a bit is turned ON, the corresponding communication input is turned ON.	WORD	R	bit 0: Communication input bit 0 0: OFF 1: ON bit 1: Communication input bit 1 0: OFF 1: ON ... bit 15: Communication input bit 15 0: OFF 1: ON
		...	...	...		...	...	
		259	103H	Communication input [3:00] to [3:15]		WORD	R	
		260	104H	Enablement code of communication input [0:00]	Indicates the status of the enablement code. The upper eight bits are ignored. (Range: 1 to 255)	UINT	R	0000H to 00FFH
		...	...	...		...	...	
		289	121H	Enablement code of communication input [1:13]		UINT	R	
		290	122H	System reserved				
		291	123H	System reserved				
		292	124H	PLC text	Displays the status of the PLC text (ASCII code format). Up to 20 characters.	STRING (Up to 21 bytes)	R	0000H to FFFFH
		512	200H	Number of connected units (expansion unit)	Indicates the number of connected expansion units.	UINT	R	0 to 65535
		513	201H	Number of connected units (remote I/O module)	Indicates the number of connected remote I/O modules.	UINT	R	0 to 65535
		514	202H	Model information (main controller)	Indicates the connected unit model.	WORD	R	bit 0 to 7: Unit model 1: GC-1000 2: GC-1000R 3: GC-S84 4: GC-S16 5: GC-S1R 6: GC-A16 bit 8: Positional relationship to the GC-B30 0: Unit positioned before the GC-B30 1: Unit positioned after the GC-B30 If the GC-B30 does not exist in the unit configuration, all units are set to 0. bit 9 to 15: System reserved (fixed to 0)
		515	203H	Model information (1st expansion unit)		WORD	R	
		...	...	...		...	...	
		524	20CH	Model information (10th expansion unit)		WORD	R	
		525	20DH	Model information (1st remote I/O module)	Indicates the connected unit model.	WORD	R	bit 0 to 7: Unit model 7: GC-R45 8: GC-R48 bit 8 to 15: System reserved (fixed to 0)
		...	...	...		...	...	
		528	210H	Model information (4th remote I/O module)		WORD	R	
		529	211H	System reserved				
		530	212H	Operation time	Indicates the time elapsed since the start of the unit in units of 10 ms.	DWORD	R	0 to FFFFFFFFH

Slot*1	Sub Slot*1	Index		Item	Details	Data type	Attribute	Value
		DEC	HEX					
0	1	532	214H	GC operating state	Indicates the operating state of the GC.	WORD	R	bit 0: RUN state 0: The unit is stopped. 1: The unit is running. bit 1: Abnormal state 0: Normal 1: Abnormal * An abnormal state means that at least one alert or error is occurring. bit 2 to 15: System reserved (fixed to 0)
		533	215H	Number of errors that occurred	Indicates the number of errors that are currently occurring.	UINT	R	0 to 30
		534	216H	Main code of the (1st) error code	Indicates the code of the error that is currently occurring. Error codes are sorted in the following order: (1) Errors are sorted in order of Error, Alert, and Info, starting from the first error. (2) Errors are sorted by error category in the order that they occurred. The high byte represents the main code while the low byte represents the detailed code. "Alert/Error list" (page A-7)	UINT	R	0 to 65535
		535	217H	Detailed code of the (1st) error code		UINT	R	
		...	...	...		...	...	
		592	250H	Main code of the (30th) error code		UINT	R	
		593	251H	Detailed code of the (30th) error code		UINT	R	
		594	252H	Communication output [0:00] to [0:15]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Communication output bit 0 bit 1: Communication output bit 1 ... bit 15: Communication output bit 15
		...	...	...		...	...	
		597	255H	Communication output [3:00] to [3:15]		WORD	R	
		598	256H	GC-Link port status	Indicates the GC-Link port status.	WORD	R	bit 0 to 3: GC-Link port A connection status 0000: Searching 0001: Not connected 0010: Connected bit 4 to 7: GC-Link port A error status 0000: No error 0001: Communication error bit 8 to 11: GC-Link port B connection status 0000: Searching 0001: Not connected 0010: Connected bit 12 to 15: GC-Link port B error status 0000: No error 0001: Communication error
		768	300H	GC-Link port A GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port A.	UINT	R	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2
		769	301H	System reserved				

Slot*1	Sub Slot*1	Index		Item	Details	Data type	Attribute	Value
		DEC	HEX					
0	1	770	302H	GC-Link port A GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port A.	UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L
		771	303H	GC-Link port A GL-R Sub unit 1 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L
		772	304H	GC-Link port A GL-R Sub unit 2 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L
		773	305H	GC-Link port A GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port A.	UINT	R	0 to 127
		774	306H	GC-Link port A GL-R Number of optical axes of sub unit 1		UINT	R	0 to 127
		775	307H	GC-Link port A GL-R Number of optical axes of sub unit 2		UINT	R	0 to 127
		776	308H	GC-Link port A GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6
		777	309H	System reserved				
		778	30AH	GC-Link port A GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port A. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
		779	30BH	GC-Link port A GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
		...	...	...		...	...	
		841	349H	GC-Link port A GL-R Received-light-amount, Main unit, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0
		842	34AH	GC-Link port A GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
		843	34BH	GC-Link port A GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
		...	...	...		...	...	
		905	389H	GC-Link port A GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0
		906	38AH	GC-Link port A GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
		907	38BH	GC-Link port A GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
		...	...	...		...	...	
		969	3C9H	GC-Link port A GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0

Slot*1	Sub Slot*1	Index		Item	Details	Data type	Attribute	Value
		DEC	HEX					
0	1	970	3CAH	GC-Link port A GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	R	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis
		971	3CBH	GC-Link port A GL-R ON/OFF information of each optical axis [31:16]		WORD	R	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis
		...	...	...		...	...	
		984	3D8H	GC-Link port A GL-R ON/OFF information of each optical axis [239:224]		WORD	R	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis
		985	3D9H	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	WORD	R	0: No error 1: Error occurring
		986	3DAH	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	WORD	R	0: OFF 1: ON
		987	3DBH	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	R	0: Disabled 1: Enabled
		988	3DCH	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	R	0: No alert 1: Alert occurring
		989	3DDH	GC-Link port A GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A in percentage.	UINT	R	0 to 100
		990	3DEH	GC-Link port A GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	UINT	R	0: No set 1: 5 sec 2: 30 sec 3: 5 min
		1024	400H	GC-Link port A GS Number of connected units	Indicates the number of GS units connected to the GC-Link port A.	UINT	R	0 to 16
		1025	401H	GC-Link port A GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port A.	WORD	R	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved
		1026	402H	GC-Link port A GS Model information (2nd unit)		WORD	R	
		...	...	...		...	...	
		1040	410H	GC-Link port A GS Model information (16th unit)		WORD	R	

Slot*1	Sub Slot*1	Index		Item	Details	Data type	Attribute	Value
		DEC	HEX					
0	1	1041	411H	GC-Link port A GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	WORD	R	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved
		1042	412H	GC-Link port A GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port A.	WORD	R	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close
		1043	413H	GC-Link port A GS Lock status	Indicates the lock status of each GS connected to the GC-Link port A. This is always 0 for the non-contact type.	WORD	R	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked
		1044	414H	GC-Link port A GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port A.	WORD	R	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved
		1045	415H	GC-Link port A GS 2nd unit status		WORD	R	
		...	...	...		...	...	
		1059	423H	GC-Link port A GS 16th unit status		WORD	R	
		1280	500H	GC-Link port B GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port B.	UINT	R	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2
		1281	501H	System reserved				
		1282	502H	GC-Link port B GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port B.	UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L
		1283	503H	GC-Link port B GL-R Sub unit 1 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L
		1284	504H	GC-Link port B GL-R Sub unit 2 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L

Slot*1	Sub Slot*1	Index		Item	Details	Data type	Attribute	Value
		DEC	HEX					
0	1	1285	505H	GC-Link port B GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port B.	UINT	R	0 to 127
		1286	506H	GC-Link port B GL-R Number of optical axes of sub unit 1		UINT	R	0 to 127
		1287	507H	GC-Link port B GL-R Number of optical axes of sub unit 2		UINT	R	0 to 127
		1288	508H	GC-Link port B GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6
		1289	509H	System reserved				
		1290	50AH	GC-Link port B GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port B. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
		1291	50BH	GC-Link port B GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
		...	...	...		...	...	
		1353	549H	GC-Link port B GL-R Received-light-amount, Main unit, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0
		1354	54AH	GC-Link port B GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
		1355	54BH	GC-Link port B GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
		...	...	...		...	...	
		1417	589H	GC-Link port B GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0
		1418	58AH	GC-Link port B GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis
		1419	58BH	GC-Link port B GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis
		...	...	...		...	...	
		1481	5C9H	GC-Link port B GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0

Slot*1	Sub Slot*1	Index		Item	Details	Data type	Attribute	Value
		DEC	HEX					
0	1	1482	5CAH	GC-Link port B GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	R	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis
		1483	5CBH	GC-Link port B GL-R ON/OFF information of each optical axis [31:16]		WORD	R	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis
		...	...	...		...	...	...
		1496	5D8H	GC-Link port B GL-R ON/OFF information of each optical axis [239:224]		WORD	R	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis
		1497	5D9H	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	WORD	R	0: No error 1: Error occurring
		1498	5DAH	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	WORD	R	0: OFF 1: ON
		1499	5DBH	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	R	0: Disabled 1: Enabled
		1500	5DCH	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	R	0: No alert 1: Alert occurring
		1501	5DDH	GC-Link port B GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B in percentage.	UINT	R	0 to 100
		1502	5DEH	GC-Link port B GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	UINT	R	0: No set 1: 5 sec 2: 30 sec 3: 5 min
		1536	600H	GC-Link port B GS Number of connected units	Indicates the number of GS units connected to the GC-Link port B.	UINT	R	0 to 16
		1537	601H	GC-Link port B GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port B.	WORD	R	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved
		1538	602H	GC-Link port B GS Model information (2nd unit)		WORD	R	
		...	...	...		...	...	
		1552	610H	GC-Link port B GS Model information (16th unit)		WORD	R	

Slot*1	Sub Slot*1	Index		Item	Details	Data type	Attribute	Value
		DEC	HEX					
0	1	1553	611H	GC-Link port B GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port B.	WORD	R	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved
		1554	612H	GC-Link port B GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port B.	WORD	R	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close
		1555	613H	GC-Link port B GS Lock status	Indicates the lock status of each GS connected to the GC-Link port B. This is always 0 for the non-contact type.	WORD	R	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked
		1556	614H	GC-Link port B GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port B.	WORD	R	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved
		1557	615H	GC-Link port B GS 2nd unit status		WORD	R	
		...	...	...		...	...	
		1571	623H	GC-Link port B GS 16th unit status		WORD	R	
		1792	700H	Project name	Indicates the project name of the configuration file (ASCII code format). Up to 64 characters.	STRING (up to 65 bytes)	R	
		1857	741H	Configuration CRC	Indicates the configuration CRC of the configuration file (ASCII code format). Up to 8 characters.	STRING (up to 9 bytes)	R	
		1866	74AH	Date and time of transfer	Indicates the date and time of transfer of the configuration file (ASCII code format). Up to 20 characters.	STRING (up to 21 bytes)	R	

Slot*1	Sub Slot*1	Index		Item	Details	Data type	Attribute	Value
		DEC	HEX					
0	1	2048	800H	Input status (GC-Link port)	Indicates the input/output status of each unit.* 2	2 bytes WORD	R	
		2049	801H	Input status (main controller)		2 bytes WORD	R	
		2050	802H	Input status (1st expansion unit)		2 bytes WORD	R	
		2051	803H	Input status (2nd expansion unit)		2 bytes WORD	R	
		...						
		2059	80BH	Input status (10th expansion unit)		2 bytes WORD	R	
		2060	80CH	Input status (1st remote I/O module)		2 bytes WORD	R	
		2061	80DH	Input status (2nd remote I/O module)		2 bytes WORD	R	
		...						
		2063	80FH	Input status (1st remote I/O module)		2 bytes WORD	R	
		2064	810H	Output status (GC-Link port)		2 bytes WORD	R	
		2065	811H	Output status (main controller)		2 bytes WORD	R	
		2066	812H	Output status (1st expansion unit)		2 bytes WORD	R	
		2067	813H	Output status (2nd expansion unit)		2 bytes WORD	R	
		...						
		2075	81BH	Output status (10th expansion unit)		2 bytes WORD	R	
		2076	81CH	Output status (1st remote I/O module)		2 bytes WORD	R	
		2077	81DH	Output status (2nd remote I/O module)		2 bytes WORD	R	
		...						
		2079	81FH	Output status (4th remote I/O module)		2 bytes WORD	R	
		2304	900H	Number of used blocks	Indicates the number of blocks used by the program.	2 bytes UINT	R	0 to 500
		2305	901H	Block output status (Block ID 1)	Indicates the output status of each block used by the program.* 3	2 bytes WORD	R	
		2306	902H	Block output status (Block ID 2)		2 bytes WORD	R	
		...						
		2804	AF4H	Block output status (Block ID 500)		2 bytes WORD	R	
		2816	B00H	Number of error histories	Indicates the number of error histories.	2 bytes UINT	R	0 to 100
		2817	B01H	1st error history, Error code, Main code	Indicates the error code of the 1st error history. Error histories are sorted in newest-first chronological order. " Alert/Error list" (page A-7)	2 bytes UINT	R	0 to 99
		2818	B02H	1st error history, Error code, Detailed code		2 bytes UINT	R	0 to 9999
		2819	B03H	1st error history, Operation time on error	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	4 bytes UDINT	R	0 to 4294967295

Slot*1	Sub Slot*1	Index		Item	Details	Data type	Attribute	Value
		DEC	HEX					
0	1	2821	B05H	2nd error history, Error code, Main code	Indicates the error code of the 2nd error history. Error histories are sorted in newest-first chronological order. " Alert/Error list" (page A-7)	2 bytes UINT	R	0 to 99
		2822	B06H	2nd error history, Error code, Detailed code		2 bytes UINT	R	0 to 9999
		2823	B07H	2nd error history, Operation time on error	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	4 bytes UDINT	R	0 to 4294967295
		...						
		3213	C8DH	100th error history, Error code, Main code	Indicates the error code of the 100th error history. Error histories are sorted in newest-first chronological order. " Alert/Error list" (page A-7)	2 bytes UINT	R	0 to 99
		3214	C8EH	100th error history, Error code, Detailed code		2 bytes UINT	R	0 to 9999
		3215	C8FH	100th error history, Operation time on error	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	4 bytes UDINT	R	0 to 4294967295

*1 For this example, the slot is set to 0 and the sub slot is set to 1. As long as it is a combination of a connected slot and sub slot, any number can be set.

*2 For the bit assignment of each unit, refer to "Input/output status assignment by unit" (page 17-30).

*3 Check the block ID in the GC Configurator report. For the bit assignment of each block, refer to "Output status assignment by block" (page 17-32).

● Input/output status assignment by unit

0: OFF, 1: ON

◆Input status (GC-Link port)

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved										Port B	Port A	Port B		Port A	
										Ai	Ai	Si1	Si0	Si1	Si0

◆Input status (main controller)

GC-1000

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Si15	Si14	Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

GC-1000R

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved		Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

◆Input status (nth expansion unit)

GC-S84

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved								Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

GC-S16

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Si15	Si14	Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

◆Input status (nth remote I/O module)

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved				CN4	CN3	CN2	CN1	CN4		CN3		CN2		CN1	
				Ai	Ai	Ai	AI	Si1	Si0	Si1	Si0	Si1	Si0	Si1	Si0

◆Output status (GC-Link port)

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved												Port B		Port A	
												Ao1	Ao0	Ao1	Ao0

◆Output status (main controller)

GC-1000

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved						Ao3	Ao2	Ao1	Ao0	So5	So4	So3	So2	So1	So0

GC-1000R

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved							Ao3	Ao2	Ao1	Ao0	SRo	So3	So2	So1	So0

◆Output status (nth expansion unit)

GC-S84

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved												So3	So2	So1	So0

GC-S1R

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved															SRo

GC-A16

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Ao15	Ao14	Ao13	Ao12	Ao11	Ao10	Ao9	Ao8	Ao7	Ao6	Ao5	Ao4	Ao3	Ao2	Ao1	Ao0

◆Output status (nth remote I/O module)

GC-R45

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved												CN4	CN3	CN2	CN1
												Ao	Ao	Ao	Ao

GC-R48

bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Reserved												CN4	CN3	CN2	CN1
												So	So	So	So

● Output status assignment by block

		Block name	Bit assignment
Input devices	Safety input devices	Emergency stop switch	bit 0: Output
		Limit switch	
		Interlock switch	
		Guard locking switch	
		GS Series [KEYENCE]	
		Light curtain	
		GL-R Series [KEYENCE]	
		GL-S Series [KEYENCE]	
		Laser scanner	
		SZ-V Series [KEYENCE]	
		SZ Series [KEYENCE]	
		Rope pull	
		Safety mat	
		Two hand control switch	
		Enabling device	
		Other safety switch	
		Other safety input	
	Other input devices	Reset switch	bit 0: Output
		Mode selecting switch	bit 0: Mode Output 1 bit 1: Mode Output 2 bit 2: Error
		EDM input	bit 0: Output
		Muting input	
		Safety plug	
		Hold-to-run switch	
		Other switch	
		Other input	

		Block name		Bit assignment
Output devices	Safety outputs	S-OUT S-OUT EDM enabled	Safety 1 output	bit 0: Output bit 1: Reserved bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
			Safety 2 output	bit 0: Output1 bit 1: Output2 bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
		S-OUT (Relay output) S-OUT (Relay output) EDM enabled		bit 0: Output bit 1: Reserved bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
	Other outputs	AUX-OUT		bit 0: Output bit 1: Reserved bit 2: Error
Communications	Communication input	Reset input (COM) Other input (COM)	Enablement code disabled	bit 0: Output
			Enablement code enabled	bit 0: Output bit1: Ready bit 2: Error
	Communication output	Communication output		bit 0: Output bit 1: Reserved bit 2: Error
Register		Register (Load)		bit 0: Output
		Register (Store)		
Expansion blocks	None	GS closed state		bit 0: Output
		GS locked state		
		GS indicator control output		bit 0: Red bit 1: Green bit 2: Output Error
Other input blocks		GL-R received-light-amount decrease alert		bit 0: Output
		AUX-IN		
		OSSD 3/4		
		IN		

		Block name		Bit assignment
Other output blocks		Unlock output	Lock control 1 output	bit 0: Output bit 1: Reserved bit 2: DIAG Error bit 3: Wait OFF
			Lock control 2 output	bit 0: Output1 bit 1: Output2 bit 2: DIAG Error bit 3: Wait OFF
		Indicator control output		bit 0: Red bit 1: Green bit 2: Output Error
		Bank switching output	Independent bank	bit 0: Bank Output A bit 1: Bank Output a bit 2: Input Mismatch bit 3: Output Error
			Single	bit 0: Bank Output A bit 1: Bank Output a bit 2: Bank Output B bit 3: Bank Output b bit 4: Bank Output C bit 5: Bank Output c bit 6: Input Mismatch bit 7: Output Error
			Binary	bit 0: Bank Output A bit 1: Bank Output a bit 2: Bank Output B bit 3: Bank Output b bit 4: Bank Output C bit 5: Bank Output c bit 6: Bank Output D bit 7: Bank Output d bit 8: Bank Output E bit 9: Bank Output e bit 10: Input Mismatch bit 11: Output Error
		OUT		bit 0: Output bit 1: Reserved bit 2: Error
Function blocks	Logic	AND		bit 0: Output
		AND (6-10 inputs)		
		OR		
		NOT		
		NAND		
		NOR		
		XOR		
		SR Flip-Flop (Set has priority)		
		RS Flip-Flop (Reset has priority)		
		JK Flip-Flop		

		Block name	Bit assignment
Function blocks	Reset	Reset	bit 0: Output bit 1: Reset Required
		Reset (with AND)	bit 0: Output bit 1: Reset Required
		Dual reset	bit 0: Output bit 1: Reset Required1 bit 2: Reset Required2
		Existence detection reset	bit 0: Output bit 1: Reset Required
	Muting	Sequential muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Parallel muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Cross-muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Muting for exit	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Position detection muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout

		Block name	Bit assignment
Function blocks	Application	Master ON	bit 0: Master ON Ready bit 1: Reset Required
		Unlock control	bit 0: Unlock Output bit 1: Unlock Required
		Bypass	bit 0: Output bit 1: Bypass Active
		Control guard	bit 0: Output bit 1: Reset Required
		PSDI control	bit 0: Output bit 1: Output2 bit 2: Break Required bit 3: Reset Required bit 4: Normal Operation bit 5: PSDI Error bit 6: PSDI Timeout
	Manual mode	Manual mode control (MMC)	bit 0: Input Bypass bit 1: Output Enable bit 2: Restart Required bit 3: Manual Mode Active
		MMC input bypass	bit 0: Output
		MMC input bypass_	bit 0: Output
		MMC output enable	bit 0: Output
	Timers / Counters	OFF-delay	bit 0: Output bit 1: Delay Active
		ON-delay	bit 0: Output bit 1: Delay Active
		Pulse generator	bit 0: Output
		Up-down counter	bit 0: Reached Upper Limit bit 1: Reached Zero
		Up-down counter (with binary output)	bit 0: Reached Upper Limit bit 1: Reached Zero bit 2: Output bit 0 bit 3: Output bit 1 bit 4: Output bit 2 bit 5: Output bit 3 bit 6: Output bit 4 bit 7: Output bit 5 bit 8: Output bit 6 bit 9: Output bit 7

		Block name	Bit assignment
Function blocks	Others	Edge detection	bit 0: Rising Edge bit 1: Falling Edge
		Binary decoder	bit 0: Output1 bit 1: Output2 bit 2: Output3 bit 3: Output4 bit 4: Output5 bit 5: Output6 bit 6: Output7 bit 7: Output8
		Binary encoder	bit 0: Output bit 0 bit 1: Output bit 1 bit 2: Output bit 2 bit 3: Error
		Mode changing control	bit 0: Mode Output1 bit 1: Mode Output2 bit 2: Mode Output3 bit 3: Mode Output4 bit 4: Mode Output5 bit 5: Mode Output6 bit 6: Mode Output7 bit 7: Mode Output8 bit 8: Mode Error bit 9: Trigger Required
		Selector (2 inputs) Selector (4 inputs)	bit 0: Output bit 1: Mode Error
System blocks	None	Always ON	bit 0: Output
		Always OFF	
		1 scan ON upon start-up	
		System Information	
		Block information	
		Jump (Load)	
		Jump (Store)	
		Event history trigger	
Other functions	Recipe block	AND (with connection constraint function)	bit 0: Output

17-6 Diagnostic Function

Using the PROFINET Diagnostics function, the information of alerts or errors that occurred in the GC Series can be transmitted to a PLC (PROFINET IO controller) via PROFINET communication.

Diagnostics number		Error category	Slot where the error occurred		Details	Corresponding main code of the error code
DEC	HEX		Slot	Sub slot		
4097	1001H	Function Block Alert	0	1	Muting Error	01
4098	1002H		0	1	Max. Muting / Override Period Exceeded	02
4099	1003H	Information	0	1	Mode Changing Control Inputs Mismatch	03
4100	1004H		0	1	Bank Inputs Mismatch	04
4106	100AH		0	1	Waiting For Input Block Recovery	10
4107	100BH	Terminal alert	0	1	AUX Output Terminal Overcurrent	11
4108	100CH		0	1	Test Output Terminal Overcurrent	12
4109	100DH		0	1	Safety Input Diag. (Test Output	13
4110	100EH		0	1	Inputs Incorrect	14
4111	100FH		0	1	Remote I/O Module Power Overcurrent	15
4112	1010H	Terminal error	0	1	EDM Error	16
4113	1011H		0	1	Safety Output Terminal Overcurrent	17
4114	1012H		0	1	Safety Output Terminal Error	18
4115	1013H		0	1	Safety Relay Output Terminal Error	19
4117	1015H	GS (port A) alert	0	1	GC-Link Port A GS Connection	21
4118	1016H		0	1	GC-Link Port A GS Error	22
4119	1017H	GS (port B) alert	0	1	GC-Link Port B GS Connection	23
4120	1018H		0	1	GC-Link Port B GS Error	24
4121	1019H	GL-R (port A) alert	0	1	GC-Link Port A GL-R Connection	25
4122	101AH		0	1	GC-Link Port A GL-R Error	26
4123	101BH		0	1	GC-Link Port A GL-R Alert	27
4124	101CH	GL-R (port B) alert	0	1	GC-Link Port B GL-R Connection	28
4125	101DH		0	1	GC-Link Port B GL-R Error	29
4126	101EH		0	1	GC-Link Port B GL-R Alert	30
4127	101FH	Information	0	1	Waiting For Configuration	31
4128	1020H	Main controller error	0	1	Waiting For Activation	32
4129	1021H		0	1	Settings Unsupported By Version	33

Diagnostics number		Error category	Slot where the error occurred		Details	Corresponding main code of the error code
DEC	HEX		Slot	Sub slot		
4132	1024H	Main controller alert	0	1	GC-Link Port A GS Config. Mismatch	36
4133	1025H		0	1	GC-Link Port B GS Config. Mismatch	37
4134	1026H		0	1	GC-Link Port A GL-R Config Mismatch	38
4135	1027H		0	1	GC-Link Port B GL-R Config Mismatch	39
4136	1028H		0	1	Low Power Voltage	40
4139	102BH		0	1	GC-Link Port A GS Connection	43
4140	102CH		0	1	GC-Link Port B GS Connection	44
4141	102DH		0	1	GC-Link Port A GS Low Power Voltage	45
4142	102EH		0	1	GC-Link Port B GS Low Power Voltage	46
4143	102FH		0	1	History Data Save Failed	47
4144	1030H		0	1	History Data Error	48
4145	1031H		0	1	IP Address Conflict	49
4146	1032H	Main controller error	0	1	Configuration Mismatch	50
4147	1033H		0	1	Remote I/O Module Config. Mismatch	51
4148	1034H		0	1	System Memory Data Error	52
4149	1035H		0	1	System Memory Data Error	53
4150	1036H		0	1	Expansion Unit Comm. Error	54
4151	1037H		0	1	Remote I/O Module Comm. Error	55
4152	1038H		0	1	Expansion Unit Comm. Error	56
4153	1039H		0	1	Remote I/O Module Comm. Error	57
4154	103AH		0	1	High Power Voltage	58
4155	103BH		0	1	Expansion Unit Unsupported Version	59
4156	103CH		0	1	Remote I/O Module Unsupported Version	60
4157	103DH		0	1	System Memory Access Error	61
4158	103EH		0	1	System Memory Data Error	62
4159	103FH		0	1	GC-Link Port A Unsupported GS	63
4160	1040H		0	1	GC-Link Port B Unsupported GS	64
4194	1062H	System error	0	1	System Error	98
4195	1063H		0	1	System Error	99

MEMO

18

UDP Communication Function

This chapter describes the settings and functions of the UDP communication function.

18-1 Overview of the UDP Communication Function.....page 18-2
18-2 UDP Communication Settings.....page 18-3
18-3 UDP Communication Commands.....page 18-4

18-1 Overview of the UDP Communication Function

DANGER	**All of the data received from the communication of the EtherNet/IP™, PROFINET, UDP, Modbus/TCP, or MC protocol cannot be used for the safety related part of the control system. When used incorrectly, there is a possibility that the operator of the device may be threatened with major injury or even death.**

Point **The Ethernet communication function is available only for the main controller "GC-1000".**

Overview of the UDP Communication Function

What is UDP communication?

UDP (User Datagram Protocol) is one of the Internet protocols. This protocol establishes communications in a "command-response" format, where data read and write commands are transmitted to the GC Series specified from a general-purpose PLC or PC and the GC Series returns responses to the requests.

What you can do with UDP communication function

With UDP communication, you can perform the following in the GC Series.

Item	UDP communication
Write a communication input	✓
Write an enablement code	✓
Write a character string that is stored into the history function	✓
Read out a communication output	✓
Read out an error code	✓
Read out the unit configuration and model information	✓
Read out the received-light-amount and ON/OFF state of the GL-R Series connected to a GC-Link port.	✓
Read out the door open/close state and ON/OFF state of the GS Series connected to a GC-Link port.	✓
Read out the ON/OFF status of the main controller, expansion unit, and remote I/O module.	✓
Read out the block status	✓
Read out the error history	✓

UDP communication specifications

Interface	UDP (Ethernet)
UDP port number	Default: 8900 Setting range: 0 to 65535*1
Communication speed	100Mbps

*1 The following port numbers cannot be used.
2222, 5100, 8638, 22112, 22096, 34964, 44818, 49152, 53248, 57345, 57346

18-2 UDP Communication Settings

UDP Communication Settings

GC Configurator settings

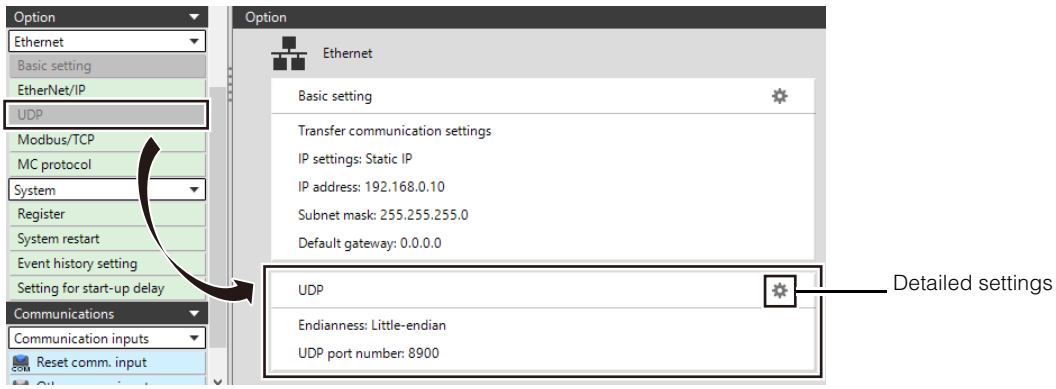
[Setting procedure]

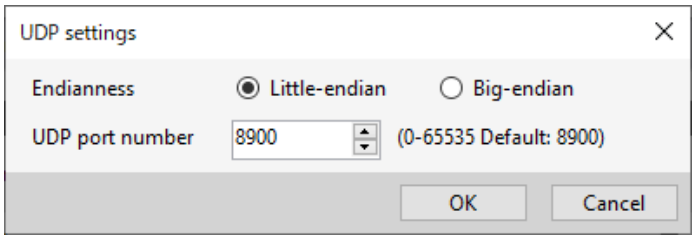
■ Basic Ethernet settings

Open the configuration screen from [Settings] and configure the basic Ethernet settings. "15-2 GC Configurator Settings" (page 15-3)

■ UDP settings

Open the configuration screen from [Settings] and drag and drop [UDP] to the screen to register.





Item	Details
Endianness	Select the endian for UDP communication data. (Default: Little-endian)
UDP port number	Set the port number used for UDP communication. Setting range: 0 to 65535 (Default: 8900)

■ Registering communication inputs and communication outputs

Open the configuration screen from [Settings] and drag and drop [Communication input] and [Communication output] to the screen to register.

"15-2 GC Configurator Settings" (page 15-3)

■ Programming

Perform programming using the communication blocks.

"How to Use a Communication Block" (page 15-9)

18-3 UDP Communication Commands

UDP Communication Command List

The commands available in UDP communication are as follows.

Type	Command	Name	Details
Read (GC Series -> External device)	80H	Word read	Read word data of a specified size from a specified word address.
	81H	Multi-word read	Read word data of a specified size from specified multiple word addresses.
	82H	Bit read	Read bit data of a specified size from a specified bit address.
Write (External device -> GC Series)*1	90H	Word write	Write word data of a specified size to a specified word address.
	91H	Multi-word write	Write word data of a specified size to specified multiple word addresses.
	92H	Bit write	Write bit data of a specified size to a specified bit address.

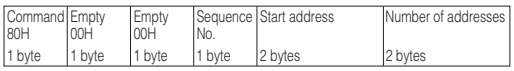
*1 When cyclic communication is performed, data cannot be written.

UDP Command Details

80H: Word read

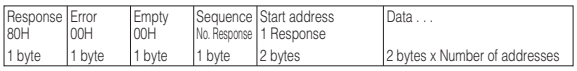
Read word data of a specified size from a specified word address.

■ Request command



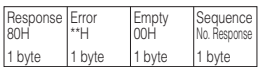
Item	Details	Data length
Command	Set the word read command. "80H"	1 byte
Empty	Not used. Set "00H".	1 byte
Empty	Not used. Set "00H".	1 byte
Sequence No.	Set the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Start address	Specify the word address to start reading the data from.	2 bytes
Number of addresses	Specify the number of word addresses to read the data from.	2 bytes

■ Response (normal state)



Item	Details	Data length
Response	Returns the word read command. "80H"	1 byte
Error	Returns "00H" when in a normal state.	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Start address	Returns the start word address.	2 bytes
Data	Returns the read word data. If multiple addresses are read, word data of these addresses is returned in 2-byte chunks.	2 bytes x Number of addresses

■ Response (abnormal state)

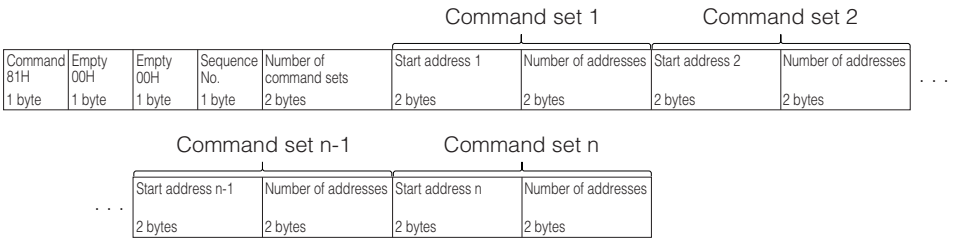


Item	Details	Data length
Response	Returns the word read command. "80H"	1 byte
Error	Returns the error code. (Refer to "Error codes" (page 18-12).)	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte

81H: Multi-word read

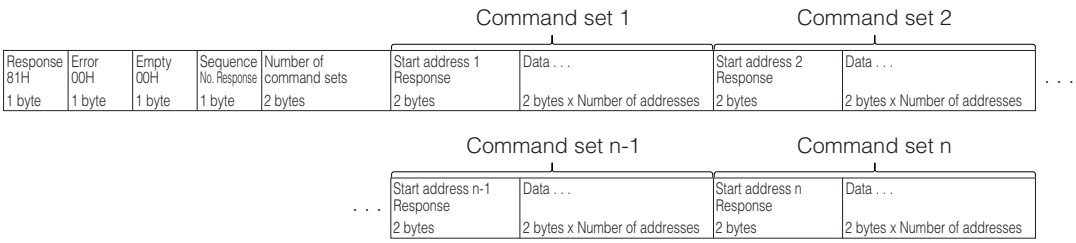
Read word data of a specified size from specified multiple word addresses.
This command reads out multiple start word addresses and the data of these addresses at once with a word address to start reading data and the number of addresses as one command set.

■ Request command



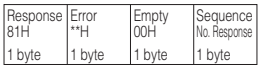
Item	Details	Data length
Command	Set the multi-word read command. "81H"	1 byte
Empty	Not used. Set "00H".	1 byte
Empty	Not used. Set "00H".	1 byte
Sequence No.	Set the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Number of command sets	A word address to start reading the data and the number of addresses are counted as one command set. Set the number of command sets to be transmitted in the request command.	2 bytes
Start address	Specify the word address to start reading the data from.	2 bytes
Number of addresses	Specify the number of word addresses to read the data from.	2 bytes

■ Response (normal state)



Item	Details	Data length
Response	Returns the multi-word read command. "81H"	1 byte
Error	Returns "00H" when in a normal state.	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Number of command sets	Returns the number of command sets.	2 bytes
Start address	Returns the start word address.	2 bytes
Data	Returns the read word data. If multiple addresses are read, word data of these addresses is returned in 2-byte chunks.	2 bytes x Number of addresses

■ Response (abnormal state)

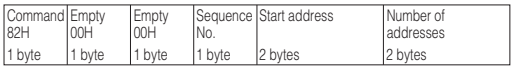


Item	Details	Data length
Response	Returns the multi-word read command. "81H"	1 byte
Error	Returns the error code. (Refer to "Error codes" (page 18-12).)	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte

82H: Bit read

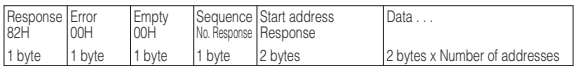
Read bit data of a specified size from a specified bit address.

■ Request command



Item	Details	Data length
Command	Set the bit read command. "82H"	1 byte
Empty	Not used. Set "00H".	1 byte
Empty	Not used. Set "00H".	1 byte
Sequence No.	Set the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Start address	Specify the bit address to start reading the data from.	2 bytes
Number of addresses	Specify the number of bit addresses to read the data from.	2 bytes

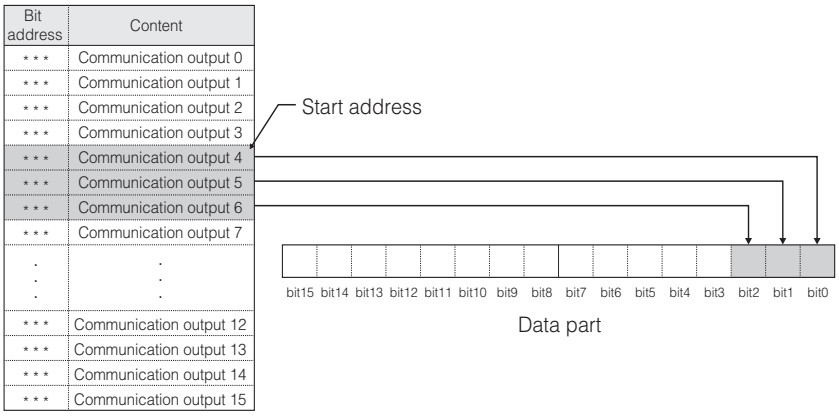
■ Response (normal state)



Item	Details	Data length
Response	Returns the bit read command. "82H"	1 byte
Error	Returns "00H" when in a normal state.	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Start address	Returns the start bit address.	2 bytes
Data	Returns the read bit data. The read bit data is stored starting from bit 0.	2 bytes Unit*

* If 17 or more addresses (17 bits) are read, the data size increases in increments of two bytes.

Example: When reading three bits from bit address "****H" (Communication output 4)



■ Response (abnormal state)

Response	Error	Empty	Sequence
82H	**H	00H	No. Response
1 byte	1 byte	1 byte	1 byte

Item	Details	Data length
Response	Returns the bit read command. "82H"	1 byte
Error	Returns the error code. (Refer to "Error codes" (page 18-12).)	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte

90H: Word write

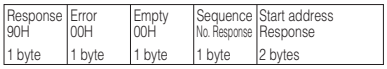
Write word data of a specified size to a specified word address.

■ Request command

Command	Empty	Empty	Sequence No.	Start address	Number of addresses	Write data . . .
90H	00H	00H				
1 byte	1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes x Number of addresses

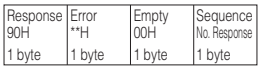
Item	Details	Data length
Command	Set the word write command. "90H"	1 byte
Empty	Not used. Set "00H".	1 byte
Empty	Not used. Set "00H".	1 byte
Sequence No.	Set the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Start address	Specify the word address to start writing the data to.	2 bytes
Number of addresses	Specify the number of word addresses to write the data to.	2 bytes
Write data	Specify the write word data. To write multiple addresses, set word data of these addresses in 2-byte chunks.	2 bytes x Number of addresses

■ Response (normal state)



Item	Details	Data length
Response	Returns the word write command. "90H"	1 byte
Error	Returns "00H" when in a normal state.	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Start address	Returns the start bit address.	2 bytes

■ Response (abnormal state)

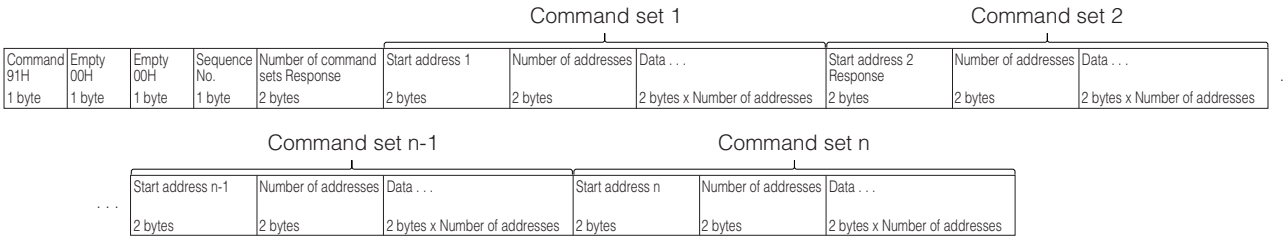


Item	Details	Data length
Response	Returns the word write command. "90H"	1 byte
Error	Returns the error code. (Refer to "Error codes" (page 18-12).)	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte

91H: Multi-word write

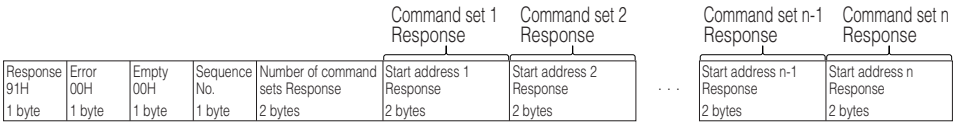
Write word data of a specified size to specified multiple word addresses.

■ Request command



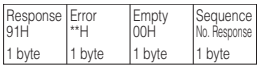
Item	Details	Data length
Command	Set the multi-word write command. "91H"	1 byte
Empty	Not used. Set "00H".	1 byte
Empty	Not used. Set "00H".	1 byte
Sequence No.	Set the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Number of command sets	A word address to start writing the data and the number of addresses are counted as one command set. Set the number of command sets to be transmitted in the request command.	2 bytes
Start address	Specify the word address to start writing the data to.	2 bytes
Number of addresses	Specify the number of word addresses to write the data to.	2 bytes
Write data	Specify the write word data. To write multiple addresses, set word data of these addresses in 2-byte chunks.	2 bytes x Number of addresses

■ Response (normal state)



Item	Details	Data length
Response	Returns the multi-word write command. "91H"	1 byte
Error	Returns "00H" when in a normal state.	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Number of command sets	Returns the number of command sets.	2 bytes
Start address	Returns the start bit address.	2 bytes

■ Response (abnormal state)

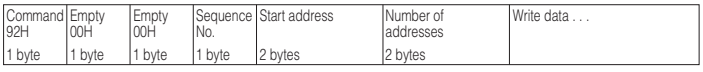


Item	Details	Data length
Response	Returns the multi-word write command. "91H"	1 byte
Error	Returns the error code. (Refer to "Error codes" (page 18-12).)	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte

92H: Bit write

Write bit data of a specified size to a specified bit address.

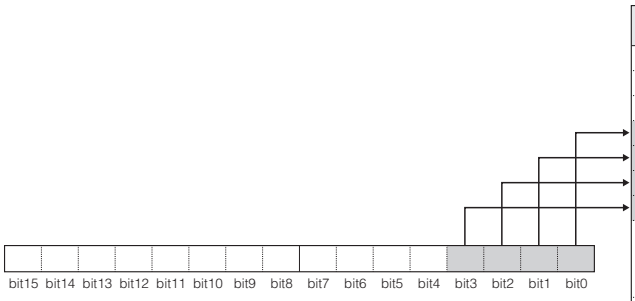
■ Request command



Item	Details	Data length
Command	Set the bit write command. "92H"	1 byte
Empty	Not used. Set "00H".	1 byte
Empty	Not used. Set "00H".	1 byte
Sequence No.	Set the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Start address	Specify the bit address to start writing the data to.	2 bytes
Number of addresses	Specify the number of bit addresses to write the data to.	2 bytes
Write data	Specify the write bit data. Set the write word data starting from bit 0.	2 bytes Unit*

* If 17 or more addresses (17 bits) are written, the data size increases in increments of two bytes.

Example: When writing four bits from bit address "****H" (Communication input 3)



Bit address	Content
* * *	Communication input 0
* * *	Communication input 1
* * *	Communication input 2
* * *	Communication input 3
* * *	Communication input 4
* * *	Communication input 5
* * *	Communication input 6
* * *	Communication input 7
* * *	Communication input 14
* * *	Communication input 15

■ Response (normal state)

Response	Error	Empty	Sequence No.	Sequence No.
92H	00H	00H	Response	Response
1 byte	1 byte	1 byte	1 byte	2 bytes

Item	Details	Data length
Response	Returns the bit write command. "92H"	1 byte
Error	Returns "00H" when in a normal state.	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte
Start address	Returns the start bit address.	2 bytes

■ Response (abnormal state)

Response	Error	Empty	Sequence No.
92H	**H	00H	Response
1 byte	1 byte	1 byte	1 byte

Item	Details	Data length
Response	Returns the bit write command. "92H"	1 byte
Error	Returns the error code. (Refer to "Error codes" (page 18-12).)	1 byte
Empty	Not used. "00H" is returned.	1 byte
Sequence No.	Returns the sequence number. (Refer to "Sequence numbers" (page 18-11).)	1 byte

Sequence numbers

Sequence numbers are used to correlate request commands and responses.
When a request command is sent with a specific number stored in a sequence number, the same number is returned to the sequence number of the response.
Checking the sequence number enhances the safety of the communications.

Error codes

Error code	Details
00H	Normal response
01H	The GC main controller cannot execute the command.
02H	The command was sent to the wrong address.
03H	The parameter of the sent command is incorrect.
04H	The data length of the sent command is insufficient.
FFH	Command analysis error

Parameter List

Word address

To use the following UDP commands, use the word address parameter:

- 80H: Word read
- 81H: Multi-word read
- 90H: Word write
- 91H: Multi-word write

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
256	100H	Communication input [0:00] to [0:15]	Indicates the status of the communication inputs. When a bit is turned ON, the corresponding communication input is turned ON.	WORD	R/W	bit 0: Communication input bit 0 0: OFF 1: ON bit 1: Communication input bit 1 0: OFF 1: ON ... bit 15: Communication input bit 15 0: OFF 1: ON	○
...	...	...		...	...		
259	103H	Communication input [3:00] to [3:15]		WORD	R/W		○
260	104H	Enablement code of communication input [0:00]	Indicates the status of the enablement code. The upper eight bits are ignored. (Range: 1 to 255)	UINT	R/W	0000H to 00FFH	
...	...	...		...	...		
289	121H	Enablement code of communication input [1:13]		UINT	R/W		
290	122H	System reserved					
291	123H	System reserved					
292	124H	PLC text, 1st character, 2nd character	Displays the status of the PLC text. The first character is set in the low byte while the second character is set in the high byte in the ASCII code format.	STRING	R/W	0000H to FFFFH	
...	...	...		...	...		
301	12DH	PLC text, 19th character, 20th character		STRING	R/W		
512	200H	Number of connected units (expansion unit)	Indicates the number of connected expansion units.	UINT	R	0 to 65535	
513	201H	Number of connected units (remote I/O module)	Indicates the number of connected remote I/O modules.	UINT	R	0 to 65535	
514	202H	Model information (main controller)	Indicates the connected unit model.	WORD	R	bit 0 to 7: Unit model 1: GC-1000 2: GC-1000R 3: GC-S84 4: GC-S16 5: GC-S1R 6: GC-A16 7: GC-R45 8: GC-R48 bit 8: Positional relationship to the GC-B30 0: Unit positioned before the GC-B30 1: Unit positioned after the GC-B30 If the GC-B30 does not exist in the unit configuration, all units are set to 0. bit 9 to 15: System reserved (fixed to 0)	
515	203H	Model information (1st expansion unit)		WORD	R		
...	...	...		...	...		
524	20CH	Model information (10th expansion unit)		WORD	R		
525	20DH	Model information (1st remote I/O module)		WORD	R		
...	...	...		...	...		
528	210H	Model information (4th remote I/O module)		WORD	R		
529	211H	System reserved					

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
530	212H	Operation time, Byte 0, Byte 1	Indicates the time elapsed since the start of the unit in units of 10 ms.	WORD	R	0 to FFFFH	
531	213H	Operation time, Byte 2, Byte 3		WORD	R	0 to FFFFH	
532	214H	GC operating state	Indicates the operating state of the GC.	WORD	R	bit 0: RUN state 0: The unit is stopped. 1: The unit is running. bit 1: Abnormal state 0: Normal 1: Abnormal * An abnormal state means that at least one alert or error is occurring. bit 2 to 15: System reserved (fixed to 0)	○
533	215H	Number of errors that occurred	Indicates the number of errors that are currently occurring.	UINT	R	0 to 30	
534	216H	Main code of the (1st) error code	Indicates the code of the error that is currently occurring. Error codes are sorted in the following order: (1) Errors are sorted in order of Error, Alert, and Info, starting from the first error. (2) Errors are sorted by error category in the order that they occurred. The high byte represents the main code while the low byte represents the detailed code. "Alert/Error list" (page A-7)	UINT	R	0 to 65535	
535	217H	Detailed code of the (1st) error code		UINT	R		
...	...	...		...	...		
592	250H	Main code of the (30th) error code		UINT	R		
593	251H	Detailed code of the (30th) error code		UINT	R		
594	252H	Communication output [0:00] to [0:15]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Communication output bit 0 bit 1: Communication output bit 1 ... bit 15: Communication output bit 15	○
...	...	...		...	...		
597	255H	Communication output [3:00] to [3:15]		WORD	R		○
598	256H	GC-Link port status	Indicates the GC-Link port status.	WORD	R	bit 0 to 3: GC-Link port A connection status 0000: Searching 0001: Not connected 0010: Connected bit 4 to 7: GC-Link port A error status 0000: No error 0001: Communication error bit 8 to 11: GC-Link port B connection status 0000: Searching 0001: Not connected 0010: Connected bit 12 to 15: GC-Link port B error status 0000: No error 0001: Communication error	
768	300H	GC-Link port A GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port A.	UINT	R	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2	
769	301H	System reserved					

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
770	302H	GC-Link port A GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port A.	UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
771	303H	GC-Link port A GL-R Sub unit 1 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
772	304H	GC-Link port A GL-R Sub unit 2 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
773	305H	GC-Link port A GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port A.	UINT	R	0 to 127	
774	306H	GC-Link port A GL-R Number of optical axes of sub unit 1		UINT	R	0 to 127	
775	307H	GC-Link port A GL-R Number of optical axes of sub unit 2		UINT	R	0 to 127	
776	308H	GC-Link port A GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6	○
777	309H	System reserved					
778	30AH	GC-Link port A GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port A. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
779	30BH	GC-Link port A GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
841	349H	GC-Link port A GL-R Received-light-amount, Main unit, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
842	34AH	GC-Link port A GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
843	34BH	GC-Link port A GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
905	389H	GC-Link port A GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
906	38AH	GC-Link port A GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
907	38BH	GC-Link port A GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
969	3C9H	GC-Link port A GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
970	3CAH	GC-Link port A GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	R	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis	○
971	3CBH	GC-Link port A GL-R ON/OFF information of each optical axis [31:16]		WORD	R	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis	○
...	...	...		...	...		
984	3D8H	GC-Link port A GL-R ON/OFF information of each optical axis [239:224]		WORD	R	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis	○
985	3D9H	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	WORD	R	0: No error 1: Error occurring	○
986	3DAH	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	WORD	R	0: OFF 1: ON	○
987	3DBH	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	R	0: Disabled 1: Enabled	○
988	3DCH	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	R	0: No alert 1: Alert occurring	○
989	3DDH	GC-Link port A GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A in percentage.	UINT	R	0 to 100	
990	3DEH	GC-Link port A GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	UINT	R	0: No set 1: 5 sec 2: 30 sec 3: 5 min	
1024	400H	GC-Link port A GS Number of connected units	Indicates the number of GS units connected to the GC-Link port A.	UINT	R	0 to 16	
1025	401H	GC-Link port A GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port A.	WORD	R	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved	○
1026	402H	GC-Link port A GS Model information (2nd unit)		WORD	R		○
...	...	...		...	...		
1040	410H	GC-Link port A GS Model information (16th unit)		WORD	R		○

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
1041	411H	GC-Link port A GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	WORD	R	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved	O
1042	412H	GC-Link port A GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port A.	WORD	R	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close	O
1043	413H	GC-Link port A GS Lock status	Indicates the lock status of each GS connected to the GC-Link port A. This is always 0 for the non-contact type.	WORD	R	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked	O
1044	414H	GC-Link port A GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port A.	WORD	R	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved	O
1045	415H	GC-Link port A GS 2nd unit status		WORD	R		O
...	...	...		...	...		
1059	423H	GC-Link port A GS 16th unit status		WORD	R		O
1280	500H	GC-Link port B GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port B.	UINT	R	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2	
1281	501H	System reserved					
1282	502H	GC-Link port B GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port B.	UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
1283	503H	GC-Link port B GL-R Sub unit 1 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
1284	504H	GC-Link port B GL-R Sub unit 2 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
1285	505H	GC-Link port B GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port B.	UINT	R	0 to 127	
1286	506H	GC-Link port B GL-R Number of optical axes of sub unit 1		UINT	R	0 to 127	
1287	507H	GC-Link port B GL-R Number of optical axes of sub unit 2		UINT	R	0 to 127	

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
1288	508H	GC-Link port B GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6	○
1289	509H	System reserved					
1290	50AH	GC-Link port B GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port B. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
1291	50BH	GC-Link port B GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
1353	549H	GC-Link port B GL-R Received-light-amount, Main unit, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
1354	54AH	GC-Link port B GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
1355	54BH	GC-Link port B GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
1417	589H	GC-Link port B GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
1418	58AH	GC-Link port B GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
1419	58BH	GC-Link port B GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
1481	5C9H	GC-Link port B GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
1482	5CAH	GC-Link port B GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	R	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis	○
1483	5CBH	GC-Link port B GL-R ON/OFF information of each optical axis [31:16]		WORD	R	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis	○
...	...	...		...	...	...	
1496	5D8H	GC-Link port B GL-R ON/OFF information of each optical axis [239:224]		WORD	R	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis	○

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
1497	5D9H	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	WORD	R	0: No error 1: Error occurring	O
1498	5DAH	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	WORD	R	0: OFF 1: ON	O
1499	5DBH	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	R	0: Disabled 1: Enabled	O
1500	5DCH	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	R	0: No alert 1: Alert occurring	O
1501	5DDH	GC-Link port B GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B in percentage.	UINT	R	0 to 100	
1502	5DEH	GC-Link port B GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	UINT	R	0: No set 1: 5 sec 2: 30 sec 3: 5 min	
1536	600H	GC-Link port B GS Number of connected units	Indicates the number of GS units connected to the GC-Link port B.	UINT	R	0 to 16	
1537	601H	GC-Link port B GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port B.	WORD	R	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved	O
1538	602H	GC-Link port B GS Model information (2nd unit)		WORD	R		O
...	...	...		...	...		
1552	610H	GC-Link port B GS Model information (16th unit)		WORD	R		O
1553	611H	GC-Link port B GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port B.	WORD	R	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved	O

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
1554	612H	GC-Link port B GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port B.	WORD	R	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close	○
1555	613H	GC-Link port B GS Lock status	Indicates the lock status of each GS connected to the GC-Link port B. This is always 0 for the non-contact type.	WORD	R	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked	○
1556	614H	GC-Link port B GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port B.	WORD	R	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved	○
1557	615H	GC-Link port B GS 2nd unit status		WORD	R		○
...	...	...		...	...		
1571	623H	GC-Link port B GS 16th unit status		WORD	R		○
1792	700H	Project name, 1st character	Indicates the project name of the configuration file (UTF-16).	STRING	R		
...	...			...	...		
1855	73FH	Project name, 64th character		STRING	R		
1856	740H	System reserved					
1857	741H	Configuration CRC, 1st character	Indicates the configuration CRC of the configuration file (UTF-16).	STRING	R		
...	...			...	...		
1864	748H	Configuration CRC, 8th character		STRING	R		
1865	749H	System reserved					
1866	74AH	Date and time of transfer, 1st character	Indicates the date and time of transfer of the configuration file (UTF-16).	STRING	R		
...	...			...	...		
1885	75DH	Date and time of transfer, 20th character		STRING	R		
1886	75EH	System reserved					

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
2048	800H	Input status (GC-Link port)	Indicates the input/output status of each unit.*1	WORD	R		O
2049	801H	Input status (main controller)		WORD	R		O
2050	802H	Input status (1st expansion unit)		WORD	R		O
...	...	...		...	...		
2059	80BH	Input status (10th expansion unit)		WORD	R		O
2060	80CH	Input status (1st remote I/O module)		WORD	R		O
...	...	...		...	...		
2063	80FH	Input status (4th remote I/O module)		WORD	R		O
2064	810H	Output status (GC-Link port)		WORD	R		O
2065	811H	Output status (main controller)		WORD	R		O
2066	812H	Output status (1st expansion unit)		WORD	R		O
...	...	...		...	...		
2075	81BH	Output status (10th expansion unit)		WORD	R		O
2076	81CH	Output status (1st remote I/O module)	Indicates the input/output status of each unit.*1	WORD	R		O
...	...	...		...	...		
2079	81FH	Output status (4th remote I/O module)		WORD	R		O
2304	900H	Number of used blocks	Indicates the number of blocks used by the program.	UINT	R	0 to 500	
2305	901H	Block output status (Block ID 1)	Indicates the output status of each block used by the program.*2	WORD	R		O
...	...	...		...	...		
2804	AF4H	Block output status (Block ID 500)		WORD	R		O
2816	B00H	Number of error histories	Indicates the number of error histories.	UINT	R	0 to 100	
2817	B01H	1st error history, Error code, Main code	Indicates the error code of the 1st error history. Error histories are sorted in newest-first chronological order. "Alert/Error list" (page A-7)	UINT	R	0 to 99	
2818	B02H	1st error history, Error code, Detailed code		UINT	R	0 to 9999	
2819	B03H	1st error history, Operation time on error, Low	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	WORD	R	0 to 65535	
2820	B04H	1st error history, Operation time on error, High		WORD	R	0 to 65535	
...	...	...	...	...	...		
3213	C8DH	100th error history, Error code, Main code	Indicates the error code of the 100th error history.	UINT	R	0 to 99	
3214	C8EH	100th error history, Error code, Detailed code		UINT	R	0 to 9999	
3215	C8FH	100th error history, Operation time on error, Low	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	WORD	R	0 to 65535	
3216	C90H	100th error history, Operation time on error, High		WORD	R	0 to 65535	

*1 For the bit assignment of each unit, refer to "Input/output status assignment by unit" (page 18-30).

*2 Check the block ID in the GC Configurator report. For the bit assignment of each block, refer to "Output status assignment by block" (page 18-32).

Bit address

To use the following UDP commands, use the bit address parameter:

- 82H: Bit read
- 92H: Bit write

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
4096	1000H	Communication input [0:00] to [0:15]	0	[0:00]	Indicates the status of the communication inputs. When a bit is turned ON, the corresponding communication input is turned ON.	Bit	R/W	0: OFF 1: ON
...	...		...	...		Bit	R/W	
4111	100FH		15	[0:15]		Bit	R/W	
...	...	...	...	...		Bit	R/W	
4144	1030H	Communication input [3:00] to [3:15]	0	[3:00]		Bit	R/W	
...	...		...	...		Bit	R/W	
4159	103FH		15	[3:15]		Bit	R/W	
8512	2140H	GC operating state	0	RUN state	Indicates the RUN state of the GC.	Bit	R	0: The unit is stopped. 1: The unit is running.
8513	2141H		1	Abnormal state	Indicates the abnormal state of the GC. An abnormal state means that at least one alert or error is occurring.	Bit	R	0: Normal 1: Abnormal
9504	2520H	Communication output [0:00] to [0:15]	0	Communication output [0:00]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
9519	252FH		15	Communication output [0:15]		Bit	R	
...	...	...	...	...		Bit	R	
9552	2550H	Communication output [3:00] to [3:15]	0	Communication output [3:00]		Bit	R	
...	...		...	...		Bit	R	
9567	255F		15	Communication output [3:15]		Bit	R	
12416	3080H	GC-Link port A GL-R Main controller setting switch settings	0	GC-Link port A GL-R Main controller setting switch settings, Switch 1	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
12417	3081H		1	GC-Link port A GL-R Main controller setting switch settings, Switch 2		Bit	R	
12418	3082H		2	GC-Link port A GL-R Main controller setting switch settings, Switch 3		Bit	R	
12419	3083H		3	GC-Link port A GL-R Main controller setting switch settings, Switch 4		Bit	R	
12420	3084H		4	GC-Link port A GL-R Main controller setting switch settings, Switch 5		Bit	R	
12421	3085H		5	GC-Link port A GL-R Main controller setting switch settings, Switch 6		Bit	R	

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
15520	3CA0H	GC-Link port A GL-R ON/OFF information of each optical axis [15:0]	0	GC-Link port A GL-R ON/OFF information of each optical axis, 1st optical axis	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the offset following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
15535	3CAFH		15	GC-Link port A GL-R ON/OFF information of each optical axis, 16th optical axis		Bit	R	
...	...	...	...	...		Bit	R	
15744	3D80H	GC-Link port A GL-R ON/OFF information of each optical axis [239:224]	0	GC-Link port A GL-R ON/OFF information of each optical axis, 225th optical axis		Bit	R	
...	...		...	...		Bit	R	
15759	3D8FH		15	GC-Link port A GL-R ON/OFF information of each optical axis, 240th optical axis		Bit	R	
15760	3D90H	GC-Link port A GL-R Error status	0	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	Bit	R	0: No error 1: Error occurring
15776	3DA0H	GC-Link port A GL-R OSSD output status	0	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
15792	3DB0H	GC-Link port A GL-R Received-light-amount decrease alert enablement status	0	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	Bit	R	0: Disabled 1: Enabled
15808	3DC0H	GC-Link port A GL-R Received-light-amount decrease alert detection status	0	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	Bit	R	0: No alert 1: Alert occurring
16400	4010H	GC-Link port A GS Model information (1st unit)	0	GC-Link port A GS 1st GS model information	Indicates the model information of the 1st GS connected to the GC-Link port A.	Bit	R	0: Non-contact type 1: Lock type
16401	4011H		1	GC-Link port A GS 1st GS lock type information	Indicates the lock type information of the 1st GS connected to the GC-Link port A.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
16402	4012H		2	System reserved	System reserved	Bit	R	
16403	4013H		3	System reserved	System reserved	Bit	R	
16404	4014H		4	System reserved	System reserved	Bit	R	
16405	4015H		5	System reserved	System reserved	Bit	R	
16406	4016H		6	GC-Link port A GS 1st GS coding level settings	Indicates the coding level settings of the 1st GS connected to the GC-Link port A.	Bit	R	0: Low (multi operation) 1: High (unique operation)
...	...	...	...	...	...	Bit	R	...

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
16640	4100H	GC-Link port A GS Model information (16th unit)	0	GC-Link port A GS 16th GS model information	Indicates the model information of the 16th GS connected to the GC-Link port A.	Bit	R	0: Non-contact type 1: Lock type
16641	4101H		1	GC-Link port A GS 16th GS lock type information	Indicates the lock type information of the 16th GS connected to the GC-Link port A.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
16642	4102H		2	System reserved	System reserved	Bit	R	
16643	4103H		3	System reserved	System reserved	Bit	R	
16644	4104H		4	System reserved	System reserved	Bit	R	
16645	4105H		5	System reserved	System reserved	Bit	R	
16646	4106H		6	GC-Link port A GS 16th GS coding level settings	Indicates the coding level settings of the 16th GS connected to the GC-Link port A.	Bit	R	0: Low (multi operation) 1: High (unique operation)
16656	4110H	GC-Link port A GS OSSD/lock control status	0	GC-Link port A GS OSSD status	Indicates the OSSD status of the GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
16657	4111H		1	GC-Link port A GS Lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	Bit	R	0: Unlocked 1: Locked
16672	4120H	GC-Link port A GS Open/close state	0	GC-Link port A 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
...	...		...	...	...	Bit	R	...
16687	412FH		15	GC-Link port A 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
16688	4130H	GC-Link port A GS Lock status	0	GC-Link port A 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
...	...		...	...	...	Bit	R	...
16703	413FH		15	GC-Link port A 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
16704	4140H	GC-Link port A GS 1st unit status	0	GC-Link port A 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
16705	4141H		1	GC-Link port A 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
16706	4142H		2	GC-Link port A 1st GS Red LED display status	Indicates the red LED display status of the 1st GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
16707	4143H		3	GC-Link port A 1st GS Green LED display status	Indicates the green LED display status of the 1st GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
...	...	...	...	...	...	Bit	R	...

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
16944	4230H	GC-Link port A GS 16th unit status	0	GC-Link port A 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
16945	4231H		1	GC-Link port A 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
16946	4232H		2	GC-Link port A 15th GS Red LED display status	Indicates the red LED display status of the 15th GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
16947	4233H		3	GC-Link port A 15th GS Green LED display status	Indicates the green LED display status of the 15th GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
20608	5080H	GC-Link port B GL-R Main controller setting switch settings	0	GC-Link port B GL-R Main controller setting switch settings, Switch 1	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
20609	5081H		1	GC-Link port B GL-R Main controller setting switch settings, Switch 2		Bit	R	
20610	5082H		2	GC-Link port B GL-R Main controller setting switch settings, Switch 3		Bit	R	
20611	5083H		3	GC-Link port B GL-R Main controller setting switch settings, Switch 4		Bit	R	
20612	5084H		4	GC-Link port B GL-R Main controller setting switch settings, Switch 5		Bit	R	
20613	5085H		5	GC-Link port B GL-R Main controller setting switch settings, Switch 6		Bit	R	
23712	5CA0H	GC-Link port B GL-R ON/OFF information of each optical axis [15:0]	0	GC-Link port B GL-R ON/OFF information of each optical axis, 1st optical axis	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the offset following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
23727	5CAFH		15	GC-Link port B GL-R ON/OFF information of each optical axis, 16th optical axis		Bit	R	
...	...	...	...	...		Bit	R	
23936	5D80H	GC-Link port B GL-R ON/OFF information of each optical axis [239:224]	0	GC-Link port B GL-R ON/OFF information of each optical axis, 225th optical axis		Bit	R	
...	...		...	...		Bit	R	
23951	5D8FH		15	GC-Link port B GL-R ON/OFF information of each optical axis, 240th optical axis		Bit	R	
23952	5D90H	GC-Link port B GL-R Error status	0	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	Bit	R	0: No error 1: Error occurring
23968	5DA0H	GC-Link port B GL-R OSSD output status	0	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
23984	5DB0H	GC-Link port B GL-R Received-light-amount decrease alert enablement status	0	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	Bit	R	0: Disabled 1: Enabled
24000	5DC0H	GC-Link port B GL-R Received-light-amount decrease alert detection status	0	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	Bit	R	0: No alert 1: Alert occurring

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
24592	6010H	GC-Link port B GS Model information (1st unit)	0	GC-Link port B GS 1st GS model information	Indicates the model information of the 1st GS connected to the GC-Link port B.	Bit	R	0: Non-contact type 1: Lock type
24593	6011H		1	GC-Link port B GS 1st GS lock type information	Indicates the lock type information of the 1st GS connected to the GC-Link port B.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
24594	6012H		2	System reserved	System reserved	Bit	R	
24595	6013H		3	System reserved	System reserved	Bit	R	
24596	6014H		4	System reserved	System reserved	Bit	R	
24597	6015H		5	System reserved	System reserved	Bit	R	
24598	6016H		6	GC-Link port B GS 1st GS coding level settings	Indicates the coding level settings of the 1st GS connected to the GC-Link port B.	Bit	R	0: Low (multi operation) 1: High (unique operation)
...	...	...	...	...	...	Bit	R	...
24832	6100H	GC-Link port B GS Model information (16th unit)	0	GC-Link port B GS 16th GS model information	Indicates the model information of the 16th GS connected to the GC-Link port B.	Bit	R	0: Non-contact type 1: Lock type
24833	6101H		1	GC-Link port B GS 16th GS lock type information	Indicates the lock type information of the 16th GS connected to the GC-Link port B.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
24834	6102H		2	System reserved	System reserved	Bit	R	
24835	6103H		3	System reserved	System reserved	Bit	R	
24836	6104H		4	System reserved	System reserved	Bit	R	
24837	6105H		5	System reserved	System reserved	Bit	R	
24838	6106H		6	GC-Link port B GS 16th GS coding level settings	Indicates the coding level settings of the 16th GS connected to the GC-Link port B.	Bit	R	0: Low (multi operation) 1: High (unique operation)
24848	6110H	GC-Link port B GS OSSD/lock control status	0	GC-Link port B GS OSSD status	Indicates the OSSD status of the GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
24849	6111H		1	GC-Link port B GS Lock control status	Indicates the lock control status of the GS connected to the GC-Link port B.	Bit	R	0: Unlocked 1: Locked
24864	6120H	GC-Link port B GS Open/close state	0	GC-Link port B 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
...	...		...	...	...	Bit	R	...
24879	612FH		15	GC-Link port B 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
24880	6130H	GC-Link port B GS Lock status	0	GC-Link port B 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
...	...		...	...	...	Bit	R	...
24895	613FH		15	GC-Link port B 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
24896	6140H	GC-Link port B GS 1st unit status	0	GC-Link port B 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
24897	6141H		1	GC-Link port B 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
24898	6142H		2	GC-Link port B 1st GS Red LED display status	Indicates the red LED display status of the 1st GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
24899	6143H		3	GC-Link port B 1st GS Green LED display status	Indicates the green LED display status of the 1st GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
...	...	...	...	...	...	Bit	R	...
25136	6230H	GC-Link port B GS 16th unit status	0	GC-Link port B 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
25137	6231H		1	GC-Link port B 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
25138	6232H		2	GC-Link port B 15th GS Red LED display status	Indicates the red LED display status of the 15th GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
25139	6233H		3	GC-Link port B 15th GS Green LED display status	Indicates the green LED display status of the 15th GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
32768	8000H	Input status (GC-Link port)	0	Input status (GC-Link port) bit 0	Indicates the input status of the GC-Link port.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32783	800FH		15	Input status (GC-Link port) bit 15		Bit	R	
32784	8010H	Input status (main controller)	0	Input status (main controller) bit 0	Displays the input status of the main controller.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32799	801FH		15	Input status (main controller) bit 15		Bit	R	
32800	8020H	Input status (1st expansion unit)	0	Input status (1st expansion unit) bit 0	Indicates the input status of the 1st expansion unit.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32815	802FH		15	Input status (1st expansion unit) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
32944	80B0H	Input status (10th expansion unit)	0	Input status (10th expansion unit) bit 0	Indicates the input status of the 10th expansion unit.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32959	80BFH		15	Input status (10th expansion unit) bit 15		Bit	R	

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
32960	80C0H	Input status (1st remote I/O module)	0	Input status (1st remote I/O module) bit 0	Indicates the input status of the 1st remote I/O module.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32975	80CFH		15	Input status (1st remote I/O module) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
33008	80F0H	Input status (4th remote I/O module)	0	Input status (4th remote I/O module) bit 0	Indicates the input status of the 4th remote I/O module.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33023	80FFH		15	Input status (4th remote I/O module) bit 15		Bit	R	
33024	8100H	Output status (GC-Link port)	0	Output status (GC-Link port) bit 0	Indicates the output status of the GC-Link port.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33039	810FH		15	Output status (GC-Link port) bit 15		Bit	R	
33040	8110H	Output status (main controller)	0	Output status (main controller) bit 0	Displays the output status of the main controller.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33055	811FH		15	Output status (main controller) bit 15		Bit	R	
33056	8120H	Output status (1st expansion unit)	0	Output status (1st expansion unit) bit 0	Indicates the output status of the 1st expansion unit.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33071	812FH		15	Output status (1st expansion unit) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
33200	81B0H	Output status (10th expansion unit)	0	Output status (10th expansion unit) bit 0	Indicates the output status of the 10th expansion unit.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33215	81BFH		15	Output status (10th expansion unit) bit 15		Bit	R	
33216	81C0H	Output status (1st remote I/O module)	0	Output status (1st remote I/O module) bit 0	Indicates the output status of the 1st remote I/O module.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33231	81CFH		15	Output status (1st remote I/O module) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
33264	81F0H	Output status (4th remote I/O module)	0	Output status (4th remote I/O module) bit 0	Indicates the output status of the 4th remote I/O module.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33279	81FFH		15	Output status (4th remote I/O module) bit 15		Bit	R	
36880	9010H	Block output status (Block ID 1)	0	Block output status (Block ID 1) bit 0	Indicates the output status of the Block ID 1 block.* 2	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
36895	901FH		15	Block output status (Block ID 1) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
44864	AF40H	Block output status (Block ID 500)	0	Block output status (Block ID 500) bit 0	Indicates the output status of the Block ID 500 block.*2	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
44879	AF4FH		15	Block output status (Block ID 500) bit 15		Bit	R	

*1 For the bit assignment of each unit, refer to "Input/output status assignment by unit" (page 18-30).

*2 Check the block ID in the GC Configurator report. For the bit assignment of each block, refer to "Output status assignment by block" (page 18-32).

● Input/output status assignment by unit

◆Input status (GC-Link port)

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved										Port B	Port A	Port B		Port A	
										Ai	Ai	Si1	Si0	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (main controller)

GC-1000

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Si15	Si14	Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

GC-1000R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved		Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (nth expansion unit)

GC-S84

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved								Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

GC-S16

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Si15	Si14	Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (nth remote I/O module)

GC-R45/R48

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved				CN4	CN3	CN2	CN1	CN4		CN3		CN2		CN1	
				Ai	Ai	Ai	Ai	Si1	Si0	Si1	Si0	Si1	Si0	Si1	Si0

Input status 0: OFF, 1: ON

◆Output status (GC-Link port)

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												Port B		Port A	
												Ao1	Ao0	Ao1	Ao0

Output status 0: OFF, 1: ON

◆Output status (main controller)

GC-1000

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved						Ao3	Ao2	Ao1	Ao0	So5	So4	So3	So2	So1	So0

Output status 0: OFF, 1: ON

GC-1000R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved							Ao3	Ao2	Ao1	Ao0	SRo	So3	So2	So1	So0

Output status 0: OFF, 1: ON

◆Output status (nth expansion unit)

GC-S84

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												So3	So2	So1	So0

Output status 0: OFF, 1: ON

GC-S1R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved															SRo

Output status 0: OFF, 1: ON

GC-A16

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Ao15	Ao14	Ao13	Ao12	Ao11	Ao10	Ao9	Ao8	Ao7	Ao6	Ao5	Ao4	Ao3	Ao2	Ao1	Ao0

Output status 0: OFF, 1: ON

◆Output status (nth remote I/O module)

GC-R45

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												CN4	CN3	CN2	CN1
												Ao	Ao	Ao	Ao

Output status 0: OFF, 1: ON

GC-R48

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												CN4	CN3	CN2	CN1
												So	So	So	So

Output status 0: OFF, 1: ON

● Output status assignment by block

		Block name	Bit assignment
Input devices	Safety input devices	Emergency stop switch	bit 0: Output
		Limit switch	
		Interlock switch	
		Guard locking switch	
		GS Series [KEYENCE]	
		Light curtain	
		GL-R Series [KEYENCE]	
		GL-S Series [KEYENCE]	
		Laser scanner	
		SZ-V Series [KEYENCE]	
		SZ Series [KEYENCE]	
		Rope pull switch	
		Safety mat	
		Two hand control device	
		Enabling device	
		Other safety switch	
		Other safety input	
	Other input devices	Reset switch	bit 0: Output
		Mode selecting switch	bit 0: Mode Output 1 bit 1: Mode Output 2 bit 2: Error
		EDM input	bit 0: Output
		Muting input	
		Safety plug	
		Hold-to-run switch	
		Other switch	
		Other input	

		Block name		Bit assignment
Output devices	Safety outputs	S-OUT S-OUT EDM enabled	Safety 1 output	bit 0: Output bit 1: Reserved bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
			Safety 2 output	bit 0: Output1 bit 1: Output2 bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
		S-OUT (Relay output) S-OUT (Relay output) EDM enabled		bit 0: Output bit 1: Reserved bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
	Other outputs	AUX-OUT		bit 0: Output bit 1: Reserved bit 2: Error
Communications	Communication input	Reset input (COM) Other input (COM)	Enablement code disabled	bit 0: Output
			Enablement code enabled	bit 0: Output bit1: Ready bit 2: Error
	Communication output	Communication output		bit 0: Output bit 1: Reserved bit 2: Error
Register		Register (Load)		bit 0: Output
		Register (Store)		
Expansion blocks	None	GS closed state		bit 0: Output
		GS locked state		
		GS indicator control output		bit 0: Red bit 1: Green bit 2: Output Error
Other input blocks		GL-R received-light-amount decrease alert		bit 0: Output
		AUX-IN		
		OSSD 3/4		
		IN		

		Block name		Bit assignment
Other output blocks		Unlock output	Lock control 1 output	bit 0: Output bit 1: Reserved bit 2: DIAG Error bit 3: Wait OFF
			Lock control 2 output	bit 0: Output1 bit 1: Output2 bit 2: DIAG Error bit 3: Wait OFF
		Indicator control output		bit 0: Red bit 1: Green bit 2: Output Error
		Bank switching output	Independent bank	bit 0: Bank Output A bit 1: Bank Output a bit 2: Input Mismatch bit 3: Output Error
			Single	bit 0: Bank Output A bit 1: Bank Output a bit 2: Bank Output B bit 3: Bank Output b bit 4: Bank Output C bit 5: Bank Output c bit 6: Input Mismatch bit 7: Output Error
			Binary	bit 0: Bank Output A bit 1: Bank Output a bit 2: Bank Output B bit 3: Bank Output b bit 4: Bank Output C bit 5: Bank Output c bit 6: Bank Output D bit 7: Bank Output d bit 8: Bank Output E bit 9: Bank Output e bit 10: Input Mismatch bit 11: Output Error
		OUT		bit 0: Output bit 1: Reserved bit 2: Error
Function blocks	Logic	AND		bit 0: Output
		AND (6-10 inputs)		
		OR		
		NOT		
		NAND		
		NOR		
		XOR		
		SR Flip-Flop (Set has priority)		
		RS Flip-Flop (Reset has priority)		
		JK Flip-Flop		

		Block name	Bit assignment
Function blocks	Reset	Reset	bit 0: Output bit 1: Reset Required
		Reset (with AND)	bit 0: Output bit 1: Reset Required
		Dual reset	bit 0: Output bit 1: Reset Required1 bit 2: Reset Required2
		Existence detection reset	bit 0: Output bit 1: Reset Required
	Muting	Sequential muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Parallel muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Cross-muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Muting for exit	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Position detection muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout

		Block name	Bit assignment
Function blocks	Application	Master ON	bit 0: Master ON Ready bit 1: Reset Required
		Unlock control	bit 0: Unlock Output bit 1: Unlock Required
		Bypass	bit 0: Output bit 1: Bypass Active
		Control guard	bit 0: Output bit 1: Reset Required
		PSDI control	bit 0: Output bit 1: Output2 bit 2: Break Required bit 3: Reset Required bit 4: Normal Operation bit 5: PSDI Error bit 6: PSDI Timeout
	Manual mode	Manual mode control (MMC)	bit 0: Input Bypass bit 1: Output Enable bit 2: Restart Required bit 3: Manual Mode Active
		MMC input bypass	bit 0: Output
		MMC input bypass_	bit 0: Output
		MMC output enable	bit 0: Output
	Timers / Counters	OFF-delay	bit 0: Output bit 1: Delay Active
		ON-delay	bit 0: Output bit 1: Delay Active
		Pulse generator	bit 0: Output
		Up-down counter	bit 0: Reached Upper Limit bit 1: Reached Zero
		Up-down counter (with binary output)	bit 0: Reached Upper Limit bit 1: Reached Zero bit 0: Output bit 2 bit 3: Output bit 1 bit 4: Output bit 2 bit 5: Output bit 3 bit 6: Output bit 4 bit 7: Output bit 5 bit 8: Output bit 6 bit 9: Output bit 7

		Block name	Bit assignment
Function blocks	Others	Edge detection	bit 0: Rising Edge bit 1: Falling Edge
		Binary decoder	bit 0: Output1 bit 1: Output2 bit 2: Output3 bit 3: Output4 bit 4: Output5 bit 5: Output6 bit 6: Output7 bit 7: Output8
		Binary encoder	bit 0: Output bit 0 bit 1: Output bit 1 bit 2: Output bit 2 bit 3: Error
		Mode changing control	bit 0: Mode Output1 bit 1: Mode Output2 bit 2: Mode Output3 bit 3: Mode Output4 bit 4: Mode Output5 bit 5: Mode Output6 bit 6: Mode Output7 bit 7: Mode Output8 bit 8: Mode Error bit 9: Trigger Required
		Selector (2 inputs) Selector (4 inputs)	bit 0: Output bit 1: Mode Error
System blocks	None	Always ON	bit 0: Output
		Always OFF	
		1 scan ON upon start-up	
		System Information	
		Block information	
		Jump (Load)	
		Jump (Store)	
		Event history trigger	
Other functions	Recipe block	AND (with connection constraint function)	bit 0: Output

MEMO

19

Modbus/TCP Communication Function

This chapter describes the settings and functions of the Modbus/TCP communication function.

19-1 Overview of the Modbus/TCP Communication Function ..... page 19-2
19-2 Modbus/TCP Communication Function Specifications ..... page 19-3
19-3 Modbus/TCP Communication Settings ..... page 19-12
19-4 Modbus/TCP Address List ..... page 19-13

19-1 Overview of the Modbus/TCP Communication Function

DANGER	**All of the data received from the communication of the EtherNet/IP™, PROFINET, UDP, Modbus/TCP, or MC protocol cannot be used for the safety related part of the control system. When used incorrectly, there is a possibility that the operator of the device may be threatened with major injury or even death.**

Point **The Ethernet communication function is available only for the main controller "GC-1000".**

Overview of the Modbus/TCP Communication Function

What is Modbus/TCP communication?

The Modbus protocol is a communication protocol developed by Modicon Inc. (AEG Schneider Automation International S.A.S) for PLCs. With the specifications published, the Modbus protocol is so simple that it is widely used in the fields of FA (Factory Automation) and PA (Process Automation), however there are no organizations for verification and certification. Therefore, you need to verify the connectivity before use. Modbus is a trademark or registered trademark of Schneider Automation Inc.

What you can do with Modbus/TCP communication

With Modbus/TCP communication, you can perform the following in the GC Series.

Item	Modbus/TCP communication
Write a communication input	✓
Write an enablement code	✓
Write a character string that is stored into the history function	✓
Read out a communication output	✓
Read out an error code	✓
Read out the unit configuration and model information	✓
Read out the received-light-amount and ON/OFF state of the GL-R Series connected to a GC-Link port.	✓
Read out the door open/close state and ON/OFF state of the GS Series connected to a GC-Link port.	✓
Read out the ON/OFF status of the main controller, expansion unit, and remote I/O module.	✓
Read out the block status	✓
Read out the error history	✓

19-2 Modbus/TCP Communication Function Specifications

Modbus/TCP Communication Specifications

Item	Specification
Communication media	Ethernet 100BASE-TX
Communication mode	TCP/IP
Supported configuration	Server
Maximum number of concurrent connected clients	4
Port number	502 (fixed)

Command and Response Formats

Modbus/TCP frame format

Ethernet header	IP header	TCP header	**Application data**

Application data format

In the Modbus/TCP frame format, the format of the application data part is as follows.

Transaction ID	Protocol ID	Data length	Unit ID	Function code	Data part
2 bytes	2 bytes	2 bytes	1 byte	1 byte	4 to 251 bytes

Item	Size	Details
Transaction ID	2 bytes	Used by the client to identify a response from the server (GC). The server copies the request value from the client and stores it in the response.
Protocol ID	2 bytes	Normally fixed to 0. The server (GC) copies the command value from the client and stores it in the response.
Data length	2 bytes	Stores the data size of this and subsequent areas in bytes.
Unit ID	1 byte	The server (GC) copies the command value from the client and stores it in the response. The client can specify any value, which does not affect a response to each command. Normally, specify 1.
Function code	1 byte	This is a function number that the client requests for the server (GC). For the function codes supported by the GC Series, refer to the following. When a response is returned from the server (GC), the completion state is added as follows: • Normal end: Stores the function code requested from the client. • Abnormal end: Stores the function code requested from the client with the highest bit ON (80H + function code). Example: When the function code is 03H, 83H is stored.
Data part	4 to 251 bytes	Transmits the data required to execute the requested process when the client sends a request. Returns the execution result of the requested process when the server (GC) returns a response. For the data part format of each function code, refer to the following.

Modbus/TCP Function Codes

Supported function codes

The GC Series supports the following function codes:

Function code (hexadecimal)	Function	Details
01H	Coil read	Read coils.
02H	Input read	Read inputs.
03H	Holding register read	Read holding register values.
04H	Input register read	Read input register values.
05H	Coil single write*1	Turn ON/OFF a signal coil.
06H	Holding register single write*1	Write a value to a single holding register.
07H	Exception status read	0 can be read in the GC Series.
10H	Holding register sequential write*1	Write a value to as many holding registers as specified from a specified address.

*1 When cyclic communication is performed, data cannot be written.

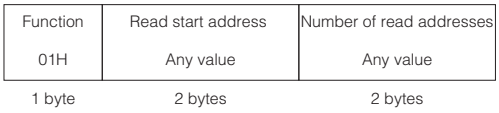
Function Code Details

The following describes the details of each function code used in Modbus/TCP communication.
In this section, the information of the parts following the "function code" of the "application data" in the command and response formats is explained.

01H: Coil read

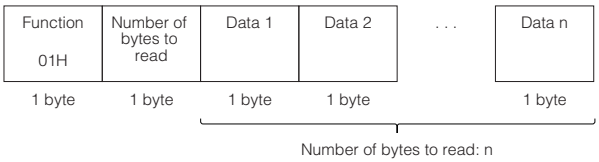
Read one or more coil states (ON/OFF).

■ Request command



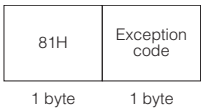
Item	Size	Data range	Details
Function code	1 byte	01H	Coil read
Read start address	2 bytes	0 to 65535 bytes	Specify the address to start reading the data from.
Number of read addresses	2 bytes	1 to 2000 (bits)	Specify the number of addresses (bits) to read the data from.

Response (normal state)



Item	Size	Data range	Details
Function code	1 byte	01H	Coil read
Number of bytes to read	1 byte	0 to 250 bytes	Returns the quotient of (Number of read addresses + 7) / 8.
Read data	n byte(s)	00H to FFH	Returns the 8-bit ON (1)/OFF (0) information as 1-byte data.

■ Response (abnormal state)

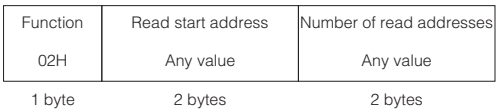


"Response exception codes"

02H: Input read

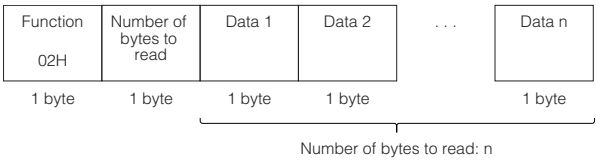
Read one or more input states (ON/OFF).

■ Request command



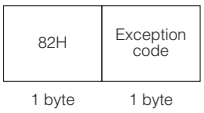
Item	Size	Data range	Details
Function code	1 byte	02H	Coil read
Read start address	2 bytes	0 to 65535 bytes	Specify the address to start reading the data from.
Number of read addresses	2 bytes	1 to 2000 (bits)	Specify the number of addresses (bits) to read the data from.

■ Response (normal state)



Item	Size	Data range	Details
Function code	1 byte	02H	Input read
Number of bytes to read	1 byte	0 to 250 bytes	Returns the quotient of (Number of read addresses + 7) / 8.
Read data	n byte(s)	00H to FFH	Returns the 8-bit ON (1)/OFF (0) information as 1-byte data.

■ Response (abnormal state)

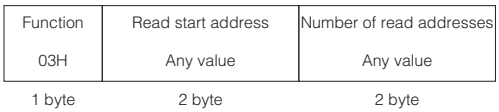


"Response exception codes"

03H: Holding register read

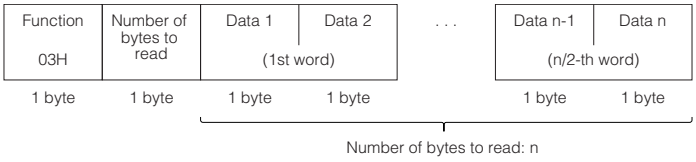
Read one or multiple holding register values.

■ Request command



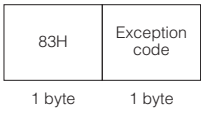
Item	Size	Data range	Details
Function code	1 byte	03H	Holding register read
Read start address	2 bytes	0 to 65535 bytes	Specify the address to start reading the data from.
Number of read addresses	2 bytes	1 to 125 (words)	Specify the number of addresses (words) to read the data from.

■ Response (normal state)



Item	Size	Data range	Details
Function code	1 byte	03H	Holding register read
Number of bytes to read	1 byte	0 to 250 bytes	Returns 2 to 250 (Number of read addresses x 2).
Read data	n byte(s)	00H to FFH	Returns the read holding register value(s).

■ Response (abnormal state)

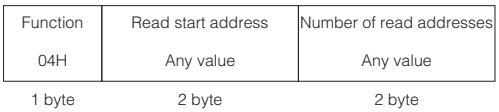


"Response exception codes"

04H: Input register read

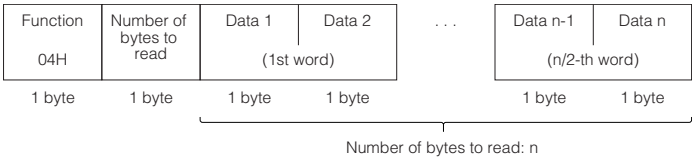
Read one or multiple input register values.

■ Request command



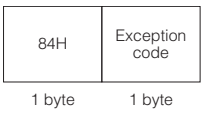
Item	Size	Data range	Details
Function code	1 byte	04H	Input register read
Read start address	2 bytes	0 to 65535 bytes	Specify the address to start reading the data from.
Number of read addresses	2 bytes	1 to 125 (words)	Specify the number of addresses (words) to read the data from.

■ Response (normal state)



Item	Size	Data range	Details
Function code	1 byte	04H	Input register read
Number of bytes to read	1 byte	0 to 250 bytes	Returns 2 to 250 (Number of read addresses x 2).
Read data	n byte(s)	00H to FFH	Returns the read input register value(s).

■ Response (abnormal state)



"Response exception codes"

05H: Coil single write

Write the coil state (ON/OFF) to a single coil.

■ Request command

Function	Read start address	Number of read addresses
05H	Any value	Any value
1 byte	2 bytes	2 bytes

Item	Size	Data range	Details
Function code	1 byte	05H	Coil single write
Write address	2 bytes	0 to 65535 bytes	Specify the address to write the data to.
Write data	2 bytes	OFF: 0 ON: Other than 0	Specify the write data.

■ Response (normal state)

Function	Read start address	Number of read addresses
05H	Any value	Any value
1 byte	2 byte	2 bytes

Item	Size	Data range	Details
Function code	1 byte	05H	Coil single write
Write address	2 bytes	0 to 65535 bytes	Returns the request command.
Write data	2 bytes	OFF: 0 ON: Other than 0	

■ Response (abnormal state)

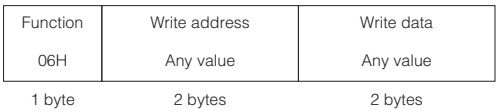
85H	Exception code
1 byte	1 byte

"Response exception codes"

06H: Holding register single write

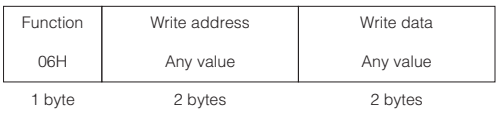
Write a value to a single holding register.

■ Request command



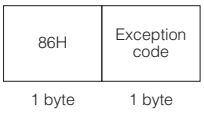
Item	Size	Data range	Details
Function code	1 byte	06H	Holding register single write
Write address	2 bytes	0 to 65535 bytes	Specify the address to write the data to.
Write data	2 bytes	0 to 65535 bytes	Specify the write data.

■ Response (normal state)



Item	Size	Data range	Details
Function code	1 byte	06H	Holding register single write
Write address	2 bytes	0 to 65535 bytes	Returns the request command.
Write data	2 bytes	0 to 65535 bytes	

■ Response (abnormal state)

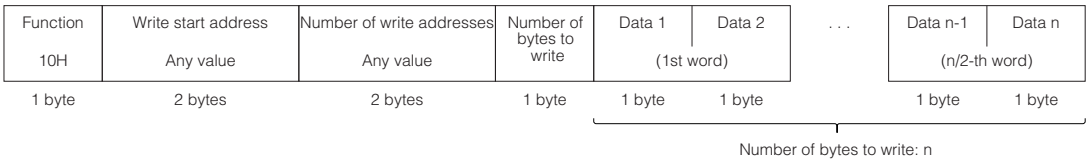


"Response exception codes"

10H: Holding register continuous write

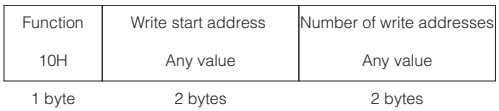
Write values to multiple holding registers.

■ Request command



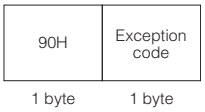
Item	Size	Data range	Details
Function code	1 byte	10H	Holding register sequential write
Write start address	2 bytes	0 to 65535 bytes	Specify the address to start writing the data to.
Number of write addresses	2 bytes	1 to 123 (words)	Specify the number of addresses (words) to write the data to.
Number of bytes to write	1 byte	2 to 246 bytes	Specify the (number of write addresses x 2).
Write data	n byte(s)	00H to FFH	Specify each byte of 1-word data in order from high to low.

■ Response (normal state)



Item	Size	Data range	Details
Function code	1 byte	10H	Holding register sequential write
Write start address	2 bytes	0 to 65535 bytes	Returns the request command.
Number of write addresses	2 bytes	1 to 123 bytes	

■ Response (abnormal state)



"Response exception codes"

Response exception codes

Exception code (H)	Description
01	The received function code is not supported.
02	The specified address is not supported.
03	The specified number of addresses is not supported. Otherwise, the specified number of addresses extends over the address area outside the valid area.

19-3 Modbus/TCP Communication Settings

Modbus/TCP Communication Settings

GC Configurator settings

[Setting procedure]

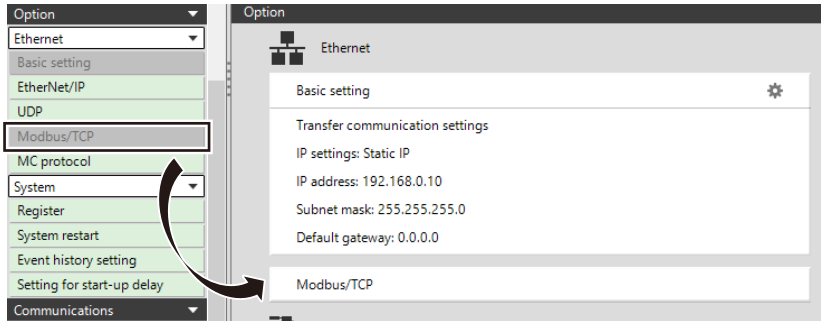
■ Basic Ethernet settings

Open the configuration screen from [Settings] and configure the basic Ethernet settings.

"15-2 GC Configurator Settings" (page 15-3)

■ Modbus/TCP settings

Open the configuration screen from [Settings] and drag and drop [Modbus/TCP] to the screen to register.



■ Registering communication inputs and communication outputs

Open the configuration screen from [Settings] and drag and drop [Communication input] and [Communication output] to the screen to register.

"15-2 GC Configurator Settings" (page 15-3)

■ Programming

Perform programming using the communication blocks.

"How to Use a Communication Block" (page 15-9)

19-4 Modbus/TCP Address List

Input Registers and Holding Registers

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
256	100H	Communication input [0:00] to [0:15]	Indicates the status of the communication inputs. When a bit is turned ON, the corresponding communication input is turned ON.	WORD	R/W	bit 0: Communication input bit 0 0: OFF 1: ON bit 1: Communication input bit 1 0: OFF 1: ON ... bit 15: Communication input bit 15 0: OFF 1: ON	○
...	...	...		...	...		
259	103H	Communication input [3:00] to [3:15]		WORD	R/W		○
260	104H	Enablement code of communication input [0:00]	Indicates the status of the enablement code. The upper eight bits are ignored. (Range: 1 to 255)	UINT	R/W	0000H to 00FFH	
...	...	...		...	...		
289	121H	Enablement code of communication input [1:13]		UINT	R/W		
290	122H	System reserved					
291	123H	System reserved					
292	124H	PLC text, 1st character, 2nd character	Displays the status of the PLC text. The first character is set in the low byte while the second character is set in the high byte in the ASCII code format.	STRING	R/W	0000H to FFFFH	
...	...	...		...	...		
301	12DH	PLC text, 19th character, 20th character		STRING	R/W		
512	200H	Number of connected units (expansion unit)	Indicates the number of connected expansion units.	UINT	R	0 to 65535	
513	201H	Number of connected units (remote I/O module)	Indicates the number of connected remote I/O modules.	UINT	R	0 to 65535	
514	202H	Model information (main controller)	Indicates the connected unit model.	WORD	R	bit 0 to 7: Unit model 1: GC-1000 2: GC-1000R 3: GC-S84 4: GC-S16 5: GC-S1R 6: GC-A16 7: GC-R45 8: GC-R48 bit 8: Positional relationship to the GC-B30 0: Unit positioned before the GC-B30 1: Unit positioned after the GC-B30 If the GC-B30 does not exist in the unit configuration, all units are set to 0. bit 9 to 15: System reserved (fixed to 0)	
515	203H	Model information (1st expansion unit)		WORD	R		
...	...	...		...	...		
524	20CH	Model information (10th expansion unit)		WORD	R		
525	20DH	Model information (1st remote I/O module)		WORD	R		
...	...	...		...	...		
528	210H	Model information (4th remote I/O module)		WORD	R		
529	211H	System reserved					
530	212H	Operation time, Byte 0, Byte 1	Indicates the time elapsed since the start of the unit in units of 10 ms.	WORD	R	0 to FFFFH	
531	213H	Operation time, Byte 2, Byte 3		WORD	R	0 to FFFFH	
532	214H	GC operating state	Indicates the operating state of the GC.	WORD	R	bit 0: RUN state 0: The unit is stopped. 1: The unit is running. bit 1: Abnormal state 0: Normal 1: Abnormal * An abnormal state means that at least one alert or error is occurring. bit 2 to 15: System reserved (fixed to 0)	○
533	215H	Number of errors that occurred	Indicates the number of errors that are currently occurring.	UINT	R	0 to 30	

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
534	216H	Main code of the (1st) error code	Indicates the code of the error that is currently occurring. Error codes are sorted in the following order: (1) Errors are sorted in order of Error, Alert, and Info, starting from the first error. (2) Errors are sorted by error category in (1) in order that they occurred. The high byte represents the main code while the low byte represents the detailed code. "Alert/Error list" (page A-7)	UINT	R	0 to 65535	
535	217H	Detailed code of the (1st) error code		UINT	R		
...	...	...		...	...		
592	250H	Main code of the (30th) error code		UINT	R		
593	251H	Detailed code of the (30th) error code		UINT	R		
594	252H	Communication output [0:00] to [0:15]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Communication output bit 0 bit 1: Communication output bit 1 ... bit 15: Communication output bit 15	O
...	...	...		...	...		
597	255H	Communication output [3:00] to [3:15]		WORD	R		O
598	256H	GC-Link port status	Indicates the GC-Link port status.	WORD	R	bit 0 to 3: GC-Link port A connection status 0000: Searching 0001: Not connected 0010: Connected bit 4 to 7: GC-Link port A error status 0000: No error 0001: Communication error bit 8 to 11: GC-Link port B connection status 0000: Searching 0001: Not connected 0010: Connected bit 12 to 15: GC-Link port B error status 0000: No error 0001: Communication error	
768	300H	GC-Link port A GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port A.	UINT	R	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2	
769	301H	System reserved					
770	302H	GC-Link port A GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port A.	UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
771	303H	GC-Link port A GL-R Sub unit 1 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
772	304H	GC-Link port A GL-R Sub unit 2 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
773	305H	GC-Link port A GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port A.	UINT	R	0 to 127	
774	306H	GC-Link port A GL-R Number of optical axes of sub unit 1		UINT	R	0 to 127	
775	307H	GC-Link port A GL-R Number of optical axes of sub unit 2		UINT	R	0 to 127	
776	308H	GC-Link port A GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6	O
777	309H	System reserved					

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
778	30AH	GC-Link port A GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port A. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
779	30BH	GC-Link port A GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
841	349H	GC-Link port A GL-R Received-light-amount, Main unit, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
842	34AH	GC-Link port A GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
843	34BH	GC-Link port A GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
905	389H	GC-Link port A GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
906	38AH	GC-Link port A GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
907	38BH	GC-Link port A GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
969	3C9H	GC-Link port A GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
970	3CAH	GC-Link port A GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	R	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis	O
971	3CBH	GC-Link port A GL-R ON/OFF information of each optical axis [31:16]		WORD	R	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis	O
...	...	...		...	...		
984	3D8H	GC-Link port A GL-R ON/OFF information of each optical axis [239:224]		WORD	R	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis	O
985	3D9H	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	WORD	R	0: No error 1: Error occurring	O
986	3DAH	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	WORD	R	0: OFF 1: ON	O
987	3DBH	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	R	0: Disabled 1: Enabled	O
988	3DCH	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	R	0: No alert 1: Alert occurring	O
989	3DDH	GC-Link port A GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A in percentage.	UINT	R	0 to 100	

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
990	3DEH	GC-Link port A GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	UINT	R	0: No set 1: 5 sec 2: 30 sec 3: 5 min	
1024	400H	GC-Link port A GS Number of connected units	Indicates the number of GS units connected to the GC-Link port A.	UINT	R	0 to 16	
1025	401H	GC-Link port A GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port A.	WORD	R	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved	○
1026	402H	GC-Link port A GS Model information (2nd unit)		WORD	R		○
...	...	...		...	...		
1040	410H	GC-Link port A GS Model information (16th unit)		WORD	R		○
1041	411H	GC-Link port A GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	WORD	R	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved	○
1042	412H	GC-Link port A GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port A.	WORD	R	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close	○
1043	413H	GC-Link port A GS Lock status	Indicates the lock status of each GS connected to the GC-Link port A. This is always 0 for the non-contact type.	WORD	R	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked	○
1044	414H	GC-Link port A GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port A.	WORD	R	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved	○
1045	415H	GC-Link port A GS 2nd unit status		WORD	R		○
...	...	...		...	...		
1059	423H	GC-Link port A GS 16th unit status		WORD	R		○
1280	500H	GC-Link port B GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port B.	UINT	R	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2	

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
1281	501H	System reserved					
1282	502H	GC-Link port B GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port B.	UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
1283	503H	GC-Link port B GL-R Sub unit 1 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
1284	504H	GC-Link port B GL-R Sub unit 2 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
1285	505H	GC-Link port B GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port B.	UINT	R	0 to 127	
1286	506H	GC-Link port B GL-R Number of optical axes of sub unit 1		UINT	R	0 to 127	
1287	507H	GC-Link port B GL-R Number of optical axes of sub unit 2		UINT	R	0 to 127	
1288	508H	GC-Link port B GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6	○
1289	509H	System reserved					
1290	50AH	GC-Link port B GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port B. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
1291	50BH	GC-Link port B GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
1353	549H	GC-Link port B GL-R Received-light-amount, Main unit, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
1354	54AH	GC-Link port B GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
1355	54BH	GC-Link port B GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
1417	589H	GC-Link port B GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
1418	58AH	GC-Link port B GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
1419	58BH	GC-Link port B GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
1481	5C9H	GC-Link port B GL-R Received-light-amount, Sub unit 2, 127th optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port B. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
1482	5CAH	GC-Link port B GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	R	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis	O
1483	5CBH	GC-Link port B GL-R ON/OFF information of each optical axis [31:16]		WORD	R	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis	O
...	...	...		...	...	...	
1496	5D8H	GC-Link port B GL-R ON/OFF information of each optical axis [239:224]		WORD	R	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis	O
1497	5D9H	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	WORD	R	0: No error 1: Error occurring	O
1498	5DAH	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	WORD	R	0: OFF 1: ON	O
1499	5DBH	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	R	0: Disabled 1: Enabled	O
1500	5DCH	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	R	0: No alert 1: Alert occurring	O
1501	5DDH	GC-Link port B GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B in percentage.	UINT	R	0 to 100	
1502	5DEH	GC-Link port B GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	UINT	R	0: No set 1: 5 sec 2: 30 sec 3: 5 min	
1536	600H	GC-Link port B GS Number of connected units	Indicates the number of GS units connected to the GC-Link port B.	UINT	R	0 to 16	
1537	601H	GC-Link port B GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port B.	WORD	R	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved	O
1538	602H	GC-Link port B GS Model information (2nd unit)		WORD	R		O
...	...	...		...	...		
1552	610H	GC-Link port B GS Model information (16th unit)		WORD	R		O

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
1553	611H	GC-Link port B GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port B.	WORD	R	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved	O
1554	612H	GC-Link port B GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port B.	WORD	R	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close	O
1555	613H	GC-Link port B GS Lock status	Indicates the lock status of each GS connected to the GC-Link port B. This is always 0 for the non-contact type.	WORD	R	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked	O
1556	614H	GC-Link port B GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port B.	WORD	R	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved	O
1557	615H	GC-Link port B GS 2nd unit status		WORD	R		O
...	...	...		...	...		
1571	623H	GC-Link port B GS 16th unit status		WORD	R		O
1792	700H	Project name, 1st character	Indicates the project name of the configuration file (UTF-16).	STRING	R		
...	...			...	...		
1855	73FH	Project name, 64th character		STRING	R		
1856	740H	System reserved					
1857	741H	Configuration CRC, 1st character	Indicates the configuration CRC of the configuration file (UTF-16).	STRING	R		
...	...			...	...		
1864	748H	Configuration CRC, 8th character		STRING	R		
1865	749H	System reserved					
1866	74AH	Date and time of transfer, 1st character	Indicates the date and time of transfer of the configuration file (UTF-16).	STRING	R		
...	...			...	...		
1885	75DH	Date and time of transfer, 20th character		STRING	R		
1886	745H	System reserved					

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
2048	800H	Input status (GC-Link port)	Indicates the input/output status of each unit.*1	WORD	R		O
2049	801H	Input status (main controller)		WORD	R		O
2050	802H	Input status (1st expansion unit)		WORD	R		O
...	...	...		...	...		
2059	80BH	Input status (10th expansion unit)		WORD	R		O
2060	80CH	Input status (1st remote I/O module)		WORD	R		O
...	...	...		...	...		
2063	80FH	Input status (4th remote I/O module)		WORD	R		O
2064	810H	Output status (GC-Link port)		WORD	R		O
2065	811H	Output status (main controller)		WORD	R		O
2066	812H	Output status (1st expansion unit)		WORD	R		O
...	...	...		...	...		
2075	81BH	Output status (10th expansion unit)		WORD	R		O
2076	81CH	Output status (1st remote I/O module)		WORD	R		O
...	...	...		...	...		
2079	81FH	Output status (4th remote I/O module)		WORD	R		O
2304	900H	Number of used blocks	Indicates the number of blocks used by the program.	UINT	R	0 to 500	
2305	901H	Block output status (Block ID 1)	Indicates the output status of each block used by the program.*2	WORD	R		O
...	...	...		...	...		
2804	AF4H	Block output status (Block ID 500)		WORD	R		O
2816	B00H	Number of error histories	Indicates the number of error histories.	UINT	R	0 to 100	
2817	B01H	1st error history, Error code, Main code	Indicates the error code of the 1st error history. Error histories are sorted in newest-first chronological order. "Alert/Error list" (page A-7)	UINT	R	0 to 99	
2818	B02H	1st error history, Error code, Detailed code		UINT	R	0 to 9999	
2819	B03H	1st error history, Operation time on error, Low	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	WORD	R	0 to 65535	
2820	B04H	1st error history, Operation time on error, High		WORD	R	0 to 65535	
...	...	...	...	...	...		
3213	C8DH	100th error history, Error code, Main code	Indicates the error code of the 100th error history.	UINT	R	0 to 99	
3214	C8EH	100th error history, Error code, Detailed code		UINT	R	0 to 9999	
3215	C8FH	100th error history, Operation time on error, Low	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	WORD	R	0 to 65535	
3216	C90H	100th error history, Operation time on error, High		WORD	R	0 to 65535	

*1 For the bit assignment of each unit, refer to "Input/output status assignment by unit" (page 19-29).

*2 Check the block ID in the GC Configurator report. For the bit assignment of each block, refer to "Output status assignment by block" (page 19-31).

Inputs and Coils

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
4096	1000H	Communication input [0:00] to [0:15]	0	[0:00]	Indicates the status of the communication inputs. When a bit is turned ON, the corresponding communication input is turned ON.	Bit	R/W	0: OFF 1: ON
...	...		...	...		Bit	R/W	
4111	100FH		15	[0:15]		Bit	R/W	
...	...	...	...	...		Bit	R/W	
4144	1030H	Communication input [3:00] to [3:15]	0	[3:00]		Bit	R/W	
...	...		...	...		Bit	R/W	
4159	103FH		15	[3:15]		Bit	R/W	
8512	2140H	GC operating state	0	RUN state	Indicates the RUN state of the GC.	Bit	R	0: The unit is stopped. 1: The unit is running.
8513	2141H		1	Abnormal state	Indicates the abnormal state of the GC. An abnormal state means that at least one alert or error is occurring.	Bit	R	0: Normal 1: Abnormal
9504	2520H	Communication output [0:00] to [0:15]	0	Communication output [0:00]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
9519	252FH		15	Communication output [0:15]		Bit	R	
...	...	...	...	...		Bit	R	
9552	2550H	Communication output [3:00] to [3:15]	0	Communication output [3:00]		Bit	R	
...	...		...	...		Bit	R	
9567	255FH		15	Communication output [3:15]		Bit	R	
12416	3080H	GC-Link port A GL-R Main controller setting switch settings	0	GC-Link port A GL-R Main controller setting switch settings, Switch 1	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
12417	3081H		1	GC-Link port A GL-R Main controller setting switch settings, Switch 2		Bit	R	
12418	3082H		2	GC-Link port A GL-R Main controller setting switch settings, Switch 3		Bit	R	
12419	3083H		3	GC-Link port A GL-R Main controller setting switch settings, Switch 4		Bit	R	
12420	3084H		4	GC-Link port A GL-R Main controller setting switch settings, Switch 5		Bit	R	
12421	3085H		5	GC-Link port A GL-R Main controller setting switch settings, Switch 6		Bit	R	

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
15520	3CA0H	GC-Link port A GL-R ON/OFF information of each optical axis [15:0]	0	GC-Link port A GL-R ON/OFF information of each optical axis, 1st optical axis	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the offset following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
15535	3CAFH		15	GC-Link port A GL-R ON/OFF information of each optical axis, 16th optical axis		Bit	R	
...	...	...	...	...		Bit	R	
15744	3D80H	GC-Link port A GL-R ON/OFF information of each optical axis [239:224]	0	GC-Link port A GL-R ON/OFF information of each optical axis, 225th optical axis		Bit	R	
...	...		...	...		Bit	R	
15759	3D8FH		15	GC-Link port A GL-R ON/OFF information of each optical axis, 240th optical axis		Bit	R	
15760	3D90H	GC-Link port A GL-R Error status	0	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	Bit	R	0: No error 1: Error occurring
15776	3DA0H	GC-Link port A GL-R OSSD output status	0	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
15792	3DB0H	GC-Link port A GL-R Received-light-amount decrease alert enablement status	0	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	Bit	R	0: Disabled 1: Enabled
15808	3DC0H	GC-Link port A GL-R Received-light-amount decrease alert detection status	0	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	Bit	R	0: No alert 1: Alert occurring
16400	4010H	GC-Link port A GS Model information (1st unit)	0	GC-Link port A GS 1st GS model information	Indicates the model information of the 1st GS connected to the GC-Link port A.	Bit	R	0: Non-contact type 1: Lock type
16401	4011H		1	GC-Link port A GS 1st GS lock type information	Indicates the lock type information of the 1st GS connected to the GC-Link port A.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
16402	4012H		2	System reserved	System reserved	Bit	R	
16403	4013H		3	System reserved	System reserved	Bit	R	
16404	4014H		4	System reserved	System reserved	Bit	R	
16405	4015H		5	System reserved	System reserved	Bit	R	
16406	4016H		6	GC-Link port A GS 1st GS coding level settings	Indicates the coding level settings of the 1st GS connected to the GC-Link port A.	Bit	R	0: Low (multi operation) 1: High (unique operation)
...	...	...	...	...	...	Bit	R	...

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
16640	4100H	GC-Link port A GS Model information (16th unit)	0	GC-Link port A GS 16th GS model information	Indicates the model information of the 16th GS connected to the GC-Link port A.	Bit	R	0: Non-contact type 1: Lock type
16641	4101H		1	GC-Link port A GS 16th GS lock type information	Indicates the lock type information of the 16th GS connected to the GC-Link port A.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
16642	4102H		2	System reserved	System reserved	Bit	R	
16643	4103H		3	System reserved	System reserved	Bit	R	
16644	4104H		4	System reserved	System reserved	Bit	R	
16645	4105H		5	System reserved	System reserved	Bit	R	
16646	4106H		6	GC-Link port A GS 16th GS coding level settings	Indicates the coding level settings of the 16th GS connected to the GC-Link port A.	Bit	R	0: Low (multi operation) 1: High (unique operation)
16656	4110H	GC-Link port A GS OSSD/lock control status	0	GC-Link port A GS OSSD status	Indicates the OSSD status of the GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
16657	4111H		1	GC-Link port A GS Lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	Bit	R	0: Unlocked 1: Locked
16672	4120H	GC-Link port A GS Open/close state	0	GC-Link port A 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
...	...		...	...	...	Bit	R	...
16687	412FH		15	GC-Link port A 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
16688	4130H	GC-Link port A GS Lock status	0	GC-Link port A 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
...	...		...	...	...	Bit	R	...
16703	413FH		15	GC-Link port A 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
16704	4140H	GC-Link port A GS 1st unit status	0	GC-Link port A 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
16705	4141H		1	GC-Link port A 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
16706	4142H		2	GC-Link port A 1st GS Red LED display status	Indicates the red LED display status of the 1st GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
16707	4143H		3	GC-Link port A 1st GS Green LED display status	Indicates the green LED display status of the 1st GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
...	...	...	...	...	...	Bit	R	...

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
16944	4230H	GC-Link port A GS 16th unit status	0	GC-Link port A 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
16945	4231H		1	GC-Link port A 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
16946	4232H		2	GC-Link port A 15th GS Red LED display status	Indicates the red LED display status of the 15th GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
16947	4233H		3	GC-Link port A 15th GS Green LED display status	Indicates the green LED display status of the 15th GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
20608	5080H	GC-Link port B GL-R Main controller setting switch settings	0	GC-Link port B GL-R Main controller setting switch settings, Switch 1	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
20609	5081H		1	GC-Link port B GL-R Main controller setting switch settings, Switch 2		Bit	R	
20610	5082H		2	GC-Link port B GL-R Main controller setting switch settings, Switch 3		Bit	R	
20611	5083H		3	GC-Link port B GL-R Main controller setting switch settings, Switch 4		Bit	R	
20612	5084H		4	GC-Link port B GL-R Main controller setting switch settings, Switch 5		Bit	R	
20613	5085H		5	GC-Link port B GL-R Main controller setting switch settings, Switch 6		Bit	R	
23712	5CA0H	GC-Link port B GL-R ON/OFF information of each optical axis [15:0]	0	GC-Link port B GL-R ON/OFF information of each optical axis, 1st optical axis	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the offset following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
23727	5CAFH		15	GC-Link port B GL-R ON/OFF information of each optical axis, 16th optical axis		Bit	R	
...	...	...	...	...		Bit	R	
23936	5D80H	GC-Link port B GL-R ON/OFF information of each optical axis [239:224]	0	GC-Link port B GL-R ON/OFF information of each optical axis, 225th optical axis		Bit	R	
...	...		...	...		Bit	R	
23951	5D8FH		15	GC-Link port B GL-R ON/OFF information of each optical axis, 240th optical axis		Bit	R	
23952	5D90H	GC-Link port B GL-R Error status	0	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	Bit	R	0: No error 1: Error occurring
23968	5DA0H	GC-Link port B GL-R OSSD output status	0	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
23984	5DB0H	GC-Link port B GL-R Received-light-amount decrease alert enablement status	0	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	Bit	R	0: Disabled 1: Enabled

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
24000	5DC0H	GC-Link port B GL-R Received-light-amount decrease alert detection status	0	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	Bit	R	0: No alert 1: Alert occurring
24592	6010H	GC-Link port B GS Model information (1st unit)	0	GC-Link port B GS 1st GS model information	Indicates the model information of the 1st GS connected to the GC-Link port B.	Bit	R	0: Non-contact type 1: Lock type
24593	6011H		1	GC-Link port B GS 1st GS lock type information	Indicates the lock type information of the 1st GS connected to the GC-Link port B.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
24594	6012H		2	System reserved	System reserved	Bit	R	
24595	6013H		3	System reserved	System reserved	Bit	R	
24596	6014H		4	System reserved	System reserved	Bit	R	
24597	6015H		5	System reserved	System reserved	Bit	R	
24598	6016H		6	GC-Link port B GS 1st GS coding level settings	Indicates the coding level settings of the 1st GS connected to the GC-Link port B.	Bit	R	0: Low (multi operation) 1: High (unique operation)
...	...	...	...	...	...	Bit	R	...
24832	6100H	GC-Link port B GS Model information (16th unit)	0	GC-Link port B GS 16th GS model information	Indicates the model information of the 16th GS connected to the GC-Link port B.	Bit	R	0: Non-contact type 1: Lock type
24833	6101H		1	GC-Link port B GS 16th GS lock type information	Indicates the lock type information of the 16th GS connected to the GC-Link port B.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
24834	6102H		2	System reserved	System reserved	Bit	R	
24835	6103H		3	System reserved	System reserved	Bit	R	
24836	6104H		4	System reserved	System reserved	Bit	R	
24837	6105H		5	System reserved	System reserved	Bit	R	
24838	6106H		6	GC-Link port B GS 16th GS coding level settings	Indicates the coding level settings of the 16th GS connected to the GC-Link port B.	Bit	R	0: Low (multi operation) 1: High (unique operation)
24848	6110H	GC-Link port B GS OSSD/lock control status	0	GC-Link port B GS OSSD status	Indicates the OSSD status of the GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
24849	6111H		1	GC-Link port B GS Lock control status	Indicates the lock control status of the GS connected to the GC-Link port B.	Bit	R	0: Unlocked 1: Locked
24864	6120H	GC-Link port B GS Open/close state	0	GC-Link port B 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
...	...		...	...	...	Bit	R	...
24879	612FH		15	GC-Link port B 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
24880	6130H	GC-Link port B GS Lock status	0	GC-Link port B 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
...	...		...	...	...	Bit	R	...
24895	613FH		15	GC-Link port B 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
24896	6140H	GC-Link port B GS 1st unit status	0	GC-Link port B 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
24897	6141H		1	GC-Link port B 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
24898	6142H		2	GC-Link port B 1st GS Red LED display status	Indicates the red LED display status of the 1st GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
24899	6143H		3	GC-Link port B 1st GS Green LED display status	Indicates the green LED display status of the 1st GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
...	...	...	...	...	...	Bit	R	...
25136	6230H	GC-Link port B GS 16th unit status	0	GC-Link port B 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
25137	6231H		1	GC-Link port B 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
25138	6232H		2	GC-Link port B 15th GS Red LED display status	Indicates the red LED display status of the 15th GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
25139	6233H		3	GC-Link port B 15th GS Green LED display status	Indicates the green LED display status of the 15th GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
32768	8000H	Input status (GC-Link port)	0	Input status (GC-Link port) bit 0	Indicates the input status of the GC-Link port.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32783	800FH		15	Input status (GC-Link port) bit 15		Bit	R	
32784	8010H	Input status (main controller)	0	Input status (main controller) bit 0	Displays the input status of the main controller.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32799	801FH		15	Input status (main controller) bit 15		Bit	R	
32800	8020H	Input status (1st expansion unit)	0	Input status (1st expansion unit) bit 0	Indicates the input status of the 1st expansion unit.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32815	802FH		15	Input status (1st expansion unit) bit 15		Bit	R	

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
...	...	...	...	...	...	Bit	R	...
32944	80B0H	Input status (10th expansion unit)	0	Input status (10th expansion unit) bit 0	Indicates the input status of the 10th expansion unit.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32959	80BFH		15	Input status (10th expansion unit) bit 15		Bit	R	
32960	80C0H	Input status (1st remote I/O module)	0	Input status (1st remote I/O module) bit 0	Indicates the input status of the 1st remote I/O module.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32975	80CFH		15	Input status (1st remote I/O module) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
33008	80F0H	Input status (4th remote I/O module)	0	Input status (4th remote I/O module) bit 0	Indicates the input status of the 4th remote I/O module.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33023	80FFH		15	Input status (4th remote I/O module) bit 15		Bit	R	
33024	8100H	Output status (GC-Link port)	0	Output status (GC-Link port) bit 0	Indicates the output status of the GC-Link port.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33039	810FH		15	Output status (GC-Link port) bit 15		Bit	R	
33040	8110H	Output status (main controller)	0	Output status (main controller) bit 0	Displays the output status of the main controller.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33055	811FH		15	Output status (main controller) bit 15		Bit	R	
33056	8120H	Output status (1st expansion unit)	0	Output status (1st expansion unit) bit 0	Indicates the output status of the 1st expansion unit.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33071	812FH		15	Output status (1st expansion unit) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
33200	81B0H	Output status (10th expansion unit)	0	Output status (10th expansion unit) bit 0	Indicates the output status of the 10th expansion unit.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33215	81BFH		15	Output status (10th expansion unit) bit 15		Bit	R	
33216	81C0H	Output status (1st remote I/O module)	0	Output status (1st remote I/O module) bit 0	Indicates the output status of the 1st remote I/O module.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33231	81CFH		15	Output status (1st remote I/O module) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
33264	81F0H	Output status (4th remote I/O module)	0	Output status (4th remote I/O module) bit 0	Indicates the output status of the 4th remote I/O module.* 1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33279	81FFH		15	Output status (4th remote I/O module) bit 15		Bit	R	

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
36880	9010H	Block output status (Block ID 1)	0	Block output status (Block ID 1) bit 0	Indicates the output status of the Block ID 1 block.*2	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
36895	901FH		15	Block output status (Block ID 1) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
44864	AF40H	Block output status (Block ID 500)	0	Block output status (Block ID 500) bit 0	Indicates the output status of the Block ID 500 block.*2	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
44879	AF4FH		15	Block output status (Block ID 500) bit 15		Bit	R	

*1 For the bit assignment of each unit, refer to "Input/output status assignment by unit" (page 19-29).

*2 Check the block ID in the GC Configurator report. For the bit assignment of each block, refer to "Output status assignment by block" (page 19-31).

● Input/output status assignment by unit

◆Input status (GC-Link port)

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved										Port B	Port A	Port B		Port A	
										Ai	Ai	Si1	Si0	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (main controller)

GC-1000

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Si15	Si14	Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

GC-1000R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved		Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (nth expansion unit)

GC-S84

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved								Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

GC-S16

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Si15	Si14	Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (nth remote I/O module)

GC-R45/R48

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved				CN4	CN3	CN2	CN1	CN4		CN3		CN2		CN1	
				Ai	Ai	Ai	Ai	Si1	Si0	Si1	Si0	Si1	Si0	Si1	Si0

Input status 0: OFF, 1: ON

◆Output status (GC-Link port)

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												Port B		Port A	
												Ao1	Ao0	Ao1	Ao0

Output status 0: OFF, 1: ON

◆Output status (main controller)

GC-1000

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved						Ao3	Ao2	Ao1	Ao0	So5	So4	So3	So2	So1	So0

Output status 0: OFF, 1: ON

GC-1000R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved							Ao3	Ao2	Ao1	Ao0	SRo	So3	So2	So1	So0

Output status 0: OFF, 1: ON

◆Output status (nth expansion unit)

GC-S84

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												So3	So2	So1	So0

Output status 0: OFF, 1: ON

GC-S1R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved															SRo

Output status 0: OFF, 1: ON

GC-A16

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Ao15	Ao14	Ao13	Ao12	Ao11	Ao10	Ao9	Ao8	Ao7	Ao6	Ao5	Ao4	Ao3	Ao2	Ao1	Ao0

Output status 0: OFF, 1: ON

◆Output status (nth remote I/O module)

GC-R45

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												CN4	CN3	CN2	CN1
												Ao	Ao	Ao	Ao

Output status 0: OFF, 1: ON

GC-R48

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												CN4	CN3	CN2	CN1
												So	So	So	So

Output status 0: OFF, 1: ON

● Output status assignment by block

		Block name	Bit assignment
Input devices	Safety input devices	Emergency stop switch	bit 0: Output
		Limit switch	
		Interlock switch	
		Guard locking switch	
		GS Series [KEYENCE]	
		Light curtain	
		GL-R Series [KEYENCE]	
		GL-S Series [KEYENCE]	
		Laser scanner	
		SZ-V Series [KEYENCE]	
		SZ Series [KEYENCE]	
		Rope pull switch	
		Safety mat	
		Two hand control device	
		Enabling device	
		Other safety switch	
		Other safety input	
	Other input devices	Reset switch	bit 0: Output
		Mode selecting switch	bit 0: Mode Output 1 bit 1: Mode Output 2 bit 2: Error
		EDM input	bit 0: Output
		Muting input	
		Safety plug	
		Hold-to-run switch	
		Other switch	
		Other input	

		Block name		Bit assignment
Output devices	Safety outputs	S-OUT S-OUT EDM enabled	Safety 1 output	bit 0: Output bit 1: Reserved bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
			Safety 2 output	bit 0: Output1 bit 1: Output2 bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
		S-OUT (Relay output) S-OUT (Relay output) EDM enabled		bit 0: Output bit 1: Reserved bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
	Other outputs	AUX-OUT		bit 0: Output bit 1: Reserved bit 2: Error
Communications	Communication input	Reset input (COM) Other input (COM)	Enablement code disabled	bit 0: Output
			Enablement code enabled	bit 0: Output bit1: Ready bit 2: Error
	Communication output	Communication output		bit 0: Output bit 1: Reserved bit 2: Error
Register		Register (Load)		bit 0: Output
		Register (Store)		
Expansion blocks	None	GS closed state		bit 0: Output
		GS locked state		
		GS indicator control output		bit 0: Red bit 1: Green bit 2: Output Error
Other input blocks		GL-R received-light-amount decrease alert		bit 0: Output
		AUX-IN		
		OSSD 3/4		
		IN		

		Block name		Bit assignment
Other output blocks		Unlock output	Lock control 1 output	bit 0: Output bit 1: Reserved bit 2: DIAG Error bit 3: Wait OFF
			Lock control 2 output	bit 0: Output1 bit 1: Output2 bit 2: DIAG Error bit 3: Wait OFF
		Indicator control output		bit 0: Red bit 1: Green bit 2: Output Error
		Bank switching output	Independent bank	bit 0: Bank Output A bit 1: Bank Output a bit 2: Input Mismatch bit 3: Output Error
			Single	bit 0: Bank Output A bit 1: Bank Output a bit 2: Bank Output B bit 3: Bank Output b bit 4: Bank Output C bit 5: Bank Output c bit 6: Input Mismatch bit 7: Output Error
			Binary	bit 0: Bank Output A bit 1: Bank Output a bit 2: Bank Output B bit 3: Bank Output b bit 4: Bank Output C bit 5: Bank Output c bit 6: Bank Output D bit 7: Bank Output d bit 8: Bank Output E bit 9: Bank Output e bit 10: Input Mismatch bit 11: Output Error
		OUT		bit 0: Output bit 1: Reserved bit 2: Error
Function blocks	Logic	AND		bit 0: Output
		AND (6-10 inputs)		
		OR		
		NOT		
		NAND		
		NOR		
		XOR		
		SR Flip-Flop (Set has priority)		
		RS Flip-Flop (Reset has priority)		
		JK Flip-Flop		

		Block name	Bit assignment
Function blocks	Reset	Reset	bit 0: Output bit 1: Reset Required
		Reset (with AND)	bit 0: Output bit 1: Reset Required
		Dual reset	bit 0: Output bit 1: Reset Required1 bit 2: Reset Required2
		Existence detection reset	bit 0: Output bit 1: Reset Required
	Muting	Sequential muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Parallel muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Cross-muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Muting for exit	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Position detection muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout

		Block name	Bit assignment
Function blocks	Application	Master ON	bit 0: Master ON Ready bit 1: Reset Required
		Unlock control	bit 0: Unlock Output bit 1: Unlock Required
		Bypass	bit 0: Output bit 1: Bypass Active
		Control guard	bit 0: Output bit 1: Reset Required
		PSDI control	bit 0: Output bit 1: Output2 bit 2: Break Required bit 3: Reset Required bit 4: Normal Operation bit 5: PSDI Error bit 6: PSDI Timeout
	Manual mode	Manual mode control (MMC)	bit 0: Input Bypass bit 1: Output Enable bit 2: Restart Required bit 3: Manual Mode Active
		MMC input bypass	bit 0: Output
		MMC input bypass_	bit 0: Output
		MMC output enable	bit 0: Output
	Timers / Counters	OFF-delay	bit 0: Output bit 1: Delay Active
		ON-delay	bit 0: Output bit 1: Delay Active
		Pulse generator	bit 0: Output
		Up-down counter	bit 0: Reached Upper Limit bit 1: Reached Zero
		Up-down counter (with binary output)	bit 0: Reached Upper Limit bit 1: Reached Zero bit 0: Output bit 2 bit 3: Output bit 1 bit 4: Output bit 2 bit 5: Output bit 3 bit 6: Output bit 4 bit 7: Output bit 5 bit 8: Output bit 6 bit 9: Output bit 7

		Block name	Bit assignment
Function blocks	Others	Edge detection	bit 0: Rising Edge bit 1: Falling Edge
		Binary decoder	bit 0: Output1 bit 1: Output2 bit 2: Output3 bit 3: Output4 bit 4: Output5 bit 5: Output6 bit 6: Output7 bit 7: Output8
		Binary encoder	bit 0: Output bit 0 bit 1: Output bit 1 bit 2: Output bit 2 bit 3: Error
		Mode changing control	bit 0: Mode Output1 bit 1: Mode Output2 bit 2: Mode Output3 bit 3: Mode Output4 bit 4: Mode Output5 bit 5: Mode Output6 bit 6: Mode Output7 bit 7: Mode Output8 bit 8: Mode Error bit 9: Trigger Required
		Selector (2 inputs) Selector (4 inputs)	bit 0: Output bit 1: Mode Error
System blocks	None	Always ON	bit 0: Output
		Always OFF	
		1 scan ON upon start-up	
		System Information	
		Block information	
		Jump (Load)	
		Jump (Store)	
		Event history trigger	
Other functions	Recipe block	AND (with connection constraint function)	bit 0: Output

20

MC Protocol Communication Function

This chapter describes the settings and functions of the MC protocol communication function.

20-1 Overview of the MC Protocol Communication Function ..... page 20-2
20-2 MC Protocol Communication Settings ..... page 20-3
20-3 MC Protocol Communication Specifications ..... page 20-4
20-4 MC Protocol Communication Commands ..... page 20-9
20-5 Address List ..... page 20-17

20-1 Overview of the MC Protocol Communication Function

DANGER	**All of the data received from the communication of the EtherNet/IP™, PROFINET, UDP, Modbus/TCP, or MC protocol cannot be used for the safety related part of the control system. When used incorrectly, there is a possibility that the operator of the device may be threatened with major injury or even death.**

Point

The Ethernet communication function is available only for the main controller "GC-1000".

Overview of the MC protocol Communication Function

What is MC protocol communication?

The MC protocol is an abbreviation of "MELSEC communication protocol". The MC protocol is a communication mode dedicated to Mitsubishi Electric Corporation PLCs, and is used to create a communication program on the PC or PLC and read/write the target address data or program via an Ethernet unit or port.

* MELSEC is a registered trademark of Mitsubishi Electric Corporation.

What you can do with MC protocol communication

With MC protocol communication, you can perform the following in the GC Series.

Item	MC protocol communication
Write a communication input	✓
Write an enablement code	✓
Write a character string that is stored into the history function	✓
Read out a communication output	✓
Read out an error code	✓
Read out the unit configuration and model information	✓
Read out the received-light-amount and ON/OFF state of the GL-R Series connected to a GC-Link port.	✓
Read out the door open/close state and ON/OFF state of the GS Series connected to a GC-Link port.	✓
Read out the ON/OFF status of the main controller, expansion unit, and remote I/O module.	✓
Read out the block status	✓
Read out the error history	✓

20-2 MC Protocol Communication Settings

MC Protocol Communication Settings

GC Configurator settings

[Setting procedure]

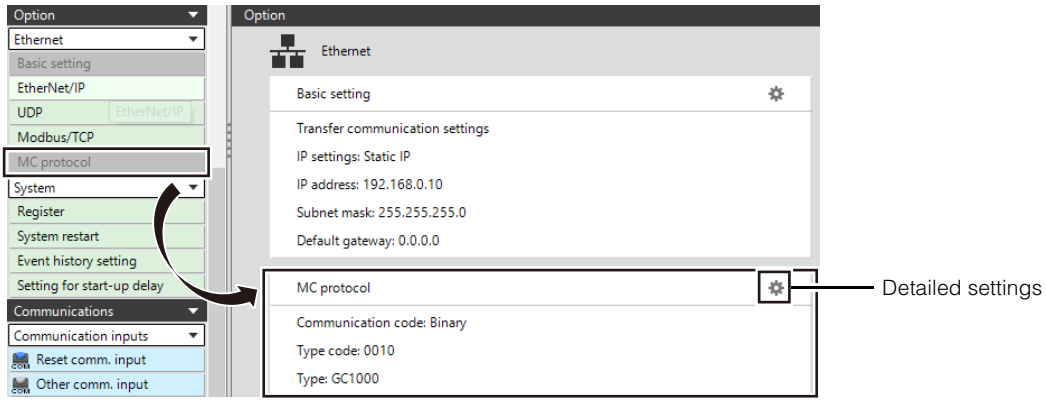
■ Basic Ethernet settings

Open the configuration screen from [Settings] and configure the basic Ethernet settings.

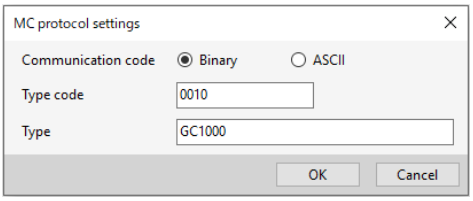
"15-2 GC Configurator Settings"

■ MC protocol settings

Open the configuration screen from [Settings] and drag and drop [MC protocol] to the screen to register.



Detailed settings



Item	Details
Communication code	Select the communication data code. Setting range: Binary/ASCII (Default: Binary)
Type code	Set the type code to be read in communications. Setting range: 0000H to FFFFH (Default: 0025H)
Type*	Set the type to be read in communications. Setting range: Up to 16 ASCII code characters (Default: GC1000)

* Even when the binary code is used for communications, [Type] is returned as ASCII code characters.
If the type name contains less than 16 bytes, it is returned as 16-byte data with "20H" added to the end.

■ Registering communication inputs and communication outputs

Open the configuration screen from [Settings] and drag and drop [Communication input] and [Communication output] to the screen to register.

"15-2 GC Configurator Settings"

■ Programming

Perform programming using the communication blocks.

"How to use a communication block"

20-3 MC Protocol Communication Specifications

MC Protocol Communication Specifications

The GC Series uses TCP/IP or UDP/IP for communication control. The TCP/IP and UDP/IP communication specifications are as follows.

TCP/IP

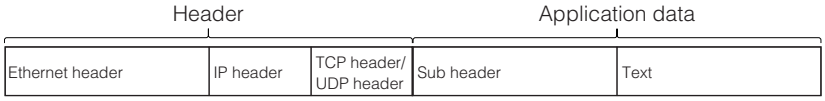
Item	Specification
Communication mode	TCP/IP
Port number	5100 (fixed)
Maximum number of connections	4
Supported frame	QnA-compatible 3E frame, 4E frame
Data format	Binary/ASCII

UDP/IP

Item	Specification
Communication mode	UDP/IP
Port number	5100 (fixed)
Maximum number of connections	1
Supported frame	QnA-compatible 3E frame, 4E frame
Data format	Binary/ASCII

MC Protocol Data Format

The communication data format of the MC protocol consists of "header" and "application".
The header part contains "Ethernet header", "IP header", and "TCP header (UDP header)" while the application part contains "sub header" and "text".



Sub header format

The sub header format is different between the QnA-compatible 3E frame and 4E frame.

■ QnA-compatible 3E frame

● For the ASCII code

Command

5	0	0	0
35H	30H	30H	30H

Response

D	0	0	0
44H	30H	30H	30H

● For the binary code

Command

50H	00H

Response

D0H	00H

■ 4E frame

● For the ASCII code

Command

5	4	0	0	H	-	-	L	0	0	0	0
35H	34H	30H	30H					30H	30H	30H	30H

Serial number*

Response

D	4	0	0	H	-	-	L	0	0	0	0
44H	34H	30H	30H					30H	30H	30H	30H

Serial number*

● For the binary code

Command

		L	H		
54H	00H			00H	00H

Serial number*

Response

		L	H	0	0
D4H	00H			00H	00H

Serial number*

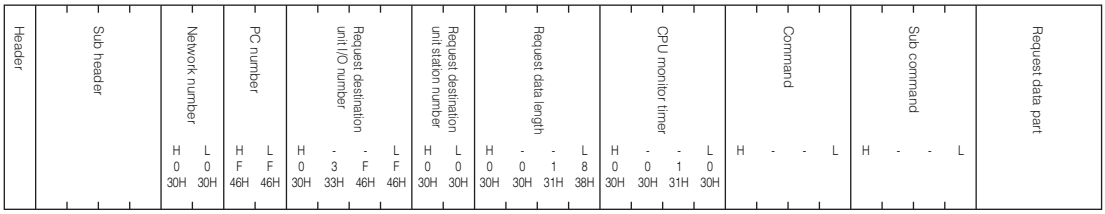
* The serial number is used to identify a response to a command.
In the GC Series, the same serial number as that of a command received from an external device is added to a response to be sent.
Setting range: 0000H to FFFFH

Text format

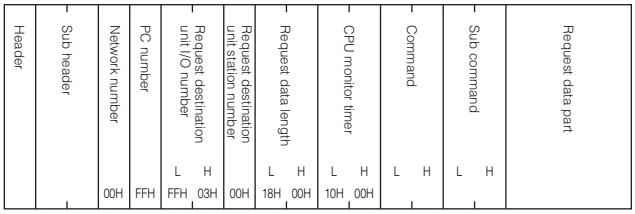
The text part format is the same for both the QnA-compatible 3E frame and 4E frame.

■ Request command

● For the ASCII code



● For the binary code



In the GC Series, the network number, PC number, request destination unit I/O number, and request destination unit station number are fixed.
Specify the following values.

Network number: 00H

PC number: FFH

Request destination unit I/O number: 03FFH

Request destination unit station number*: 00H

Specify the request data length and CPU monitor timer as follows:

Request data length: Specify the data length (in bytes) from the CPU monitor timer to the request data part.

CPU monitor timer: The CPU monitor timer value is ignored in the GC Series. Specify any value.

Point

The data length to be sent from the sub header to the request data part must be 1024 bytes or less.

■ Response (normal state)

● For the ASCII code

Header	Sub header	Network number	PC number	Request destination unit I/O number	Request destination unit station number	Response data length	End code	Response data part
		H L 0 0 30H 30H	H L F F 46H 46H	H - - L 0 3 F F 30H 33H 46H 46H	H L 0 0 30H 30H	H - - L 0 0 0 C 30H 30H 30H 43H	H - - L 0 0 0 0 30H 30H 30H 30H	

● For the binary code

Header	Sub header	Network number	PC number	Request destination unit I/O number	Request destination unit station number	Response data length	End code	Response data part
		00H	FFH	L H FFH 03H	00H	L H 06H 00H	L H 00H 00H	

The same network number, PC number, request destination unit I/O number, and request destination unit station number as those specified in the command are returned.

Request data length: Returns the data length (in bytes) from the end code to the response data part.

End code: Returns the command process result.

0000 is returned when in a normal state.

■ Response (abnormal state)

● For the ASCII code

Header	Sub header	Network number (access station)	PC number (access station)	Request destination unit I/O number	Request destination unit station number	Response data length	End code: Other than 0H	Error information part					
								Network number (response station)	PC number (response station)	Request destination unit I/O number	Request destination unit station number	Command	Sub command
		H L	H L	H - - L	H L	H - - L	H - - L	H L	H L	H - - L	H L	H - - L	H - - L
		0 0	F F	0 3 F F	0 0	0 0 1 6	C 0 5 1	0 0	F F	0 3 F F	0 0		
		30H 30H	46H 46H	30H 33H 46H 46H	30H 30H	30H 30H 31H 46H	43H 30H 35H 31H	30H 30H	46H 46H	30H 33H 46H 46H	30H 30H		

● For the binary code

Header	Sub header	Network number (access station)	PC number (access station)	Request destination unit I/O number	Request destination unit station number	Response data length	End code: Other than 0H	Error information part					
								Network number (response station)	PC number (response station)	Request destination unit I/O number	Request destination unit station number	Command	Sub command
				L H		L H	L H			L H		L H	L H
		00H	FFH	FFH 03H	00H	06H 00H	51H 00H	00H	FFH	FFH 03H	00H		

The same network number, PC number, request destination unit I/O number, and request destination unit station number as those specified in the command are returned.

Request data length: Returns the data length (in bytes) from the end code to the response data part.

End code: Returns the command process result.

An error code is returned when in an abnormal state.

"End codes for communication errors"

Error information part: Returns the same network number, PC number, request destination unit I/O number, request destination unit station number, command, and sub command as those specified in the command.

20-4 MC Protocol Communication Commands

Command List

Function	Data unit	Command (HEX)	Sub command (HEX)	Reference page
Sequential read	Bit	0401H	0001H	Page 20-11
	Word	0401H	0000H	Page 20-11
Sequential write*1	Bit	1401H	0001H	Page 20-12
	Word	1401H	0000H	Page 20-12
Sequential read of multiple blocks	Word	0406H	0000H	Page 20-13
Sequential write of multiple blocks*1	Word	1406H	0000H	Page 20-14
CPU format read	--	0101H	0000H	Page 20-15
Loop-back test*2	--	0619H	0000H	Page 20-15

*1 When cyclic communication is performed, data cannot be written.

*2 Only UDP/IP is supported.

Command Details

Address and data format for ASCII code communication

When reading and writing bit addresses bit by bit

In bit-by-bit specification for bit addresses, each bit represents "1" (31H) if it is ON or "0" (30H) if it is OFF from left to right. The data of as many addresses as specified from a specified address is processed.

When reading and writing bit addresses word by word

In word-by-word specification for bit addresses, one address is converted to hexadecimal from the most significant bit in units of four bits, handling 16 addresses from specified addresses as a batch.

When reading and writing word addresses

In word addresses, each address consists of one word (16 bits). Each group of four bits is converted to hexadecimal, starting from the most significant bit.

Address and data format for binary code communication

When reading and writing bit addresses bit by bit

In bit-by-bit specification for bit addresses, each address is specified by four bits. Each bit represents "1" (31H) if it is ON or "0" (30H) if it is OFF, starting from the most significant bit. The data of as many addresses as specified from a specified address is processed.

When reading and writing bit addresses word by word

In word-by-word specification for bit addresses, each address is specified by one bit. The data of as many addresses as specified from a specified address is processed in 16-address chunks in order from low byte (L: Bit 0 to 7) to high byte (H: Bit 8 to 15).

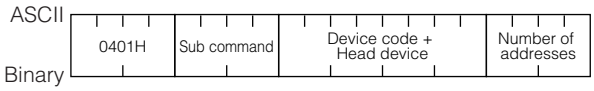
When reading and writing word addresses

In word addresses, each address consists of one word (16 bits). The data of as many addresses as specified from a specified address is processed in 1-address chunks in order from low byte (L: Bit 0 to 7) to high byte (H: Bit 8 to 15).

0401H: Sequential read

Read the specified address(es) data sequentially.

■ Request command



Sub command: When 0001 is specified, each address is read bit by bit.
When 0000 is specified, each address is read word by word.

Device code (ASCII): When using bit data, "X*" or "Y*" is used. When using word data, "D*" is used.

- When the device code is “D*” and the head device is “252H”

D	*	0	0	0	2	5	2
44H	2AH	30H	30H	30H	32H	35H	32H

Device code (Binary): When using bit data, "9CH" or "9DH" is used. When using word data, "A8H" is used.

- When the device code is “A8H” and the head device is “252H”

52H	02H	00H	A8H

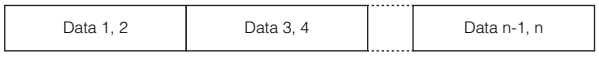
Number of addresses that can be specified

	ASCII code communication	Binary code communication
Bit-by-bit specification	1 to 896	1 to 792
Word-by-word specification	1 to 480	1 to 480

■ Response

In case of bit-by-bit specification (ASCII)

In case of bit-by-bit specification (binary) and even number of addresses



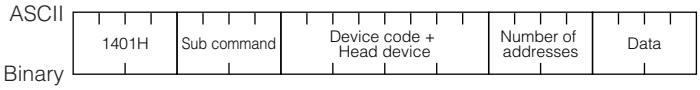
In case of bit-by-bit specification (binary) and odd number of addresses

In case of word-by-word specification

1401H: Sequential write

Write the specified address(es) data sequentially.

■ Request command



Sub command: When 0001 is specified, each address is written bit by bit.
When 0000 is specified, each address is written word by word.

Device code (ASCII): When using bit data, "X*" or "Y*" is used. When using word data, "D*" is used.

- When the device code is “D*” and the head device is “252H”

D	*	0	0	0	2	5	2
44H	2AH	30H	30H	30H	32H	35H	32H

Device code (Binary): When using bit data, "9CH" or "9DH" is used. When using word data, "A8H" is used.

- When the device code is “A8H” and the head device is “252H”

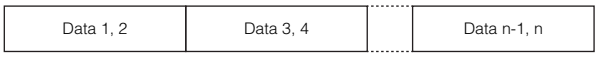
52H	02H	00H	A8H

Number of addresses that can be specified

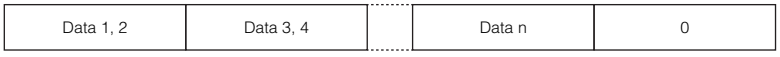
	ASCII code communication	Binary code communication
Bit-by-bit specification	1 to 896	1 to 1792
Word-by-word specification	1 to 480	1 to 480

In case of bit-by-bit specification (ASCII)

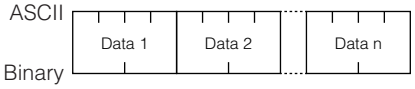
In case of bit-by-bit specification (binary) and even number of addresses



In case of bit-by-bit specification (binary) and odd number of addresses



In case of word-by-word specification



■ Response

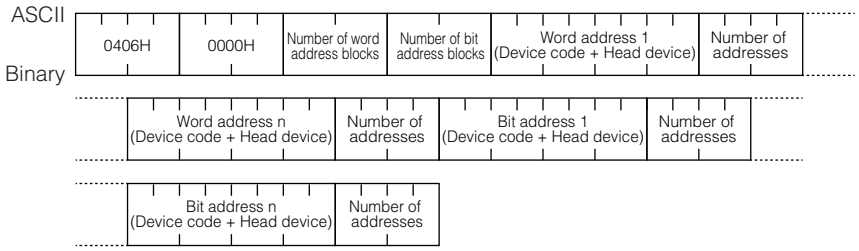
There is no response data part.

The header, sub header, network number, PC number, request destination unit I/O number, request destination station number, response data length, and end code are returned.

0406H: Sequential read of multiple blocks

Read multiple blocks with sequential addresses as one block.

■ Request command



Specify the number of word address blocks or the number of bit addresses blocks within the following range:

(Number of word address blocks + Number of bit address blocks) ≤ 32

(Total number of addresses of respective word address blocks + Total number of addresses of respective bit address blocks) ≤ 480

When the number of word address blocks is 2 and the number of bit address blocks is 3:

- ASCII

0	2	0	3
30H	32H	30H	33H

- Binary

02H	03H

Specify the number of blocks as follows:

For 5, specify 05H.

For 20, specify 14H.

Device code (ASCII): When using bit data, "X*" or "Y*" is used. When using word data, "D*" is used.

- When the device code is “D*” and the head device is “252H”

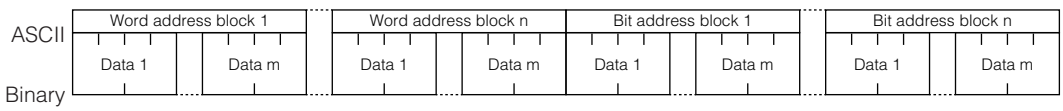
D	*	0	0	0	2	5	2
44H	2AH	30H	30H	30H	32H	35H	32H

Device code (Binary): When using bit data, "9CH" or "9DH" is used. When using word data, "A8H" is used.

- When the device code is “A8H” and the head device is “252H”

52H	02H	00H	A8H

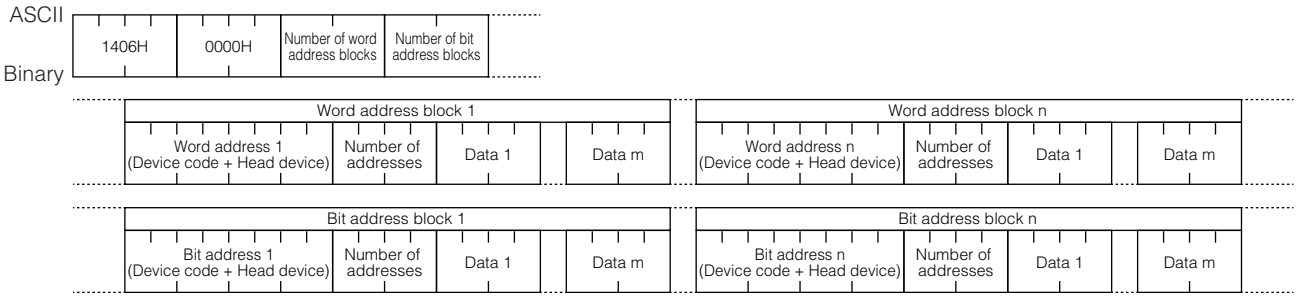
■ Response



1406H: Sequential write of multiple blocks

Write multiple blocks with sequential addresses as one block.

■ Request command



Specify the number of word address blocks or the number of bit addresses blocks within the following range:

(4 x (Number of word address blocks + Number of bit address blocks) + Total number of addresses of respective word address blocks + Total number of addresses of respective bit address blocks) ≤ 480

When the number of word address blocks is 2 and the number of bit address blocks is 3:

- ASCII

0	2	0	3
30H	32H	30H	33H

- Binary

02H	03H

Specify the number of blocks as follows:

For 5, specify 05H.

For 20, specify 14H.

Device code (ASCII): When using bit data, "X*" or "Y*" is used. When using word data, "D*" is used.

- When the device code is “D*” and the head device is “252H”

D	*	0	0	0	2	5	2
44H	2AH	30H	30H	30H	32H	35H	32H

Device code (Binary): When using bit data, "9CH" or "9DH" is used. When using word data, "A8H" is used.

- When the device code is “A8H” and the head device is “252H”

52H	02H	00H	A8H

■ Response

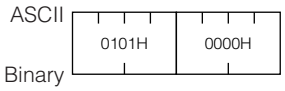
There is no response data part.

The header, sub header, network number, PC number, request destination unit I/O number, request destination station number, response data length, and end code are returned.

0101H: CPU format read

Read out the GC Series model.

■ Request command



■ Response

Type: Returns the GC Series model name as follows:
"GC1000"

Type code: Returns the GC Series type code as follows:
"10H"

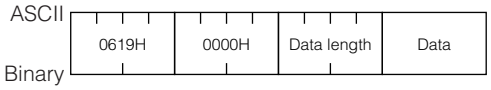
Reference

The GC Series type and type code to be read can be changed in [MC protocol settings].
"12-3 MC Protocol Communication Settings"

0619H: Loop-back test

Check if communications are available. Only UDP/IP is supported.

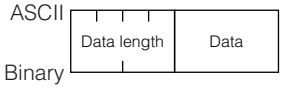
■ Request command



Data length: Specify a value between 0 and 480 (1E0H) for the "Data" size (in bytes).

Data: Specify any value.

■ Response



The same data length and data as those specified in the command are returned.

End Codes for Communication Errors

Code (HEX)	Cause	Initiated command
0000H	The command was successfully executed.	Common
**50H*	• Any other value than 5000H was specified for the sub header when using the 3E frame. • Any other value than 5400H was specified for the sub header when using the 4E frame.	Common
**54H*	A non-numerical ASCII code was specified for the sub header.	Common
C050H	A non-numerical ASCII code was specified for any other item than the sub header.	Common
4A00H	Any other value than 00H was specified for the network number.	Common
4B00H	• Any other value than FFH was specified for the PC number. • Any other value than 03FFH was specified for the IO number.	Common
C058H	Data shorter than the set number of addresses or blocks was specified during ASCII code communication.	Common
C059H	• The specified command is not supported. • The specified sub command is not supported.	Common
C061H	Data shorter than the set number of addresses or blocks was specified during binary code communication.	Common
C050H	A non-existing device code was specified during ASCII code communication.	0401,1401,0406,1406
C05BH	A non-existing device code was specified during binary code communication.	0401,1401,0406,1406
C056H	The specified address number was outside the valid range.	0401,1401,0406,1406
C051H	The specified number of addresses was outside the valid range.	0401,1401,0406,1406
C05CH	"0001" was specified for the sub command, and a word address was specified during bit address command execution.	0401,1401,0406,1406
4080H	"0" was specified for both the number of word blocks and the number of bit addresses.	0406
C051H	More than 960 bytes loop-back data have been received.	0619

20-5 Address List

Word address

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
256	100H	Communication input [0:00] to [0:15]	Indicates the status of the communication inputs. When a bit is turned ON, the corresponding communication input is turned ON.	WORD	R/W	bit 0: Communication input bit 0 0: OFF 1: ON bit 1: Communication input bit 1 0: OFF 1: ON ... bit 15: Communication input bit 15 0: OFF 1: ON	○
...	...	...		...	...		
259	103H	Communication input [3:00] to [3:15]		WORD	R/W		○
260	104H	Enablement code of communication input [0:00]	Indicates the status of the enablement code. The upper eight bits are ignored. (Range: 1 to 255)	UINT	R/W	0000H to 00FFH	
...	...	...		...	...		
289	121H	Enablement code of communication input [1:13]		UINT	R/W		
290	122H	System reserved					
291	123H	System reserved					
292	124H	PLC text, 1st character, 2nd character	Displays the status of the PLC text. The first character is set in the low byte while the second character is set in the high byte in the ASCII code format.	STRING	R/W	0000H to FFFFH	
...	...	...		...	...		
301	12DH	PLC text, 19th character, 20th character		STRING	R/W		
512	200H	Number of connected units (expansion unit)	Indicates the number of connected expansion units.	UINT	R	0 to 65535	
513	201H	Number of connected units (remote I/O module)	Indicates the number of connected remote I/O modules.	UINT	R	0 to 65535	
514	202H	Model information (main controller)	Indicates the connected unit model.	WORD	R	bit 0 to 7: Unit model 1: GC-1000 2: GC-1000R 3: GC-S84 4: GC-S16 5: GC-S1R 6: GC-A16 7: GC-R45 8: GC-R48 bit 8: Positional relationship to the GC-B30 0: Unit positioned before the GC-B30 1: Unit positioned after the GC-B30 If the GC-B30 does not exist in the unit configuration, all units are set to 0. bit 9 to 15: System reserved (fixed to 0)	
515	203H	Model information (1st expansion unit)		WORD	R		
...	...	...		...	...		
524	20CH	Model information (10th expansion unit)		WORD	R		
525	20DH	Model information (1st remote I/O module)		WORD	R		
...	...	...		...	...		
528	210H	Model information (4th remote I/O module)		WORD	R		
529	211H	System reserved					
530	212H	Operation time, Byte 0, Byte 1	Indicates the time elapsed since the start of the unit in units of 10 ms.	WORD	R	0000H to FFFFH	
531	213H	Operation time, Byte 2, Byte 3		WORD	R	0000H to FFFFH	
532	214H	GC operating state	Indicates the operating state of the GC.	WORD	R	bit 0: RUN state 0: The unit is stopped. 1: The unit is running. bit 1: Abnormal state 0: Normal 1: Abnormal * An abnormal state means that at least one alert or error is occurring. bit 2 to 15: System reserved (fixed to 0)	○
533	215H	Number of errors that occurred	Indicates the number of errors that are currently occurring.	UINT	R	0 to 30	

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
534	216H	Main code of the (1st) error code	Indicates the code of the error that is currently occurring. Error codes are sorted in the following order: (1) Errors are sorted in order of Error, Alert, and Info, starting from the first error. (2) Errors are sorted by error category in (1) in order that they occurred. The high byte represents the main code while the low byte represents the detailed code. "Alert/Error list" (page A-7)	UINT	R	0 to 65535	
535	217H	Detailed code of the (1st) error code		UINT	R		
...	...	...		...	...		
592	250H	Main code of the (30th) error code		UINT	R		
593	251H	Detailed code of the (30th) error code		UINT	R		
594	252H	Communication output [0:00] to [0:15]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Communication output bit 0 bit 1: Communication output bit 1 ... bit 15: Communication output bit 15	○
...	...	...		...	...		
597	255H	Communication output [3:00] to [3:15]		WORD	R		○
598	256H	GC-Link port status	Indicates the GC-Link port status.	WORD	R	bit 0 to 3: GC-Link port A connection status 0000: Searching 0001: Not connected 0010: Connected bit 4 to 7: GC-Link port A error status 0000: No error 0001: Communication error bit 8 to 11: GC-Link port B connection status 0000: Searching 0001: Not connected 0010: Connected bit 12 to 15: GC-Link port B error status 0000: No error 0001: Communication error	
768	300H	GC-Link port A GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port A.	UINT	R	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2	
769	301H	System reserved					
770	302H	GC-Link port A GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port A.	UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
771	303H	GC-Link port A GL-R Sub unit 1 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
772	304H	GC-Link port A GL-R Sub unit 2 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
773	305H	GC-Link port A GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port A.	UINT	R	0 to 127	
774	306H	GC-Link port A GL-R Number of optical axes of sub unit 1		UINT	R	0 to 127	
775	307H	GC-Link port A GL-R Number of optical axes of sub unit 2		UINT	R	0 to 127	
776	308H	GC-Link port A GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6	○
777	309H	System reserved					

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
778	30AH	GC-Link port A GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port A. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
779	30BH	GC-Link port A GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
841	349H	GC-Link port A GL-R Received-light-amount, Main unit, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
842	34AH	GC-Link port A GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
843	34BH	GC-Link port A GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
905	389H	GC-Link port A GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
906	38AH	GC-Link port A GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
907	38BH	GC-Link port A GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
969	3C9H	GC-Link port A GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
970	3CAH	GC-Link port A GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	R	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis	O
971	3CBH	GC-Link port A GL-R ON/OFF information of each optical axis [31:16]		WORD	R	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis	O
...	...	...		...	...		
984	3D8H	GC-Link port A GL-R ON/OFF information of each optical axis [239:224]		WORD	R	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis	O
985	3D9H	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	WORD	R	0: No error 1: Error occurring	O
986	3DAH	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	WORD	R	0: OFF 1: ON	O
987	3DBH	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	R	0: Disabled 1: Enabled	O
988	3DCH	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	WORD	R	0: No alert 1: Alert occurring	O
989	3DDH	GC-Link port A GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A in percentage.	UINT	R	0 to 100	

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
990	3DEH	GC-Link port A GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	UINT	R	0: No set 1: 5 sec 2: 30 sec 3: 5 min	
1024	400H	GC-Link port A GS Number of connected units	Indicates the number of GS units connected to the GC-Link port A.	UINT	R	0 to 16	
1025	401H	GC-Link port A GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port A.	WORD	R	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved	○
1026	402H	GC-Link port A GS Model information (2nd unit)		WORD	R		○
...	...	...		...	...		
1040	410H	GC-Link port A GS Model information (16th unit)		WORD	R		○
1041	411H	GC-Link port A GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	WORD	R	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved	○
1042	412H	GC-Link port A GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port A.	WORD	R	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close	○
1043	413H	GC-Link port A GS Lock status	Indicates the lock status of each GS connected to the GC-Link port A. This is always 0 for the non-contact type.	WORD	R	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked	○
1044	414H	GC-Link port A GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port A.	WORD	R	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved	○
1045	415H	GC-Link port A GS 2nd unit status		WORD	R		○
...	...	...		...	...		
1059	423H	GC-Link port A GS 16th unit status		WORD	R		○
1280	500H	GC-Link port B GL-R Number of connected units	Indicates the number of GL-R units connected to the GC-Link port B.	UINT	R	0: Not connected 1: Main unit only 2: Main unit + sub unit 1 3: Main unit + sub unit 1 + sub unit 2	

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
1281	501H	System reserved					
1282	502H	GC-Link port B GL-R Main unit type	Indicates the type of the GL-R connected to the GC-Link port B.	UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
1283	503H	GC-Link port B GL-R Sub unit 1 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
1284	504H	GC-Link port B GL-R Sub unit 2 type		UINT	R	0: Not connected 1: Type F 2: Type H 3: Type L	
1285	505H	GC-Link port B GL-R Number of optical axes of the main unit	Indicates the number of optical axes of the GL-R connected to the GC-Link port B.	UINT	R	0 to 127	
1286	506H	GC-Link port B GL-R Number of optical axes of sub unit 1		UINT	R	0 to 127	
1287	507H	GC-Link port B GL-R Number of optical axes of sub unit 2		UINT	R	0 to 127	
1288	508H	GC-Link port B GL-R Main controller setting switch settings	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	WORD	R	bit 0: Switch 1 bit 1: Switch 2 ... bit 5: Switch 6	○
1289	509H	System reserved		0	R	0	
1290	50AH	GC-Link port B GL-R Received-light-amount, Main unit, 1st optical axis, 2nd optical axis	Indicates the received-light-amount of each optical axis of the GL-R connected to the GC-Link port B. The received-light-amount range is 0 to 63. The high byte of the 127th optical axis is always 0.	WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
1291	50BH	GC-Link port B GL-R Received-light-amount, Main unit, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
1353	549H	GC-Link port B GL-R Received-light-amount, Main unit, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
1354	54AH	GC-Link port B GL-R Received-light-amount, Sub unit 1, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
1355	54BH	GC-Link port B GL-R Received-light-amount, Sub unit 1, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
1417	589H	GC-Link port B GL-R Received-light-amount, Sub unit 1, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	
1418	58AH	GC-Link port B GL-R Received-light-amount, Sub unit 2, 1st optical axis, 2nd optical axis		WORD	R	bit 0 to 7: 1st optical axis bit 8 to 15: 2nd optical axis	
1419	58BH	GC-Link port B GL-R Received-light-amount, Sub unit 2, 3rd optical axis, 4th optical axis		WORD	R	bit 0 to 7: 3rd optical axis bit 8 to 15: 4th optical axis	
...	...	...		...	...		
1481	5C9H	GC-Link port B GL-R Received-light-amount, Sub unit 2, 127th optical axis		WORD	R	bit 0 to 7: 127th optical axis bit 8 to 15: Fixed to 0	

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
1482	5CAH	GC-Link port B GL-R ON/OFF information of each optical axis [15:0]	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the bits following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	WORD	R	bit 0: ON/OFF information of the 1st optical axis bit 1: ON/OFF information of the 2nd optical axis ... bit 15: ON/OFF information of the 16th optical axis	O
1483	5CBH	GC-Link port B GL-R ON/OFF information of each optical axis [31:16]		WORD	R	bit 0: ON/OFF information of the 17th optical axis bit 1: ON/OFF information of the 18th optical axis ... bit 15: ON/OFF information of the 32nd optical axis	O
...	...	...		...	...	...	
1496	5D8H	GC-Link port B GL-R ON/OFF information of each optical axis [239:224]		WORD	R	bit 0: ON/OFF information of the 225th optical axis bit 1: ON/OFF information of the 226th optical axis ... bit 15: ON/OFF information of the 240th optical axis	O
1497	5D9H	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	WORD	R	0: No error 1: Error occurring	O
1498	5DAH	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	WORD	R	0: OFF 1: ON	O
1499	5DBH	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	R	0: Disabled 1: Enabled	O
1500	5DCH	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	WORD	R	0: No alert 1: Alert occurring	O
1501	5DDH	GC-Link port B GL-R Received-light-amount decrease alert detection threshold	Indicates the detection threshold of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B in percentage.	UINT	R	0 to 100	
1502	5DEH	GC-Link port B GL-R Received-light-amount decrease alert detection time	Indicates the detection time of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	UINT	R	0: No set 1: 5 sec 2: 30 sec 3: 5 min	
1536	600H	GC-Link port B GS Number of connected units	Indicates the number of GS units connected to the GC-Link port B.	UINT	R	0 to 16	
1537	601H	GC-Link port B GS Model information (1st unit)	Indicates the model information of the GS connected to the GC-Link port B.	WORD	R	bit 0: Model information 0: Non-contact type 1: Lock type bit 1: Lock type information 0: Spring type 1: Solenoid type * This is 0 for the non-contact type. bit 2 to 3: System reserved (fixed to 0) bit 4 to 5: Indicator control mode 00: Normal operation (Default) 01: OFF 10: OFF when GS is closed (locked) 11: Control via GC-Link port bit 6: Coding level settings 0: Low (multi operation) 1: High (unique operation) bit 7 to 15: System reserved	O
1538	602H	GC-Link port B GS Model information (2nd unit)		WORD	R		O
...	...	...		...	...		
1552	610H	GC-Link port B GS Model information (16th unit)		WORD	R		O

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
1553	611H	GC-Link port B GS OSSD/lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port B.	WORD	R	bit 0: OSSD status 0: OFF 1: ON bit 1: Lock control information 0: Unlocked 1: Locked bit 11 to 15: System reserved	O
1554	612H	GC-Link port B GS Open/close state	Indicates the open/close state of each GS connected to the GC-Link port B.	WORD	R	bit 0: Open/close state of the 1st unit 0: Open 1: Close bit 1: Open/close state of the 2nd unit 0: Open 1: Close ... bit 15: Open/close state of the 16th unit 0: Open 1: Close	O
1555	613H	GC-Link port B GS Lock status	Indicates the lock status of each GS connected to the GC-Link port B. This is always 0 for the non-contact type.	WORD	R	bit 0: Lock status of the 1st unit 0: Unlocked 1: Locked bit 1: Lock status of the 2nd unit 0: Unlocked 1: Locked ... bit 15: Lock status of the 16th unit 0: Unlocked 1: Locked	O
1556	614H	GC-Link port B GS 1st unit status	Indicates the detailed information of the GS connected to the GC-Link port B.	WORD	R	bit 0: Open/close state 0: Open 1: Close bit 1: Lock status 0: Unlocked 1: Locked bit 2: Red LED display status 0: OFF 1: ON bit 3: Green LED display status 0: OFF 1: ON bit 4 to 15: System reserved	O
1557	615H	GC-Link port B GS 2nd unit status		WORD	R		O
...	...	...		...	...		
1571	623H	GC-Link port B GS 16th unit status		WORD	R		O
1792	700H	Project name, 1st character	Indicates the project name of the configuration file (UTF-16).	STRING	R		
...	...			...	...		
1855	73FH	Project name, 64th character		STRING	R		
1856	740H	System reserved					
1857	741H	Configuration CRC, 1st character	Indicates the configuration CRC of the configuration file (UTF-16).	STRING	R		
...	...			...	...		
1864	0748H	Configuration CRC, 8th character		STRING	R		
1865	749H	System reserved					
1866	74AH	Date and time of transfer, 1st character	Indicates the date and time of transfer of the configuration file (UTF-16).	STRING	R		
...	...			...	...		
1885	75DH	Date and time of transfer, 20th character		STRING	R		
1886	745H	System reserved					

Address		Item	Details	Data type	Attribute	Value	Bit address availability
DEC	HEX						
2048	800H	Input status (GC-Link port)	Indicates the input/output status of each unit.* 1	WORD	R		O
2049	801H	Input status (main controller)		WORD	R		O
2050	802H	Input status (1st expansion unit)		WORD	R		O
...	...	...		...	...		
2059	80BH	Input status (10th expansion unit)		WORD	R		O
2060	80CH	Input status (1st remote I/O module)		WORD	R		O
...	...	...		...	...		
2063	80FH	Input status (4th remote I/O module)		WORD	R		O
2064	810H	Output status (GC-Link port)		WORD	R		O
2065	811H	Output status (main controller)		WORD	R		O
2066	812H	Output status (1st expansion unit)		WORD	R		O
...	...	...		...	...		
2075	81BH	Output status (10th expansion unit)		WORD	R		O
2076	81CH	Output status (1st remote I/O module)		WORD	R		O
...	...	...		...	...		
2079	81FH	Output status (4th remote I/O module)		WORD	R		O
2304	900H	Number of used blocks	Indicates the number of blocks used by the program.	UINT	R	0 to 500	
2305	901H	Block output status (Block ID 1)	Indicates the output status of each block used by the program.* 2	WORD	R		O
...	...	...		...	...		
2804	AF4H	Block output status (Block ID 500)		WORD	R		O
2816	B00H	Number of error histories	Indicates the number of error histories.	UINT	R	0 to 100	
2817	B01H	1st error history, Error code, Main code	Indicates the error code of the 1st error history. Error histories are sorted in newest-first chronological order. "Alert/Error list" (page A-7)	UINT	R	0 to 99	
2818	B02H	1st error history, Error code, Detailed code		UINT	R	0 to 9999	
2819	B03H	1st error history, Operation time on error, Low	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	WORD	R	0 to 65535	
2820	B04H	1st error history, Operation time on error, High		WORD	R	0 to 65535	
...	...	...	...	...	...		
3213	C8DH	100th error history, Error code, Main code	Indicates the error code of the 100th error history.	UINT	R	0 to 99	
3214	C8EH	100th error history, Error code, Detailed code		UINT	R	0 to 9999	
3215	C8FH	100th error history, Operation time on error, Low	Indicates the time elapsed since the start of the GC Series when the error was detected in seconds.	WORD	R	0 to 65535	
3216	C90H	100th error history, Operation time on error, High		WORD	R	0 to 65535	

*1 For the bit assignment of each unit, refer to "Input/output status assignment by unit" (page 20-32).

*2 Check the block ID in the GC Configurator report. For the bit assignment of each block, refer to "Output status assignment by block" (page 20-34).

Bit address

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
4096	1000H	Communication input [0:00] to [0:15]	0	[0:00]	Indicates the status of the communication inputs. When a bit is turned ON, the corresponding communication input is turned ON.	Bit	R/W	0: OFF 1: ON
...	...		...	...		Bit	R/W	
4111	100FH		15	[0:15]		Bit	R/W	
...	...	...	...	...		Bit	R/W	
4144	1030H	Communication input [3:00] to [3:15]	0	[3:00]		Bit	R/W	
...	...		...	...		Bit	R/W	
4159	103FH		15	[3:15]		Bit	R/W	
8512	2140H	GC operating state	0	RUN state	Indicates the RUN state of the GC.	Bit	R	0: The unit is stopped. 1: The unit is running.
8513	2141H		1	Abnormal state	Indicates the abnormal state of the GC. An abnormal state means that at least one alert or error is occurring.	Bit	R	0: Normal 1: Abnormal
9504	2520H	Communication output [0:00] to [0:15]	0	Communication output [0:00]	Indicates the output status of the communication outputs. When a communication output is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
9519	252FH		15	Communication output [0:15]		Bit	R	
...	...	...	...	...		Bit	R	
9552	2550H	Communication output [3:00] to [3:15]	0	Communication output [3:00]		Bit	R	
...	...		...	...		Bit	R	
9567	255FH		15	Communication output [3:15]		Bit	R	
12416	3080H	GC-Link port A GL-R Main controller setting switch settings	0	GC-Link port A GL-R Main controller setting switch settings, Switch 1	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port A. When each switch is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
12417	3081H		1	GC-Link port A GL-R Main controller setting switch settings, Switch 2		Bit	R	
12418	3082H		2	GC-Link port A GL-R Main controller setting switch settings, Switch 3		Bit	R	
12419	3083H		3	GC-Link port A GL-R Main controller setting switch settings, Switch 4		Bit	R	
12420	3084H		4	GC-Link port A GL-R Main controller setting switch settings, Switch 5		Bit	R	
12421	3085H		5	GC-Link port A GL-R Main controller setting switch settings, Switch 6		Bit	R	
15520	3CA0H	GC-Link port A GL-R ON/OFF information of each optical axis [15:0]	0	GC-Link port A GL-R ON/OFF information of each optical axis, 1st optical axis	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port A. A sub unit is placed with the offset following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
15535	3CAFH		15	GC-Link port A GL-R ON/OFF information of each optical axis, 16th optical axis		Bit	R	
...	...	...	...	...		Bit	R	
15744	3D80H	GC-Link port A GL-R ON/OFF information of each optical axis [239:224]	0	GC-Link port A GL-R ON/OFF information of each optical axis, 225th optical axis		Bit	R	
...	...		...	...		Bit	R	
15759	3D8FH		15	GC-Link port A GL-R ON/OFF information of each optical axis, 240th optical axis		Bit	R	

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
15760	3D90H	GC-Link port A GL-R Error status	0	GC-Link port A GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port A.	Bit	R	0: No error 1: Error occurring
15776	3DA0H	GC-Link port A GL-R OSSD output status	0	GC-Link port A GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
15792	3DB0H	GC-Link port A GL-R Received-light-amount decrease alert enablement status	0	GC-Link port A GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	Bit	R	0: Disabled 1: Enabled
15808	3DC0H	GC-Link port A GL-R Received-light-amount decrease alert detection status	0	GC-Link port A GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port A.	Bit	R	0: No alert 1: Alert occurring
16400	4010H	GC-Link port A GS Model information (1st unit)	0	GC-Link port A GS 1st GS model information	Indicates the model information of the 1st GS connected to the GC-Link port A.	Bit	R	0: Non-contact type 1: Lock type
16401	4011H		1	GC-Link port A GS 1st GS lock type information	Indicates the lock type information of the 1st GS connected to the GC-Link port A.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
16402	4012H		2	System reserved	System reserved	Bit	R	
16403	4013H		3	System reserved	System reserved	Bit	R	
16404	4014H		4	System reserved	System reserved	Bit	R	
16405	4015H		5	System reserved	System reserved	Bit	R	
16406	4016H		6	GC-Link port A GS 1st GS coding level settings	Indicates the coding level settings of the 1st GS connected to the GC-Link port A.	Bit	R	0: Low (multi operation) 1: High (unique operation)
...	...	...	...	...	...	Bit	R	...
16640	4100H	GC-Link port A GS Model information (16th unit)	0	GC-Link port A GS 16th GS model information	Indicates the model information of the 16th GS connected to the GC-Link port A.	Bit	R	0: Non-contact type 1: Lock type
16641	4101H		1	GC-Link port A GS 16th GS lock type information	Indicates the lock type information of the 16th GS connected to the GC-Link port A.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
16642	4102H		2	System reserved	System reserved	Bit	R	
16643	4103H		3	System reserved	System reserved	Bit	R	
16644	4104H		4	System reserved	System reserved	Bit	R	
16645	4105H		5	System reserved	System reserved	Bit	R	
16646	4106H		6	GC-Link port A GS 16th GS coding level settings	Indicates the coding level settings of the 16th GS connected to the GC-Link port A.	Bit	R	0: Low (multi operation) 1: High (unique operation)
16656	4110H	GC-Link port A GS OSSD/lock control status	0	GC-Link port A GS OSSD status	Indicates the OSSD status of the GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
16657	4111H		1	GC-Link port A GS Lock control status	Indicates the OSSD status and lock control status of the GS connected to the GC-Link port A.	Bit	R	0: Unlocked 1: Locked

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
16672	4120H	GC-Link port A GS Open/close state	0	GC-Link port A 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
...	...		...	...	...	Bit	R	...
16687	412FH		15	GC-Link port A 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
16688	4130H	GC-Link port A GS Lock status	0	GC-Link port A 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
...	...		...	...	...	Bit	R	...
16703	413FH		15	GC-Link port A 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
16704	4140H	GC-Link port A GS 1st unit status	0	GC-Link port A 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
16705	4141H		1	GC-Link port A 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
16706	4142H		2	GC-Link port A 1st GS Red LED display status	Indicates the red LED display status of the 1st GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
16707	4143H		3	GC-Link port A 1st GS Green LED display status	Indicates the green LED display status of the 1st GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
...	...	...	...	...	...	Bit	R	...
16944	4230H	GC-Link port A GS 16th unit status	0	GC-Link port A 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port A.	Bit	R	0: Open 1: Close
16945	4231H		1	GC-Link port A 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port A. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
16946	4232H		2	GC-Link port A 15th GS Red LED display status	Indicates the red LED display status of the 15th GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
16947	4233H		3	GC-Link port A 15th GS Green LED display status	Indicates the green LED display status of the 15th GS connected to the GC-Link port A.	Bit	R	0: OFF 1: ON
20608	5080H	GC-Link port B GL-R Main controller setting switch settings	0	GC-Link port B GL-R Main controller setting switch settings, Switch 1	Indicates the setting switch status of the GL-R (receiver) connected to the GC-Link port B. When each switch is turned ON, the corresponding bit is turned ON.	Bit	R	0: OFF 1: ON
20609	5081H		1	GC-Link port B GL-R Main controller setting switch settings, Switch 2		Bit	R	
20610	5082H		2	GC-Link port B GL-R Main controller setting switch settings, Switch 3		Bit	R	
20611	5083H		3	GC-Link port B GL-R Main controller setting switch settings, Switch 4		Bit	R	
20612	5084H		4	GC-Link port B GL-R Main controller setting switch settings, Switch 5		Bit	R	
20613	5085H		5	GC-Link port B GL-R Main controller setting switch settings, Switch 6		Bit	R	

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
23712	5CA0H	GC-Link port B GL-R ON/OFF information of each optical axis [15:0]	0	GC-Link port B GL-R ON/OFF information of each optical axis, 1st optical axis	Indicates the ON/OFF information of each optical axis of the GL-R connected to the GC-Link port B. A sub unit is placed with the offset following the optical axis of the last unit. The ON/OFF logic is inverted for an optical axis configured with fixed blanking.	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
23727	5CAFH		15	GC-Link port B GL-R ON/OFF information of each optical axis, 16th optical axis		Bit	R	
...	...	...	...	...		Bit	R	
23936	5D80H	GC-Link port B GL-R ON/OFF information of each optical axis [239:224]	0	GC-Link port B GL-R ON/OFF information of each optical axis, 225th optical axis		Bit	R	
...	...		...	...		Bit	R	
23951	5D8FH		15	GC-Link port B GL-R ON/OFF information of each optical axis, 240th optical axis		Bit	R	
23952	5D90H	GC-Link port B GL-R Error status	0	GC-Link port B GL-R Error status	Indicates the error status of the GL-R connected to the GC-Link port B.	Bit	R	0: No error 1: Error occurring
23968	5DA0H	GC-Link port B GL-R OSSD output status	0	GC-Link port B GL-R OSSD output status	Indicates the OSSD output status of the GL-R connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
23984	5DB0H	GC-Link port B GL-R Received-light-amount decrease alert enablement status	0	GC-Link port B GL-R Received-light-amount decrease alert enablement status	Indicates the enablement status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	Bit	R	0: Disabled 1: Enabled
24000	5DC0H	GC-Link port B GL-R Received-light-amount decrease alert detection status	0	GC-Link port B GL-R Received-light-amount decrease alert detection status	Indicates the detection status of the received-light-amount decrease alert of the GL-R connected to the GC-Link port B.	Bit	R	0: No alert 1: Alert occurring
24592	6010H	GC-Link port B GS Model information (1st unit)	0	GC-Link port B GS 1st GS model information	Indicates the model information of the 1st GS connected to the GC-Link port B.	Bit	R	0: Non-contact type 1: Lock type
24593	6011H		1	GC-Link port B GS 1st GS lock type information	Indicates the lock type information of the 1st GS connected to the GC-Link port B.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
24594	6012H		2	System reserved	System reserved	Bit	R	
24595	6013H		3	System reserved	System reserved	Bit	R	
24596	6014H		4	System reserved	System reserved	Bit	R	
24597	6015H		5	System reserved	System reserved	Bit	R	
24598	6016H		6	GC-Link port B GS 1st GS coding level settings	Indicates the coding level settings of the 1st GS connected to the GC-Link port B.	Bit	R	0: Low (multi operation) 1: High (unique operation)
...	...	...	...	...	...	Bit	R	...

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
24832	6100H	GC-Link port B GS Model information (16th unit)	0	GC-Link port B GS 16th GS model information	Indicates the model information of the 16th GS connected to the GC-Link port B.	Bit	R	0: Non-contact type 1: Lock type
24833	6101H		1	GC-Link port B GS 16th GS lock type information	Indicates the lock type information of the 16th GS connected to the GC-Link port B.	Bit	R	0: Spring type 1: Solenoid type * This is 0 for the non-contact type.
24834	6102H		2	System reserved	System reserved	Bit	R	
24835	6103H		3	System reserved	System reserved	Bit	R	
24836	6104H		4	System reserved	System reserved	Bit	R	
24837	6105H		5	System reserved	System reserved	Bit	R	
24838	6106H		6	GC-Link port B GS 16th GS coding level settings	Indicates the coding level settings of the 16th GS connected to the GC-Link port B.	Bit	R	0: Low (multi operation) 1: High (unique operation)
24848	6110H	GC-Link port B GS OSSD/lock control status	0	GC-Link port B GS OSSD status	Indicates the OSSD status of the GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
24849	6111H		1	GC-Link port B GS Lock control status	Indicates the lock control status of the GS connected to the GC-Link port B.	Bit	R	0: Unlocked 1: Locked
24864	6120H	GC-Link port B GS Open/close state	0	GC-Link port B 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
...	...		...	...	...	Bit	R	...
24879	612FH		15	GC-Link port B 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
24880	6130H	GC-Link port B GS Lock status	0	GC-Link port B 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
...	...		...	...	...	Bit	R	...
24895	613FH		15	GC-Link port B 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
24896	6140H	GC-Link port B GS 1st unit status	0	GC-Link port B 1st GS Open/close state	Indicates the open/close state of the 1st GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
24897	6141H		1	GC-Link port B 1st GS Lock status	Indicates the lock status of the 1st GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
24898	6142H		2	GC-Link port B 1st GS Red LED display status	Indicates the red LED display status of the 1st GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
24899	6143H		3	GC-Link port B 1st GS Green LED display status	Indicates the green LED display status of the 1st GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
...	...	...	...	...	...	Bit	R	...

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
25136	6230H	GC-Link port B GS 16th unit status	0	GC-Link port B 15th GS Open/close state	Indicates the open/close state of the 15th GS connected to the GC-Link port B.	Bit	R	0: Open 1: Close
25137	6231H		1	GC-Link port B 15th GS Lock status	Indicates the lock status of the 15th GS connected to the GC-Link port B. This is always 0 for the non-contact type.	Bit	R	0: Unlocked 1: Locked
25138	6232H		2	GC-Link port B 15th GS Red LED display status	Indicates the red LED display status of the 15th GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
25139	6233H		3	GC-Link port B 15th GS Green LED display status	Indicates the green LED display status of the 15th GS connected to the GC-Link port B.	Bit	R	0: OFF 1: ON
32768	8000H	Input status (GC-Link port)	0	Input status (GC-Link port) bit 0	Indicates the input status of the GC-Link port.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32783	800FH		15	Input status (GC-Link port) bit 15		Bit	R	
32784	8010H	Input status (main controller)	0	Input status (main controller) bit 0	Displays the input status of the main controller.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32799	801FH		15	Input status (main controller) bit 15		Bit	R	
32800	8020H	Input status (1st expansion unit)	0	Input status (1st expansion unit) bit 0	Indicates the input status of the 1st expansion unit.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32815	802FH		15	Input status (1st expansion unit) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
32944	80B0H	Input status (10th expansion unit)	0	Input status (10th expansion unit) bit 0	Indicates the input status of the 10th expansion unit.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32959	80BFH		15	Input status (10th expansion unit) bit 15		Bit	R	
32960	80C0H	Input status (1st remote I/O module)	0	Input status (1st remote I/O module) bit 0	Indicates the input status of the 1st remote I/O module.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
32975	80CFH		15	Input status (1st remote I/O module) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
33008	80F0H	Input status (4th remote I/O module)	0	Input status (4th remote I/O module) bit 0	Indicates the input status of the 4th remote I/O module.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33023	80FFH		15	Input status (4th remote I/O module) bit 15		Bit	R	
33024	8100H	Output status (GC-Link port)	0	Output status (GC-Link port) bit 0	Indicates the output status of the GC-Link port.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33039	810FH		15	Output status (GC-Link port) bit 15		Bit	R	
33040	8110H	Output status (main controller)	0	Output status (main controller) bit 0	Displays the output status of the main controller.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33055	811FH		15	Output status (main controller) bit 15		Bit	R	

Address		Corresponding word address		Item	Details	Data type	Attribute	Value
DEC	HEX		Bit position					
33056	8120H	Output status (1st expansion unit)	0	Output status (1st expansion unit) bit 0	Indicates the output status of the 1st expansion unit.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33071	812FH		15	Output status (1st expansion unit) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
33200	81B0H	Output status (10th expansion unit)	0	Output status (10th expansion unit) bit 0	Indicates the output status of the 10th expansion unit.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33215	81BFH		15	Output status (10th expansion unit) bit 15		Bit	R	
33216	81C0H	Output status (1st remote I/O module)	0	Output status (1st remote I/O module) bit 0	Indicates the output status of the 1st remote I/O module.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33231	81CFH		15	Output status (1st remote I/O module) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
33264	81F0H	Output status (4th remote I/O module)	0	Output status (4th remote I/O module) bit 0	Indicates the output status of the 4th remote I/O module.*1	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
33279	81FFH		15	Output status (4th remote I/O module) bit 15		Bit	R	
36880	9010H	Block output status (Block ID 1)	0	Block output status (Block ID 1) bit 0	Indicates the output status of the Block ID 1 block.*2	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
36895	901FH		15	Block output status (Block ID 1) bit 15		Bit	R	
...	...	...	...	...	...	Bit	R	...
44864	AF40H	Block output status (Block ID 500)	0	Block output status (Block ID 500) bit 0	Indicates the output status of the Block ID 500 block.*2	Bit	R	0: OFF 1: ON
...	...		...	...		Bit	R	
44879	AF4FH		15	Block output status (Block ID 500) bit 15		Bit	R	

*1 For the bit assignment of each unit, refer to "Input/output status assignment by unit" (page 20-32).

*2 Check the block ID in the GC Configurator report. For the bit assignment of each block, refer to "Output status assignment by block" (page 20-34).

● Input/output status assignment by unit

◆Input status (GC-Link port)

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved										Port B	Port A	Port B		Port A	
										Ai	Ai	Si1	Si0	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (main controller)

GC-1000

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Si15	Si14	Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

GC-1000R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved		Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (nth expansion unit)

GC-S84

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved								Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

GC-S16

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Si15	Si14	Si13	Si12	Si11	Si10	Si9	Si8	Si7	Si6	Si5	Si4	Si3	Si2	Si1	Si0

Input status 0: OFF, 1: ON

◆Input status (nth remote I/O module)

GC-R45/R48

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved				CN4	CN3	CN2	CN1	CN4		CN3		CN2		CN1	
				Ai	Ai	Ai	Ai	Si1	Si0	Si1	Si0	Si1	Si0	Si1	Si0

Input status 0: OFF, 1: ON

◆Output status (GC-Link port)

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												Port B		Port A	
												Ao1	Ao0	Ao1	Ao0

Output status 0: OFF, 1: ON

◆Output status (main controller)

GC-1000

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved						Ao3	Ao2	Ao1	Ao0	So5	So4	So3	So2	So1	So0

Output status 0: OFF, 1: ON

GC-1000R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved							Ao3	Ao2	Ao1	Ao0	SRo	So3	So2	So1	So0

Output status 0: OFF, 1: ON

◆Output status (nth expansion unit)

GC-S84

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												So3	So2	So1	So0

Output status 0: OFF, 1: ON

GC-S1R

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved															SRo

Output status 0: OFF, 1: ON

GC-A16

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Ao15	Ao14	Ao13	Ao12	Ao11	Ao10	Ao9	Ao8	Ao7	Ao6	Ao5	Ao4	Ao3	Ao2	Ao1	Ao0

Output status 0: OFF, 1: ON

◆Output status (nth remote I/O module)

GC-R45

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												CN4	CN3	CN2	CN1
												Ao	Ao	Ao	Ao

Output status 0: OFF, 1: ON

GC-R48

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Reserved												CN4	CN3	CN2	CN1
												So	So	So	So

Output status 0: OFF, 1: ON

● Output status assignment by block

		Block name	Bit assignment
Input devices	Safety input devices	Emergency stop switch	bit 0: Output
		Limit switch	
		Interlock switch	
		Guard locking switch	
		GS Series [KEYENCE]	
		Light curtain	
		GL-R Series [KEYENCE]	
		GL-S Series [KEYENCE]	
		Laser scanner	
		SZ-V Series [KEYENCE]	
		SZ Series [KEYENCE]	
		Rope pull switch	
		Safety mat	
		Two hand control device	
		Enabling device	
		Other safety switch	
		Other safety input	
	Other input devices	Reset switch	bit 0: Output
		Mode selecting switch	bit 0: Mode Output 1 bit 1: Mode Output 2 bit 2: Error
		EDM input	bit 0: Output
		Muting input	
		Safety plug	
		Hold-to-run switch	
		Other switch	
		Other input	

		Block name		Bit assignment
Output devices	Safety outputs	S-OUT S-OUT EDM enabled	Safety 1 output	bit 0: Output bit 1: Reserved bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
			Safety 2 output	bit 0: Output1 bit 1: Output2 bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
		S-OUT (Relay output) S-OUT (Relay output) EDM enabled		bit 0: Output bit 1: Reserved bit 2: Reset Required bit 3: Error Reset Required bit 4: DIAG Error bit 5: EDM1 Error bit 6: EDM2 Error
	Other outputs	AUX-OUT		bit 0: Output bit 1: Reserved bit 2: Error
Communications	Communication input	Reset input (COM) Other input (COM)	Enablement code disabled	bit 0: Output
			Enablement code enabled	bit 0: Output bit1: Ready bit 2: Error
	Communication output	Communication output		bit 0: Output bit 1: Reserved bit 2: Error
Register		Register (Load)		bit 0: Output
		Register (Store)		
Expansion blocks	None	GS closed state		bit 0: Output
		GS locked state		
		GS indicator control output		bit 0: Red bit 1: Green bit 2: Output Error
Other input blocks		GL-R received-light-amount decrease alert		bit 0: Output
		AUX-IN		
		OSSD 3/4		
		IN		

		Block name		Bit assignment
Other output blocks		Unlock output	Lock control 1 output	bit 0: Output bit 1: Reserved bit 2: DIAG Error bit 3: Wait OFF
			Lock control 2 output	bit 0: Output1 bit 1: Output2 bit 2: DIAG Error bit 3: Wait OFF
		Indicator control output		bit 0: Red bit 1: Green bit 2: Output Error
		Bank switching output	Independent bank	bit 0: Bank Output A bit 1: Bank Output a bit 2: Input Mismatch bit 3: Output Error
			Single	bit 0: Bank Output A bit 1: Bank Output a bit 2: Bank Output B bit 3: Bank Output b bit 4: Bank Output C bit 5: Bank Output c bit 6: Input Mismatch bit 7: Output Error
			Binary	bit 0: Bank Output A bit 1: Bank Output a bit 2: Bank Output B bit 3: Bank Output b bit 4: Bank Output C bit 5: Bank Output c bit 6: Bank Output D bit 7: Bank Output d bit 8: Bank Output E bit 9: Bank Output e bit 10: Input Mismatch bit 11: Output Error
		OUT		bit 0: Output bit 1: Reserved bit 2: Error
Function blocks	Logic	AND		bit 0: Output
		AND (6-10 inputs)		
		OR		
		NOT		
		NAND		
		NOR		
		XOR		
		SR Flip-Flop (Set has priority)		
		RS Flip-Flop (Reset has priority)		
		JK Flip-Flop		

		Block name	Bit assignment
Function blocks	Reset	Reset	bit 0: Output bit 1: Reset Required
		Reset (with AND)	bit 0: Output bit 1: Reset Requireds
		Dual reset	bit 0: Output bit 1: Reset Required1 bit 2: Reset Required2
		Existence detection reset	bit 0: Output bit 1: Reset Required
	Muting	Sequential muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Parallel muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Cross-muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Muting for exit	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout
		Position detection muting	bit 0: Output bit 1: Muting Active bit 2: Muting Error bit 3: Override Active bit 4: Override Required bit 5: Timeout

		Block name	Bit assignment
Function blocks	Application	Master ON	bit 0: Master ON Ready bit 1: Reset Required
		Unlock control	bit 0: Unlock Output bit 1: Unlock Required
		Bypass	bit 0: Output bit 1: Bypass Active
		Control guard	bit 0: Output bit 1: Reset Required
		PSDI control	bit 0: Output bit 1: Output2 bit 2: Break Required bit 3: Reset Required bit 4: Normal Operation bit 5: PSDI Error bit 6: PSDI Time Out
	Manual mode	Manual mode control (MMC)	bit 0: Input Bypass bit 1: Output Enable bit 2: Restart Required bit 3: Manual Mode Active
		MMC input bypass	bit 0: Output
		MMC input bypass_	bit 0: Output
		MMC output enable	bit 0: Output
	Timers / Counters	OFF-delay	bit 0: Output bit 1: Delay Active
		ON-delay	bit 0: Output bit 1: Delay Active
		Pulse generator	bit 0: Output
		Up-down counter	bit 0: Reached Upper Limit bit 1: Reached Zero
		Up-down counter (with binary output)	bit 0: Reached Upper Limit bit 1: Reached Zero bit 0: Output bit 2 bit 3: Output bit 1 bit 4: Output bit 2 bit 5: Output bit 3 bit 6: Output bit 4 bit 7: Output bit 5 bit 8: Output bit 6 bit 9: Output bit 7

		Block name	Bit assignment
Function blocks	Others	Edge detection	bit 0: Rising Edge bit 1: Falling Edge
		Binary decoder	bit 0: Output1 bit 1: Output2 bit 2: Output3 bit 3: Output4 bit 4: Output5 bit 5: Output6 bit 6: Output7 bit 7: Output8
		Binary encoder	bit 0: Output bit 0 bit 1: Output bit 1 bit 2: Output bit 2 bit 3: Error
		Mode changing control	bit 0: Mode Output1 bit 1: Mode Output2 bit 2: Mode Output3 bit 3: Mode Output4 bit 4: Mode Output5 bit 5: Mode Output6 bit 6: Mode Output7 bit 7: Mode Output8 bit 8: Mode Error bit 9: Trigger Required
		Selector (2 inputs) Selector (4 inputs)	bit 0: Output bit 1: Mode Error
System blocks	None	Always ON	bit 0: Output
		Always OFF	
		1 scan ON upon start-up	
		System Information	
		Block information	
		Jump (Load)	
		Jump (Store)	
		Event history trigger	
Other functions	Recipe block	AND (with connection constraint function)	bit 0: Output

MEMO

21

Inspection and Maintenance

This chapter describes the inspection and maintenance procedures for the GC Series.

21-1 Inspection and Maintenance .....page 21-2

21-1 Inspection and Maintenance

Inspection and Maintenance

Perform an inspection of the GC Series at an appropriate time based on the following items:

Initial inspection

- Make sure that the GC Series is installed in agreement with the installation conditions, installation methods, and wiring specifications specified in this manual.
- Review the items listed in periodic inspection.

Periodic inspection*

- Make sure that all of the safety functions are operating correctly.
- Make sure that there are no changes in the installation status that will affect the results of the risk assessment carried out at the start of the installation.
- If the S-OUT self-diagnosis is disabled, use the emergency stop switch to turn OFF the target S-OUT and check if the device connected to the S-OUT is stopped.

* Determine the inspection cycle on the basis of the laws and rules in the region, cycle defined in individual standards, and results of a risk assessment of the target machine.
Unless specified in the above laws, rules, and individual standards, it is recommended that a periodic inspection should be performed at least once a year.

Under the following conditions, check the same items as those of initial inspection.

- The installation, wiring, or function was changed.
- The unit was replaced.
- The machine has not been used for a long time.
- A malfunction occurred.

If devices connected to the GC Series require inspection, inspect them, as well as perform the above initial inspection and periodic inspection. Keep the inspection results with the machine records.

Replacement

To replace a damaged unit, perform the following procedure:

1 Unit replacement

- Turn OFF the GC Series and peripheral equipment including the relay output.
- Disconnect the cable connected to the unit.
- Remove the damaged unit.
- Install a new unit.
- Reconnect the cable.

"Arranging Units"
"Attaching DIN rail"

2 System memory

To replace the main controller "GC-1000" or "GC-1000R", remove the system memory from the target main controller and reinstall it on a new main controller.

* This step is unnecessary when replacing an expansion unit or remote I/O module.

3 Power-ON

Make sure that the unit is correctly connected and there are no problems with the wiring before turning the unit ON.

When the GC Series is powered ON, the Activation CRC error is displayed on the main controller LED display.

Clear the Activation CRC error by following the instructions on the screen and then turn OFF and ON the GC Series.

Cleaning

- If the machine gets dirty, wipe off the component with a clean, dry cloth.
- If dust or dirt is present on a thin part such as a connector, remove the connector and clean the dust or dirt with a cotton swab.

Appendix

This chapter describes the troubleshooting and input/output device settings.

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A-2 List of input devices ..... page A-10
A-3 Output Device List ..... page A-87
A-4 Open License ..... page A-95
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A-6 Revision history ..... page A-97
A-7 Warranty ..... page A-98

A-1 Troubleshooting

This section describes how to check and troubleshoot an alert or error that occurred in the GC Series.

Alert and Error categories in the GC main controller

Errors that occurred in the GC main controller are categorized into the following four types according to the description.

Error level	Category	Details	Program behavior	Error history
Low High	Information	This is a minor error.	Continue	Not saved
	Alert	When an error that may affect the operation is detected, an alert state is set.	Continue	Saved
	Error	When an error that may affect the operation is detected, an error state is set. The related output block is turned OFF.	Continue	Saved
		When an error that prevents the GC main controller from operating correctly is detected, an error state is set. All of the output blocks are turned OFF.	Stop	Saved

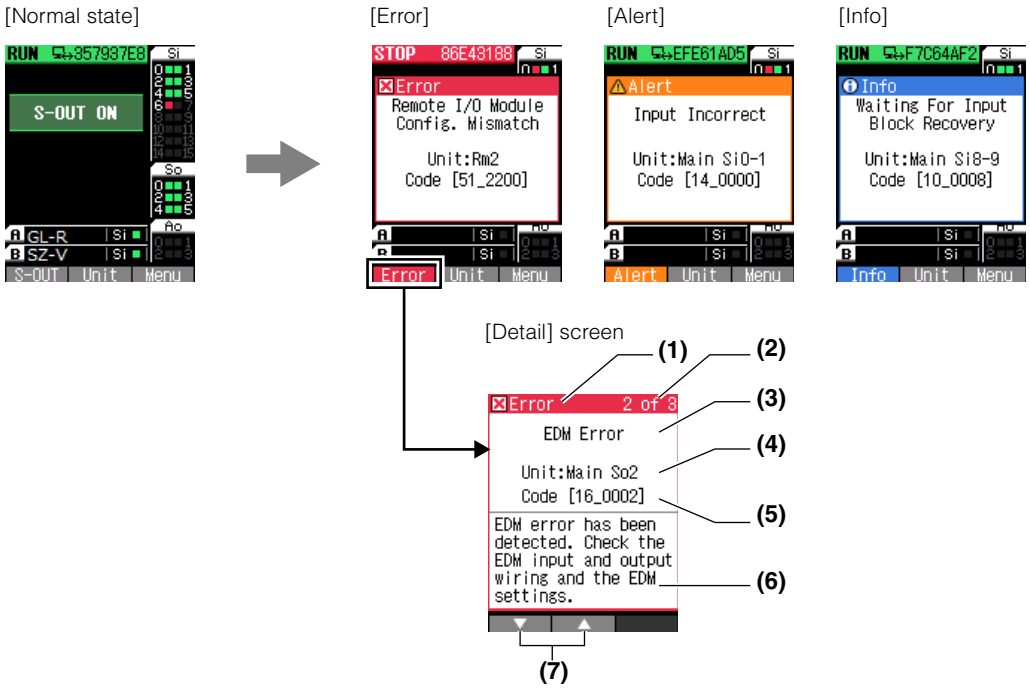
How to check an alert or error

There are two methods to check an alert or error that occurred in the GC Series: Checking it on the GC main controller LED display or the GC Configurator monitor screen.

How to check on the GC main controller LED display

■ Checking an error that is currently occurring

When an error occurs, it is displayed on the main screen.

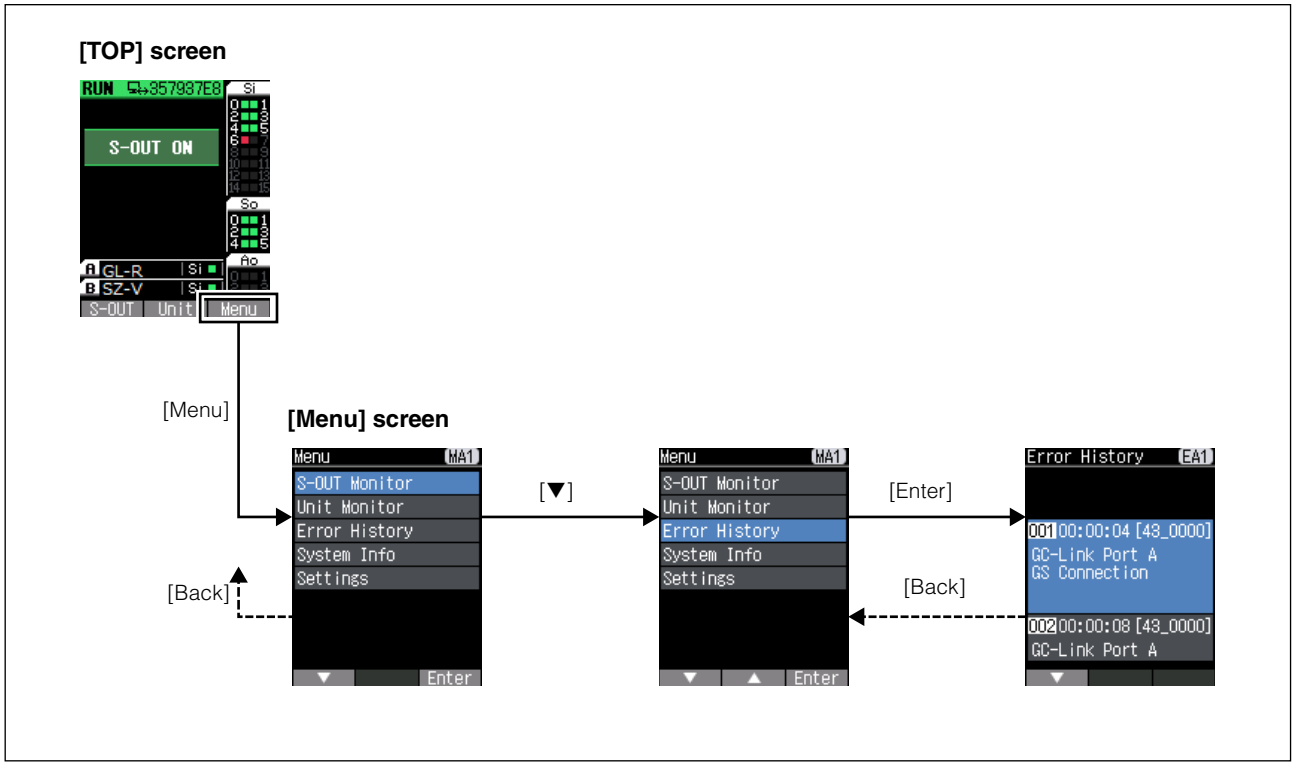


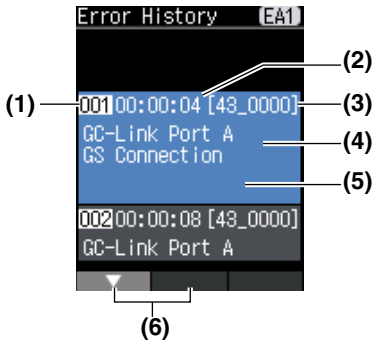
	Item	Details
(1)	Error level	Displays the error level. (Error, Alert, Info)
(2)	Page number	Displays the current page number and the total number of pages when multiple alerts or errors are occurring.
(3)	Error title	Displays the title of the error that is currently occurring. (two lines).
(4)	Error details	Displays the details of the error that is currently occurring. The displayed content varies depending on the error type.
(5)	Error code	Displays the current error code. "Alert/Error list" (page A-7)
(6)	Error message	Displays the detailed message of the error that is currently occurring.
(7)	Page switch	Switches between the pages when multiple alerts or errors are occurring

■ Checking an error that occurred in the past

On the [Error History] screen, you can check error histories.

On the [Menu] screen, select [Error History] and press the operation key (right) [Enter] button. The [Error History] screen appears.





	Item	Details
(1)	Error sequential number	Displays the error number, which lists the most recent error first.
(2)	Occurrence time	Displays the operation time elapsed since the start of the GC main controller to when the error occurred. (Hour:Minute:Second)
(3)	Error code	Displays the error code. "Alert/Error list" (page A-7)
(4)	Error title	Displays the error description in two lines.
(5)	Error details	Displays the details of the port name and terminal where the error occurred.
(6)	Key function display: [▼], [▲]	Moves down or up the highlighted item when the operation key (left) or (center) is pressed.

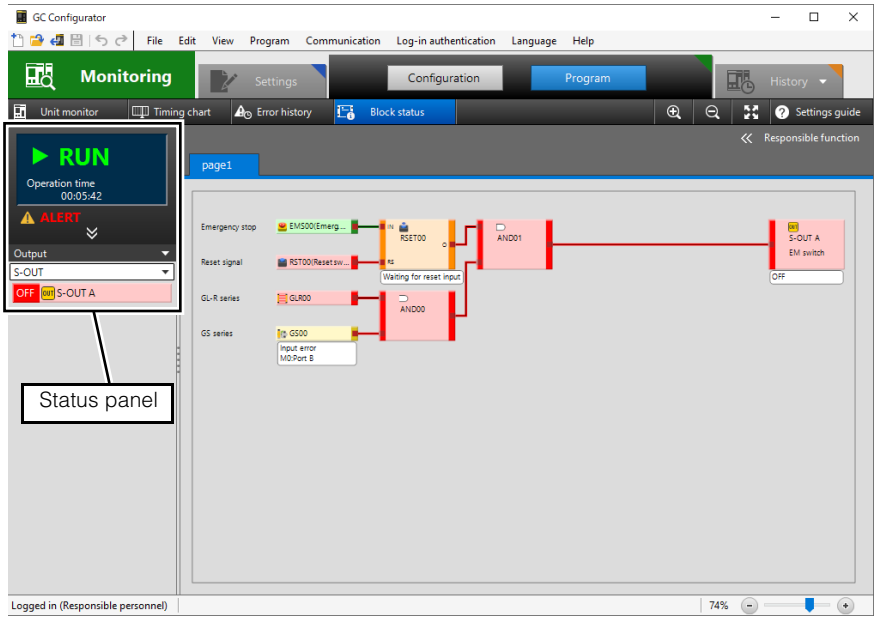
Reference

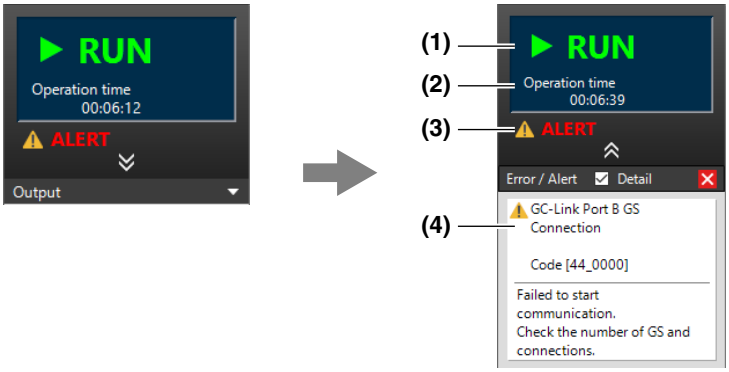
Up to 100 error histories are displayed in order from the newest to oldest. When the number of error histories exceeds 100, the history data will be overwritten from the oldest data.

How to check on the GC Configurator monitor

■ Checking an error that is currently occurring

When an error occurs, it is displayed on the status panel.

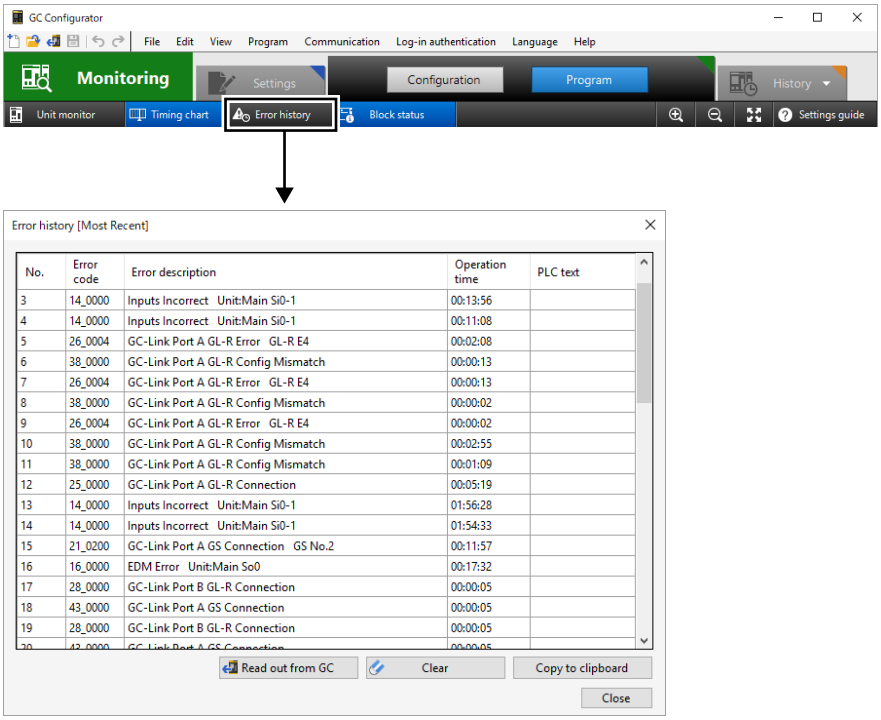




	Item	Details
(1)	Main controller operating state	Displays the operating state of the GC Series main controller. "Alert/Error list" (page A-7) RUN (green): The GC main controller is running. STOP (red): The GC main controller is stopped. OFFLINE (white): The PC is not connected to the main controller.
(2)	Operation time	Displays the operation time elapsed since the start of the GC main controller. (hh: Hour, mm: Minute, ss: Second)
(3)	Main controller error status	Displays the error/alert status of the main controller. : ERROR (red) : ALERT (red) : INFORMATION (white)
(4)	Error list	Displays any INFORMATION/ERRORS/ALERTS that are currently occurring.

■ Checking an error that occurred in the past

On the [Error history] dialog box, you can check error histories.



Item	Details
Error code	Displays the code associated with the error. "Alert/Error list" (page A-7)
Error description	Displays the error description.
Operation time	Displays the operation time elapsed since the start of the GC main controller to when the error occurred.
PLC text	Displays the contents of the "PLC text" written from the PLC via communications.
Read out from GC	Reads out the error history from the GC main controller.
Clear	Clears the error history of the GC main controller.
Copy to clipboard	Saves the error history details to the clipboard.

Alert/Error list

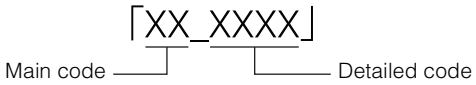
How to check the alert/error list

(1)	(2)	(3)	(4)	(5)	
Error category	**Error title (Main controller LED)**	**Error title**	**Error message**	**Error code**	
				Main	**Details**
Alert	Muting Error	Muting error	Muting input sequence or period was incorrect. Check the input and settings.	01	Block ID

(1)	Error category. (Alert/Error/Info)
(2)	Error title displayed on the GC main controller LED display.
(3)	Error title displayed on the GC Configurator.
(4)	Displays the error description and solution.
(5)	Error code. It is represented by main code + detailed code.

■ Error code

An error code is represented by the main code + detailed code.



Detailed code

For the items displayed in the detailed code, refer to the following.

Item	Details
Block ID	ID number assigned to the function block. You can check the ID number of each function block in [Settings report] by selecting [File] > [Report] from the GC Configurator menu.
Unit number*1	Displays the number in the upper two digits, which is assigned to an expansion unit or remote I/O module in the order that they are placed. (The lower two digits are fixed to 00.) Main controller: 00 Expansion units: 01 to 10 Remote I/O module: 21 to 24
Terminal number*1	Indicates the terminal number. Terminal block Si0 to Si15 : 00 to 15 So0 to So5 : 00 to 05 Ao0 to Ao15 : 00 to 15 To0 to To3 : 00 to 03 SRo0 : 00 Remote I/O module CN1 Si0/To0 : 00 CN1 Si1/To1 : 01 CN2 Si0/To0 : 02 CN2 Si1/To1 : 03 CN3 Si0/To0 : 04 CN3 Si1/To1 : 05 CN4 Si0/To0 : 06 CN4 Si1/To1 : 07 CN1 So/Ao/Ai : 00 CN2 So/Ao/Ai : 01 CN3 So/Ao/Ai : 02 CN4 So/Ao/Ai : 03
GS number	Displays the GS number in the upper two digits when the GS Series units are cascaded via GC-Link ports. (The lower two digits are fixed to 00.)
GL-R error number	Displays the GL-R Series error number. For details, refer to the "GL-R Series User's Manual".

*1 In the case of a unit number + terminal number, the upper two digits of the detailed code represent the unit number while the lower two digits represent the terminal number.

Error category	Error title (Main controller LED)	Error title	Error message	Error code	
				Main	Details
Info	Mode Changing Ctrl Inputs Mismatch	Mode Changing Control Inputs Mismatch	Check the inputs.	03	Block ID
Info	Bank Inputs Mismatch	Bank Inputs Mismatch	Check the inputs connected to the bank switching output block.	04	Block ID
Info	Waiting For Input Block Recovery	Waiting For Input Block Recovery	Incorrect inputs were clear. Perform recovery operation. (1) Off the inputs (2) Switch mode	10	Unit number + Si terminal number
Info	Waiting For Configuration	Waiting For Configuration	Settings are not configured. Please program unit.	31	0000 (fixed)
Alert	Muting Error	Muting error	Muting inputs sequence or period was incorrect. Check the inputs and settings.	01	Block ID
Alert	Max. Muting/Override Period Exceeded	Max. Muting/Override Period Exceeded	Muting/override period has exceeded the configured time. Check the settings.	02	Block ID
Alert	AUX Output Terminal Overcurrent	AUX Output Terminal Overcurrent	Check the AUX output terminal wiring.	11	Unit number + Ao terminal number
Alert	Test Output Terminal Overcurrent	Test Output Terminal Overcurrent	Check the test output terminal wiring.	12	Unit number + To terminal number
Alert	Safety Input Diag. (Test Output)	Safety Input Diag. (Test Output)	Error has been detected via safety input diagnosis. Check the wiring of Si and To terminal.	13	Unit number + Si terminal number
Alert	Inputs Incorrect	Inputs	Check the connected device, wiring, discrepancy / mismatch time or NO / NC settings.	14	Unit number + Si terminal number
Alert	Remote I/O Module Power Overcurrent	Remote I/O Module Power Overcurrent	Check the Remote I/O Module connection.	15	Unit number + connector number
Alert	GC-Link Port A GS Connection	GC-Link Port A GS Connection	Check the GS connection or end connector.	21	GS number
Alert	GC-Link Port A GS Error	GC-Link Port A GS Error	GS has detected an error. Check the details of the error.	22	GS number
Alert	GC-Link Port B GS Connection	GC-Link Port B GS Connection	Check the GS connection or end connector.	23	GS number
Alert	GC-Link Port B GS Error	GC-Link Port B GS Error	GS has detected an error. Check the details of the error.	24	GS number
Alert	GC-Link Port A GL-R Connection	GC-Link Port A GL-R Connection	Check the GL-R connection.	25	0000 (fixed)
Alert	GC-Link Port A GL-R Error	GC-Link Port A GL-R Error	GL-R has detected an error. Check the details of the error.	26	GL-R error code
Alert	GC-Link Port A GL-R Alert	GC-Link Port A GL-R Alert	The amount of GL-R received light is low. Check the alignment and remove build-up.	27	0000 (fixed)
Alert	GC-Link Port B GL-R Connection	GC-Link Port B GL-R Connection	Check the GL-R connection.	28	0000 (fixed)
Alert	GC-Link Port B GL-R Error	GC-Link Port B GL-R Error	GL-R has detected an error. Check the details of the error.	29	GL-R error code
Alert	GC-Link Port B GL-R Alert	GC-Link Port B GL-R Alert	The amount of GL-R received light is low. Check the alignment and remove build-up.	30	0000 (fixed)
Alert	GC-Link Port A GS Config. Mismatch	GC-Link Port A GS Config. Mismatch	Device configuration of the connected GS is different from the settings.	36	0000 (fixed)
Alert	GC-Link Port B GS Config. Mismatch	GC-Link Port B GS Config. Mismatch	Device configuration of the connected GS is different from the settings.	37	0000 (fixed)
Alert	GC-Link Port A GL-R Config Mismatch	GC-Link Port A GL-R Config Mismatch	Device configuration of the connected GL-R is different from the settings.	38	0000 (fixed)
Alert	GC-Link Port B GL-R Config Mismatch	GC-Link Port B GL-R Config Mismatch	Device configuration of the connected GL-R is different from the settings.	39	0000 (fixed)
Alert	Low Power Voltage	Low Power Voltage	Check the power voltage.	40	Unit number
Alert	GC-Link Port A GS Connection	GC-Link Port A GS Connection	Failed to start communication. Check the number of GS and the connections.	43	0000 (fixed)
Alert	GC-Link Port B GS Connection	GC-Link Port B GS Connection	Failed to start communication. Check the number of GS and the connections.	44	0000 (fixed)
Alert	GC-Link Port A GS Low Power Voltage	GC-Link Port A GS Low Power Voltage	Check the power voltage and cable length.	45	
Alert	GC-Link Port B GS Low Power Voltage	GC-Link Port B GS Low Power Voltage	Check the power voltage and cable length.	46	

Error category	Error title (Main controller LED)	Error title	Error message	Error code	
				Main	Details
Alert	History Data Save Failed	History Data Save Failed	Frequency of triggers to save history data is too high. Check the trigger conditions.	47	0000 (fixed)
Alert	History Data Error	History Data Error	Clear the history data.	48	0000 (fixed)
Alert	IP Address Conflict	IP Address Conflict	Check for devices with same IP address. If it exists, reconfigure the IP address.	49	0000 (fixed)
Error	EDM Error	EDM Error	Check the EDM input and output wiring and the EDM settings.	16	Unit number + So or Sro terminal number
Error	Safety Output Terminal Overcurrent	Safety Output Terminal Overcurrent	Check the safety output terminal wiring.	17	Unit number + So terminal number
Error	Safety Output Terminal Error	Safety Output Terminal Error	Error has been detected via safety output terminal diagnosis. Check the wiring.	18	Unit number + So terminal number
Error	Safety Relay Output Terminal Error	Safety Relay Output Terminal Error	Error has been detected via SRo terminal diagnosis. Check the wiring or replace the unit.	19	Unit number + Sro terminal number
Error	Waiting For Activation	Waiting For Activation	Restart and approve the configuration.	32	0000 (fixed)
Error	Settings Unsupported By Version	Settings Unsupported By Version	This version does not support the written settings. Check the settings.	33	0000 (fixed)
Error	Configuration Mismatch	Configuration Mismatch	Device configuration is different from the settings. Check the Main Controller and settings.	50	Unit number
Error	Remote I/O Module Config. Mismatch	Remote I/O Module Config. Mismatch	Device configuration of the Remote I/O Module is different from the settings. Check the settings.	51	Unit number
Error	System Memory Data Error	System Memory Data Error	Reconfigure the settings or replace the System Memory.	52	0000 (fixed)
Error	System Memory Data Error	System Memory Data Error	Reconfigure the settings or replace the System Memory.	53	0000 (fixed)
Error	Expansion Units Comm. Error	Expansion Unit Comm. Error	Failed to communicate with the Expansion Unit. Check the connection.	54	Unit number
Error	Remote I/O Module Comm. Error	Remote I/O Module Comm. Error	Failed to communicate with the Remote I/O Module. Check the connection.	55	Unit number
Error	Expansion Units Comm. Error	Expansion Unit Comm. Error	Failed to start communication. Check the connections and the number of connected units.	56	Unit number
Error	Remote I/O Module Comm. Error	Remote I/O Module Comm. Error	Failed to start communication. Check the connections and the number of connected units.	57	Unit number
Error	High Power Voltage	High Power Voltage	Check the power voltage.	58	Unit number
Error	Expansion Units Unsupported Version	Expansion Unit Unsupported Version	Unsupported Expansion Unit is connected. Check the Main Controller.	59	Unit number
Error	Remote I/O Module Unsupported Version	Remote I/O Module Unsupported Version	Unsupported Remote I/O Module is connected. Check the Main Controller.	60	Unit number
Error	System Memory Access Error	System Memory Access Error	Check the connection or replace the System Memory.	61	
Error	System Memory Data Error	System Memory Data Error	Reconfigure the settings or replace the System Memory.	62	
Error	GC-Link Port A Unsupported GS	GC-Link Port A Unsupported GS	Unsupported GS Series is connected. Check the Main Controller.	63	
Error	GC-Link Port B Unsupported GS	GC-Link Port B Unsupported GS	Unsupported GS Series is connected. Check the Main Controller.	64	
Error	System Error	System Error	Reconfigure, or replace the unit.	98	
Error	System Error	System Error	Reconfigure, or replace the unit.	99	

A-2 List of input devices

This section describes the input devices that can be connected to the GC Series.

KEYENCE safety sensors

Compatible destinations and selectable input logics

Input device	Connection type	Connection destination			
		GC-Link	Terminal block	GC-R45 (M12 5-pin)	GC-R48 (M12 8-pin)
GL-R Series	PNP 2 inputs	●	●	●	--
GL-S Series	PNP 2 inputs	●	●	●	--
GS-10 Series	PNP 2 inputs	●	●	●	●
GS-M5/9, ML5, 50 and 70 Series	PNP 2 inputs	●	●	--	●
SZ-V Series	PNP 2 inputs	●	●	●	--
SZ Series	PNP 2 inputs	●	●	●	--

Safety input devices

Compatible destinations and selectable input logics

Input device	Connection type	Connection destination		
		Terminal block	GC-R45 (M12 5-pin)	GC-R48 (M12 8-pin)
Emergency stop switch	1 input	●	●	
	1 input 1 test output	●	●	
	2 inputs	●	●	
	2 inputs 1 test output	●	--	
	2 inputs 2 test outputs	●	●	
Limit switch	PNP 1 input	●	●	
	PNP 2 inputs	●	●	
	1 input	●	●	
	1 input 1 test output	●	●	
	2 inputs	●	●	
	2 inputs 1 test output	●	--	
	2 inputs 2 test outputs	●	●	

Input device	Connection type	Connection destination		
		Terminal block	GC-R45 (M12 5-pin)	GC-R48 (M12 8-pin)
Interlock switch	PNP 1 input	●	●	
	PNP 2 inputs	●	●	
	1 input	●	●	
	1 input 1 test output	●	●	
	2 inputs	●	●	
	2 inputs 1 test output	●	--	
	2 inputs 2 test outputs	●	●	
Guard locking switch	PNP 1 input	●		●
	PNP 2 inputs	●		●
	1 input	●		●
	1 input 1 test output	●		●
	2 inputs	●		●
	2 inputs 1 test output	●		--
	2 inputs 2 test outputs	●		●
Light curtain	PNP 1 input	●	●	
	PNP 2 inputs	●	●	
Laser scanner	PNP 1 input	●	●	
	PNP 2 inputs	●	●	
Rope pull switch	PNP 1 input	●	●	
	PNP 2 inputs	●	●	
	1 input	●	●	
	1 input 1 test output	●	●	
	2 inputs	●	●	
	2 inputs 1 test output	●	--	
	2 inputs 2 test outputs	●	●	
Safety mat	PNP 1 input	●	●	
	PNP 2 inputs	●	●	
	1 input	●	●	
	1 input 1 test output	●	●	
	2 inputs	●	●	
	2 inputs 1 test output	●	--	
	2 inputs 2 test outputs	●	●	
Two hand control device	PNP 2 inputs	●	●	
	2 inputs	●	●	
	2 inputs 1 test output	●	--	
	2 inputs 2 test outputs	●	●	
Enabling device	2 inputs	●	●	
	2 inputs 1 test output	●	--	
	2 inputs 2 test outputs	●	●	

Input device	Connection type	Connection destination		
		Terminal block	GC-R45 (M12 5-pin)	GC-R48 (M12 8-pin)
Other safety switch	2 inputs	●	●	●
	2 inputs 1 test output	●	--	--
	2 inputs 2 test outputs	●	●	●
Other safety input	PNP 2 inputs	●	●	●
	2 inputs	●	●	●
	2 inputs 1 test output	●	--	--
	2 inputs 2 test outputs	●	●	●

Other input devices

Compatible destinations and selectable input logics

Input device	Connection type	Connection destination		
		Terminal block	GC-R45 (M12 5-pin)	GC-R48 (M12 8-pin)
Reset switch	1 input	●	●	
	1 input 1 test output	●	●	
Mode selecting switch	2 inputs	●	●	
	2 inputs 1 test output	●	--	
	2 inputs 2 test outputs	●	●	
EDM input	1 input	●	●	
	1 input 1 test output	●	●	
Muting input	PNP 1 input	●	●	
	1 input	●	●	
	1 input 1 test output	●	●	
Safety plug	1 input	●	●	
	1 input 1 test output	●	●	
Hold-to-run switch	1 input	●	●	
	1 input 1 test output	●	●	
Other switch	1 input	●	●	●
	1 input 1 test output	●	●	●
Other inputs	PNP 1 input	●	●	●
	1 input	●	●	●
	1 input 1 test output	●	●	●

GL-R series

- GL-R series [KEYENCE]

Connection

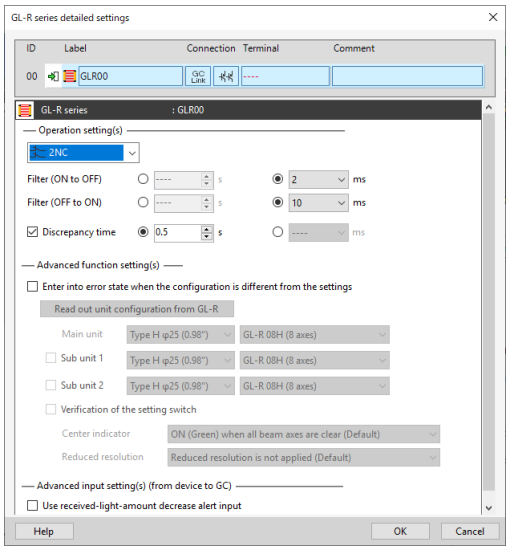
■ Compatible destinations

Input device	Input logic	GC-Link	Terminal block	GC-R45	GC-R48
GL-R Series	PNP 2 inputs	●	●	●	--

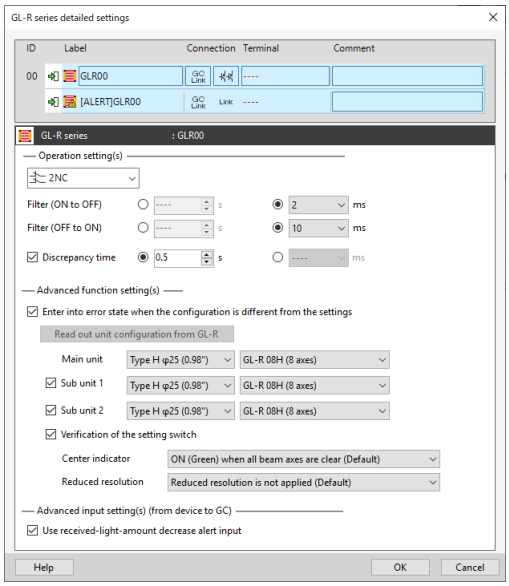
When connecting the GL-R Series to a GC-Link port

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Operation setting(s)	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Item		Details
Advanced function setting(s)	Enter into an error state when the configuration is different from the settings	Compares the settings with the GL-R main unit configuration and puts the machine into an error state if the settings are different, when selected.
	Read out the unit configuration from GL-R	Reads out the unit configuration from the GL-R Series connected to the GC Series when clicked.
	Main unit/Sub unit 1/2	Set the GL-R Series type and the number of optical axes when checking against the GL-R Series main unit configuration. When the GL-R Series units are connected in series, set the sub unit 1 and sub unit 2 types and the number of optical axes.
	Verification of the setting switch*1	Compares the configuration with the setting switch settings of the GL-R main unit when selected.
	Center indicator*1	Compares the configuration with the center indicator lighting method settings set with the setting switch of the GL-R main unit.
	Reduced resolution*1	Compares the configuration with the settings of the reduced solution set with the setting switch of the GL-R main unit.
Advanced input setting(s)	Use received-light-amount decrease alert input*2	With the check box checked, the input block of "GL-R received-light-amount decrease alert" is added. The signal generated at the occurrence of the GL-R Series received-light-amount decrease alert can be used by the input block.

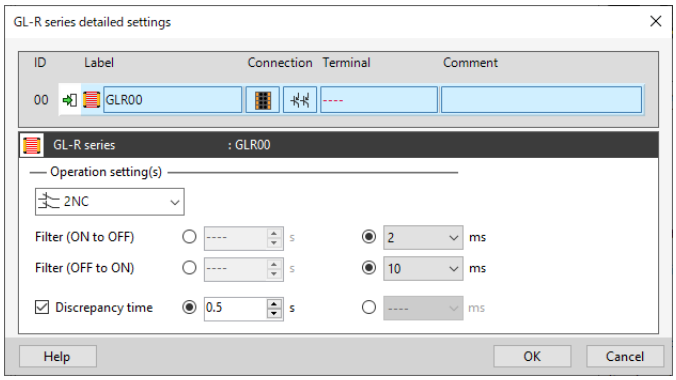
*1 For more information about the GL-R Series functions and settings, refer to the "Safety Light Curtain GL-R Series User's Manual".

*2 For more information about how to use a received-light-amount decrease alert input, refer to "6-5 Connecting KEYENCE Safety Sensors" (page 6-47).

When connecting the GL-R Series to a terminal block

GC Configurator detailed settings

[Default settings]

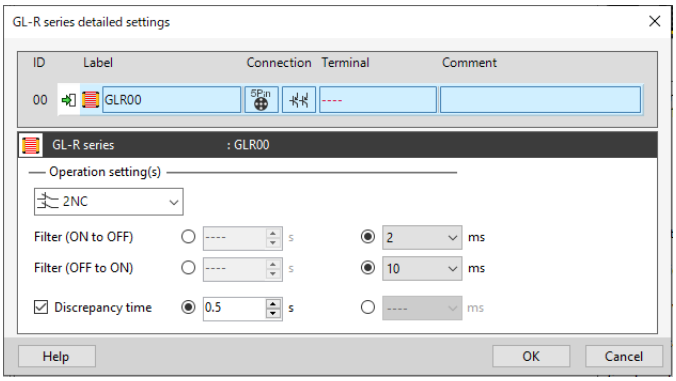


Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

When connecting the GL-R Series to the GC-R45

GC Configurator detailed settings

[Default settings]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

GL-S series

- GL-S series [KEYENCE]

Connection

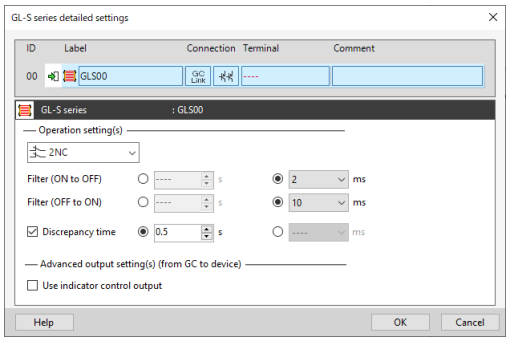
■ Compatible destinations

Input device	Input logic	GC-Link	Terminal block	GC-R45	GC-R48
GL-S Series	PNP 2 inputs	●	●	●	--

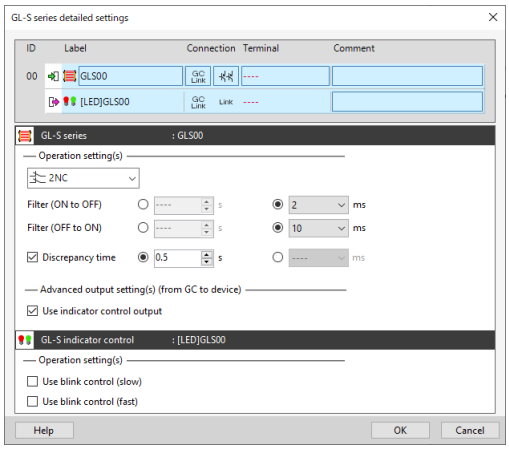
When connecting the GL-S Series to a GC-Link port

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced output setting(s)*	Use indicator control output	Adds an "indicator control output" output block when selected. You can control the center indicator of the GL-S Series.

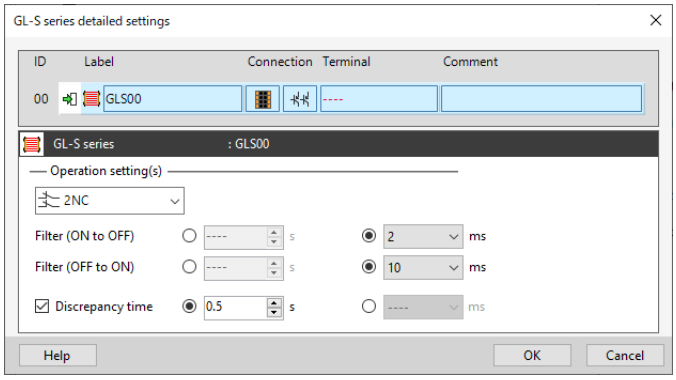
Item		Details
Indicator control output*	Use blink control (slow)	Allows you to use the blink control (slow) of the center indicator when selected. A "BS (Blink Slow)" port is added to the "indicator control output" output block.
	Use blink control (fast)	Allows you to use the blink control (fast) of the center indicator when selected. A "BF (Blink Fast)" port is added to the "indicator control output" output block.

* For more information about how to use an indicator control output, refer to "6-5 Connecting KEYENCE Safety Sensors" (page 6-47).
The indicator control output cannot be used in EASY mode.

When connecting the GL-S Series to a terminal block

GC Configurator detailed settings

[Default settings]

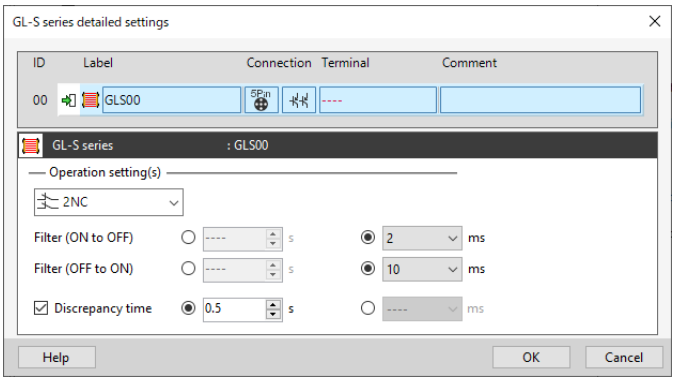


Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

When connecting the GL-S Series to the GC-R45

GC Configurator detailed settings

[Default settings]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

GS/GS-M series

- GS/GS-M series [KEYENCE]

Connection

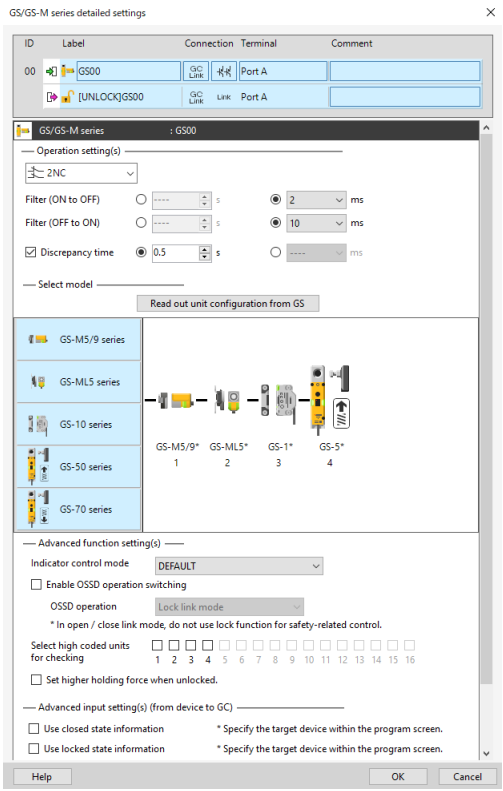
■ Compatible destinations

Input device	Input logic	GC-Link	Terminal block	GC-R45	GC-R48
GS-10 Series	PNP 2 inputs	●	●	●	●
GS-M5/9/ML5/50/70 Series	PNP 2 inputs	●	●	--	●

When connecting the GS/GS-M Series to a GC-Link port

GC Configurator detailed settings

[Default settings]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Item		Details
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Read out unit the configuration from GS	Reads out the unit configuration from the GS/GS-M Series connected to the GC Series when clicked.
	(Connected model)	Register the target model by dragging and dropping it when the unit configuration of the GS/GS-M Series to be connected is manually set.
Advanced function setting(s)	Indicator control mode	Set the display mode of the GS/GS-M Series main unit large indicator. [Normal operation]: Follows the GS/GS-M Series main controller setting. [OFF]: Turns OFF the indicator except when an error occurs. [OFF when GS is closed (locked)]: Turns OFF the indicator when the door is closed for the GS-10 Series. The indicator is turned OFF when the door is locked for the GS-M5/9, ML5, 50 and 70 Series.
	Enable OSSD operation switching	Enables the OSSD operation switching function when selected. This can be used when the GS-M5/9, ML5, 50 or 70 Series is selected for the connected model.
	OSSD operation	Set the OSSD operation when [Enable OSSD operation switching] is enabled. [Lock link mode]: Links the OSSD with the lock operation. [Open / close link mode]: Links the OSSD with the door open/close operation (when an actuator is detected). (Default: Lock link mode)
	Select high coded units for checking	Select this item when starting the GS-Series set in [Select high coded units for checking].
	Set higher holding force when unlocked	With the check box checked, the GS-M set higher holding force when unlocked. This can be used when selecting the GS-M5/9 Series or the GS-ML5 Series as the connection model.
Advanced input setting(s)	Use closed state information	Adds a "GS door closed state" expansion block when selected. The door closed state of the GS Series can be used in a program.
	Use locked state information	Adds a "GS door locked state" expansion block when selected. The lock state of the GS (lock)/GS-M can be used in a program. This can be used when the GS-M5/9, ML5, 50 or 70 Series is selected for the connected model.
Advanced output setting(s)	Use unlock output	With the check box checked, the "unlock output" block is added. This is used for the unlock output of the GS (Lock)/GS-M. This can be used when the GS-M5/9, ML5, 50 or 70 Series is selected for the connected model.
	Use indicator control output*	Adds a "GS indicator control output" expansion block when selected. You can control the indicator of the GS/GS-M Series.

For the GS/GS-M Series functions and settings, refer to the following manuals.

"GS Series (Non-contact) User's Manual"
"GS Series (Lock) User's Manual"

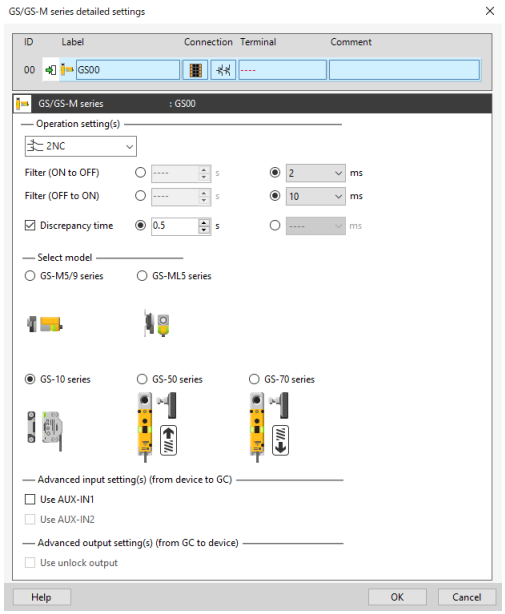
"GS-M series User's Manual"

* For more information about how to use the advanced function and advanced input/output function, refer to "6-5 Connecting KEYENCE Safety Sensors" (page 6-47). The indicator control output cannot be used in EASY mode.

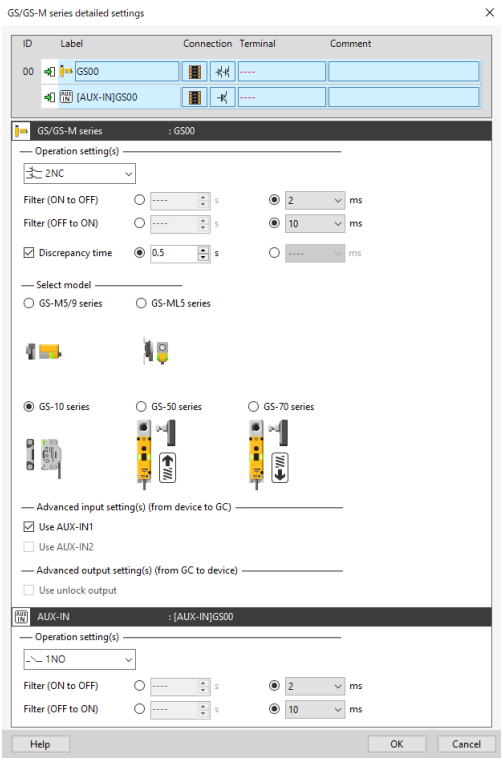
When connecting the GS-10 Series to a terminal block

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



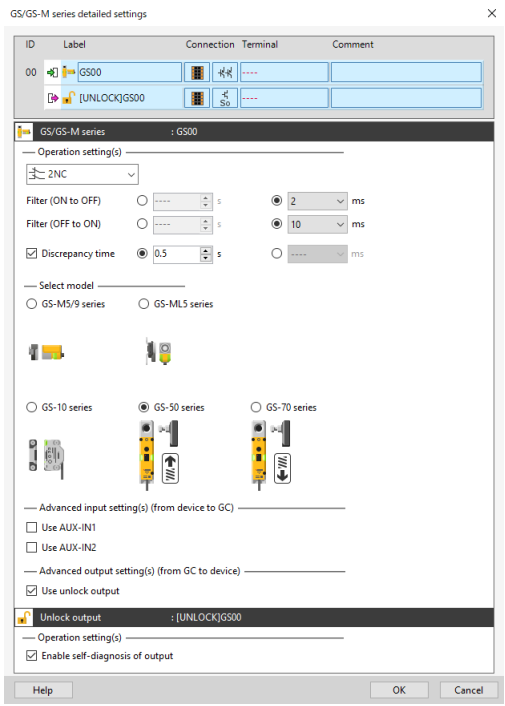
Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [GS-10 series].

Item		Details
Advanced input setting(s)	Use AUX-IN1	Adds an "AUX-IN" input block when selected. The AUX output of the GS Series can be used in a program.
	Use AUX-IN2	This cannot be selected in the GS-10 Series.
Advanced output setting(s)	Use unlock output	This cannot be selected in the GS-10 Series.
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]

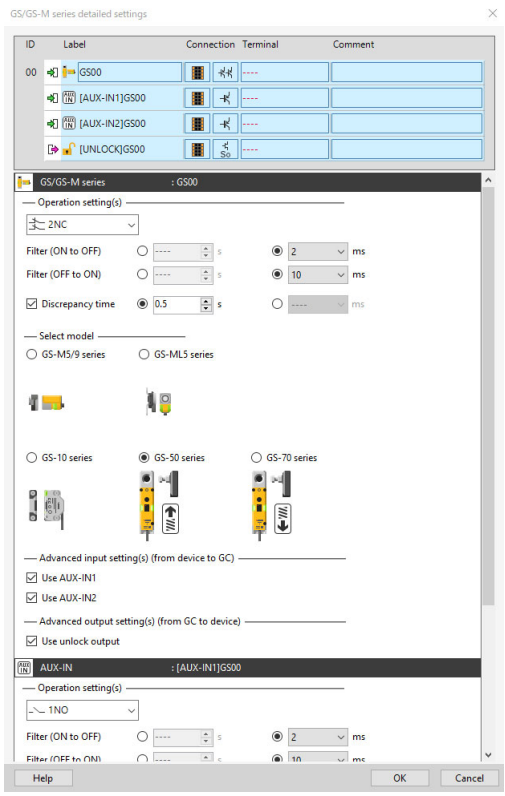
When connecting the GS-M5/9/ML5/50/70 Series to a terminal block

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



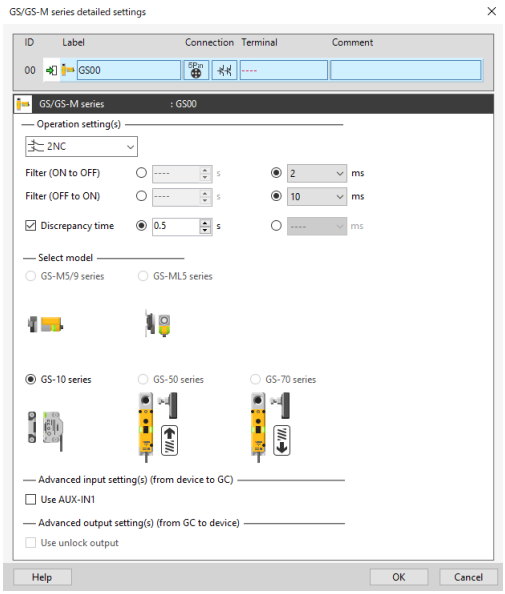
Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [GS-M5/9 series], [GS-ML5 series], [GS-50 series] or [GS-70 series].
Advanced input setting(s)	Use AUX-IN1	Adds an "AUX-IN1" input block when selected. The AUX output of the GS Series can be used in a program.
	Use AUX-IN2	Adds an "AUX-IN2" input block when selected. The AUX output of the GS Series can be used in a program.
Advanced output setting(s)	Use unlock output	Adds an "unlock" output block when selected.
AUX-IN1/AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]
Unlock output	Enable self-diagnosis of output*1	Enables the unlock output self-diagnosis function when selected.

*1 This is available only when [Safety output x 1] or [Safety output x 2] is selected for the connection type.

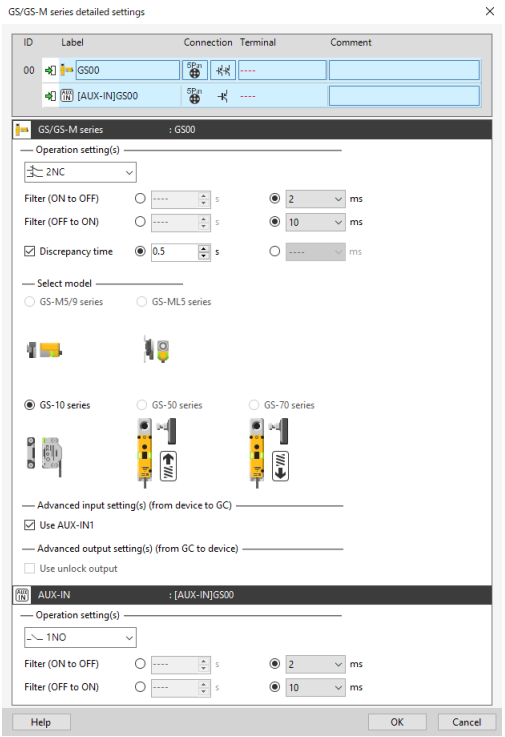
When connecting the GS-10 Series to the GC-R45/R48

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



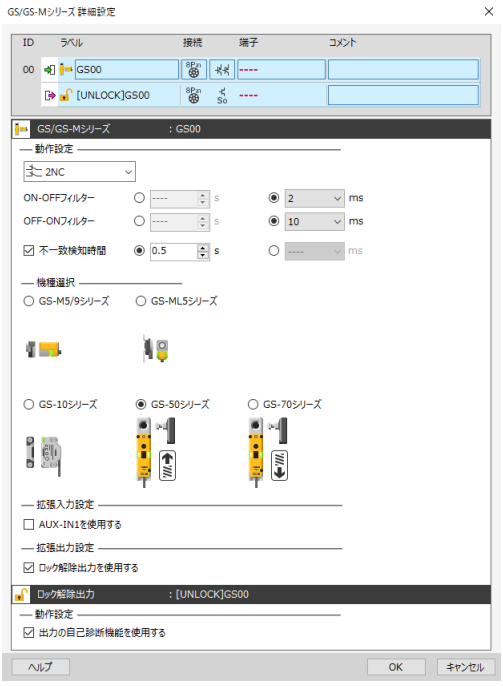
Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [GS-10 series].
Advanced input setting(s)	Use AUX-IN1	Adds an "AUX-IN" input block when selected. The AUX output of the GS Series can be used in a program.
	Use AUX-IN2	This cannot be selected in the GS-10 Series.
Advanced output setting(s)	Use unlock output	This cannot be selected in the GS-10 Series.

Item		Details
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]

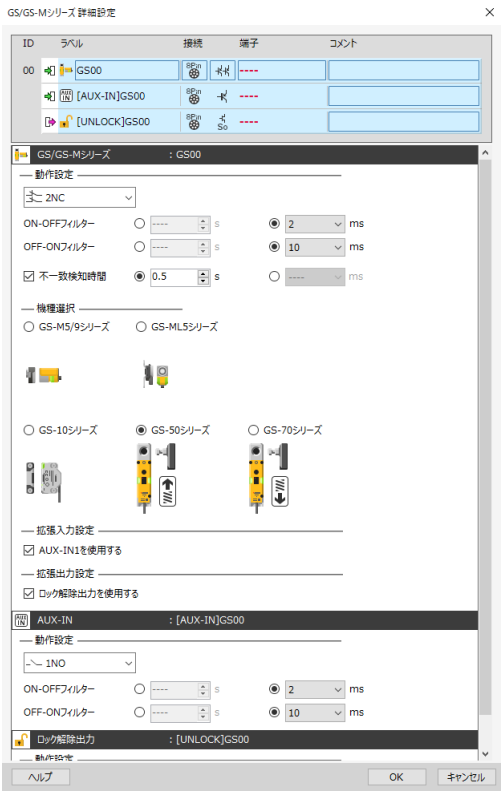
When connecting the GS-M5/9/ML5/50/70 Series to the GC-R48

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Item		Details
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [GS-M5/9 series], [GS-ML5 series], [GS-50 series] or [GS-70 series].
Advanced input setting(s)	Use AUX-IN1	Adds an "AUX-IN1" input block when selected. The AUX output of the GS Series can be used in a program.
Advanced output setting(s)	Use unlock output	Adds an "unlock" output block when selected.
AUX-IN1/AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]
Unlock output	Enable self-diagnosis of output	Enables the unlock output self-diagnosis function when selected.

SZ-V series

- SZ-V series [KEYENCE]

Connection

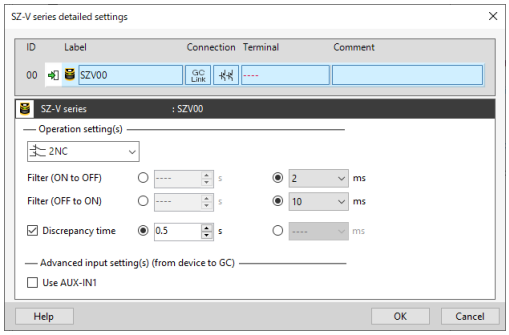
■ Compatible destinations

Input device	Input logic	GC-Link	Terminal block	GC-R45	GC-R48
SZ-V Series	PNP 2 inputs	●	●	●	--

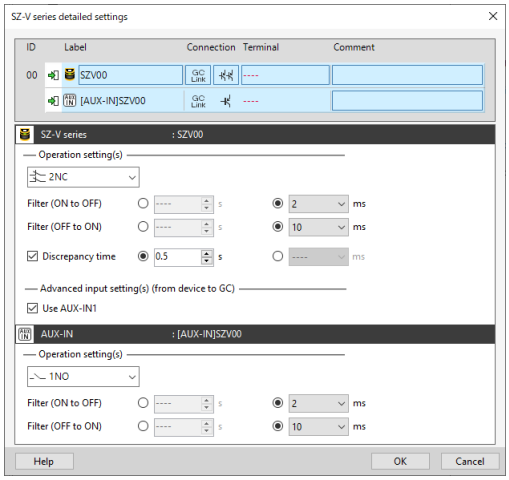
When connecting the SZ-V04 to a GC-Link port <<Simple connection>>

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Item		Details
Advanced input setting(s)	Use AUX-IN1	Adds an "AUX-IN" input block when selected. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.* 1
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]

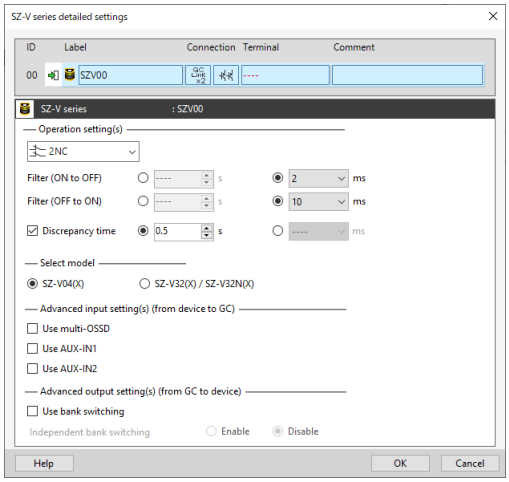
*1 For more information about the SZ-V Series functions and settings, refer to the "Safety Laser Scanner SZ-V Series User's Manual".

* For more information about how to use the advanced input/output function, refer to "6-5 Connecting KEYENCE Safety Sensors" (page 6-47).

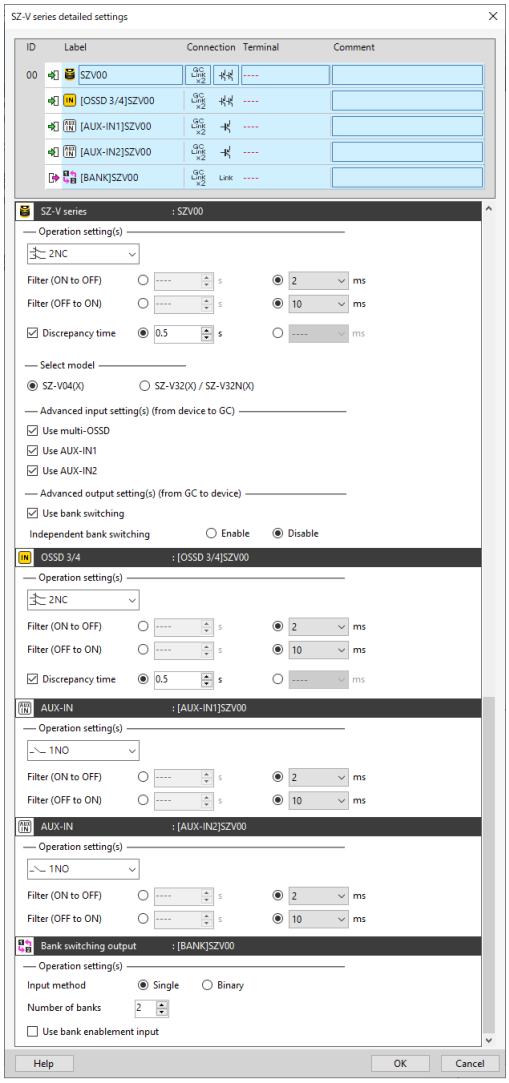
When connecting the SZ-V04 to a GC-Link port <<Advanced connection>>

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Item		Details
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [SZ-V04(X)].
Advanced input setting(s)	Use multi-OSSD	Adds an "OSSD 3/4" input block when selected. This is used when the multi-OSSD function is enabled in the SZ-V04 (X).
	Use AUX-IN1	Adds an "AUX-IN1" input block when selected. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*1
	Use AUX-IN2	Adds an "AUX-IN2" input block when selected. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*1
Advanced output setting(s)	Use bank switching*1	With the check box checked, the output block of "BANK" is added. You can switch the bank from the GC-Series.
	Independent bank switching	Select [Enable] or [Disable].
OSSD 3/4	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]
	Discrepancy time	Same as the above [Discrepancy time]
AUX-IN1/AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]
Bank switching output	Input method*1	Select [Single] or [Binary] when [Independent bank switching] is set to [Disable].
	Number of banks	Set the number of banks to switch when [Independent bank switching] is set to [Disable]. (Maximum: 4) The value is always set to "2" when [Independent bank switching] is set to [Enable].
	Use bank enablement input	Allows you to use the bank enablement input when selected. An "EN (Enable)" port is added to the "BANK" output block.

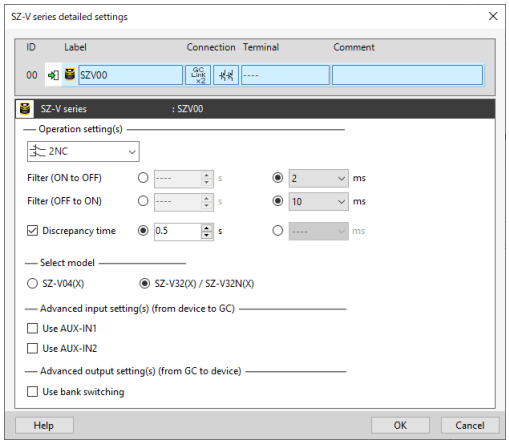
For more information about the SZ-V Series functions and settings, refer to the "Safety Laser Scanner SZ-V Series User's Manual".

*1 For more information about how to use the advanced input/output function and the bank switching function in the GC Series, refer to "6-5 Connecting KEYENCE Safety Sensors" (page 6-47).
The bank switching function cannot be used in EASY mode.

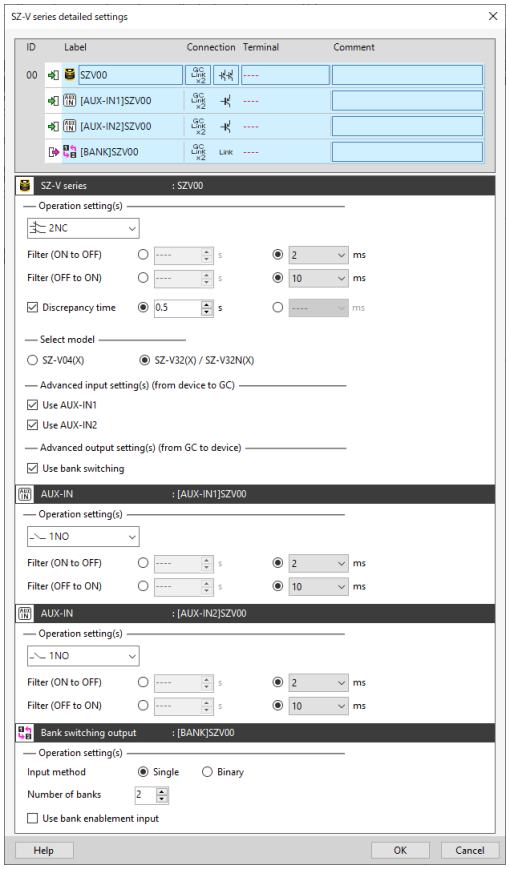
When connecting the SZ-V32 to a GC-Link port <<Advanced connection>>

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [SZ-V32(X)/SZ-V32N(X)].

Item		Details
Advanced input setting(s)	Use AUX-IN1	Adds an "AUX-IN1" input block when selected. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.* 1
	Use AUX-IN2	Adds an "AUX-IN2" input block when selected. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.* 1
Advanced output setting(s)	Use bank switching*1	With the check box checked, the output block of "BANK" is added. You can switch the bank from the GC-Series.
AUX-IN1/AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]
Bank switching output	Input method*1	Select [Single] or [Binary].
	Number of banks	Set the number of banks to switch. (Maximum: 4)
	Use bank enablement input	Allows you to use the bank enablement input when selected. An "EN (Enable)" port is added to the "BANK" output block.

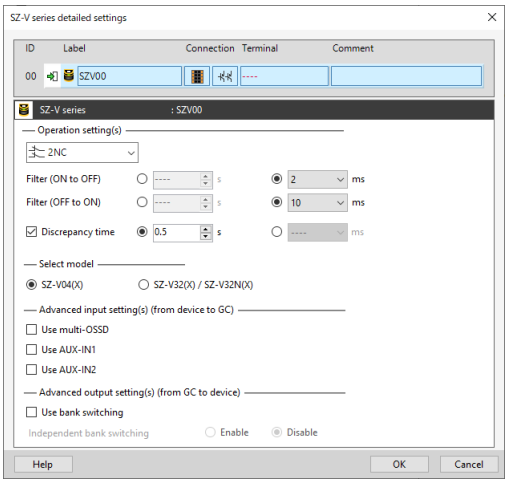
For more information about the SZ-V Series functions and settings, refer to the "Safety Laser Scanner SZ-V Series User's Manual".

* For more information about how to use the advanced input/output function and the bank switching function in the GC Series, refer to "6-5 Connecting KEYENCE Safety Sensors" (page 6-47).
The bank switching function cannot be used in EASY mode.

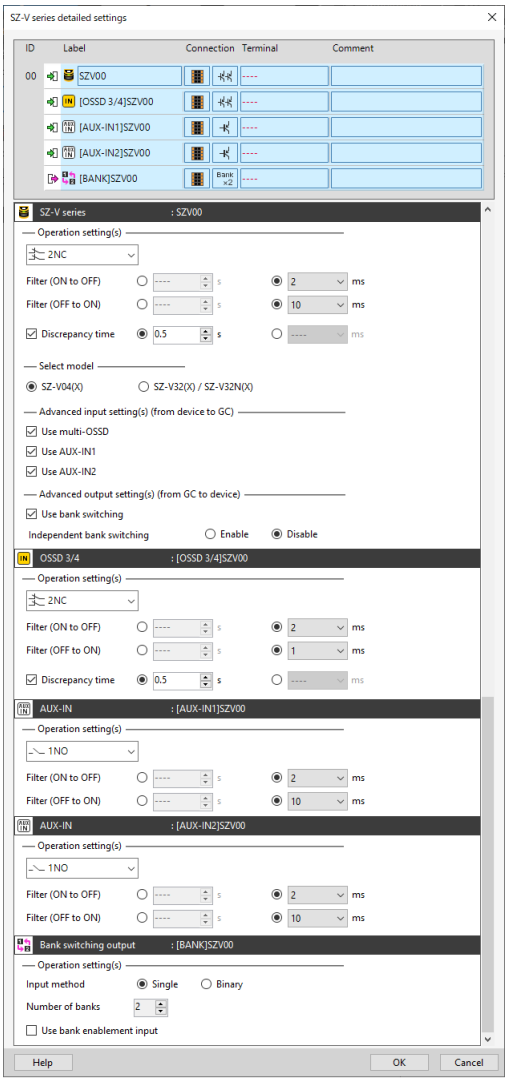
When connecting the SZ-V04 to a terminal block

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



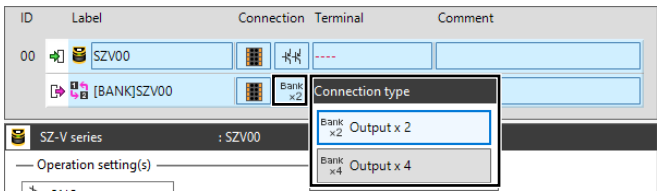
Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Item		Details
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [SZ-V04(X)].
Advanced input setting(s)	Use multi-OSSD	Adds an "OSSD 3/4" input block when selected. This is used when the multi-OSSD function is enabled in the SZ-V04 (X).
	Use AUX-IN1	Adds an "AUX-IN1" input block when selected. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*1
	Use AUX-IN2	Adds an "AUX-IN2" input block when selected. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*1
Advanced output setting(s)	Use bank switching*1	With the check box checked, the output block of "BANK" is added. You can switch the bank from the GC-Series.
	Independent bank switching	Select [Enable] or [Disable].
OSSD 3/4	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]
	Discrepancy time	Same as the above [Discrepancy time]
AUX-IN1/AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]
Bank switching output	Input method*1	Select [Single] or [Binary] when [Independent bank switching] is set to [Disable].
	Number of banks	Set the number of banks to switch when [Independent bank switching] is set to [Disable]. (Maximum: 4*2) The value is always set to "2" when [Independent bank switching] is set to [Enable].
	Use bank enablement input	Allows you to use the bank enablement input when selected. An "EN (Enable)" port is added to the "BANK" output block.

For more information about the SZ-V Series functions and settings, refer to the "Safety Laser Scanner SZ-V Series User's Manual".

*1 For more information about how to use the advanced input/output function and the bank switching function in the GC Series, refer to "6-5 Connecting KEYENCE Safety Sensors" (page 6-47). The bank switching function cannot be used in EASY mode.

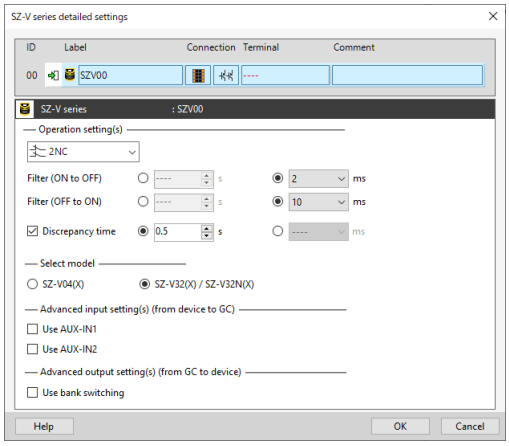
*2 To use four banks, select [Bank x 4] for the connection type in [Bank switching output].



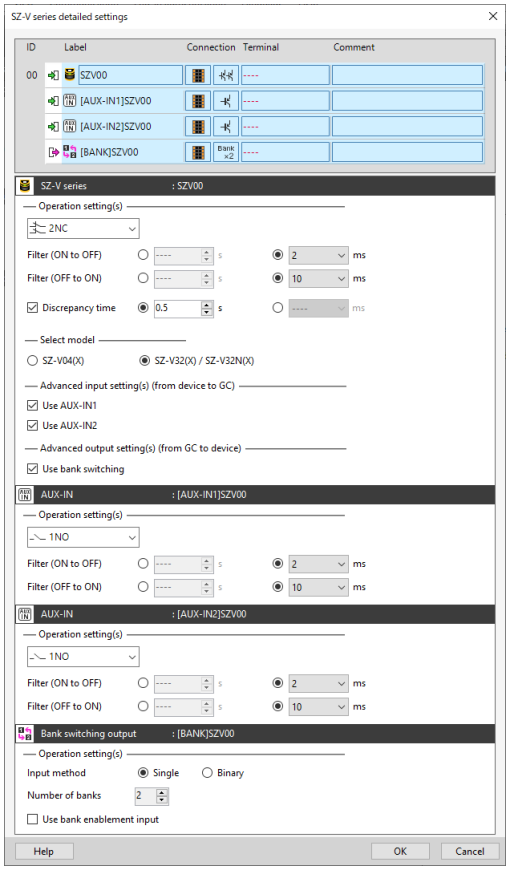
When connecting the SZ-V32 to a terminal block

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Select model	Select model	Select [SZ-V32(X)/SZ-V32N(X)].

Item		Details
Advanced input setting(s)	Use AUX-IN1	Adds an "AUX-IN1" input block when selected. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*1
	Use AUX-IN2	Adds an "AUX-IN2" input block when selected. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*1
Advanced output setting(s)	Use bank switching*1	With the check box checked, the output block of "BANK" is added. You can switch the bank from the GC-Series.
AUX-IN1/AUX-IN2	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]
Bank switching output	Input method*1	Select [Single] or [Binary].
	Number of banks	Set the number of banks to switch. (Maximum: 32)
	Use bank enablement input	Allows you to use the bank enablement input when selected. An "EN (Enable)" port is added to the "BANK" output block.

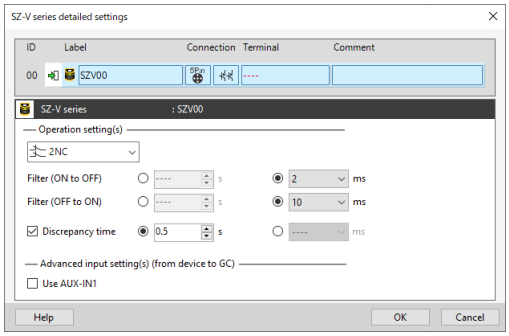
For more information about the SZ-V Series functions and settings, refer to the "Safety Laser Scanner SZ-V Series User's Manual".

*1 For more information about how to use the advanced input/output function and the bank switching function in the GC Series, refer to "6-5 Connecting KEYENCE Safety Sensors" (page 6-47).
The bank switching function cannot be used in EASY mode.

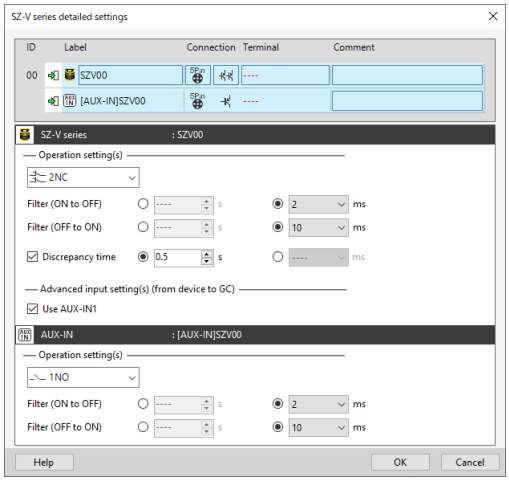
When connecting the SZ-V04/V32 to the GC-R45

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced input setting(s)	Use AUX-IN1*1	With the check box checked, the input block of "AUX-IN1" is added. The AUX output of the SZ-V Series can be used in a program. Set the function assigned to the AUX output using the SZ-V Configurator.*2
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]

*1 This is available only when the SZ-V04 (X) is connected.

*2 For more information about the SZ-V Series functions and settings, refer to the "Safety Laser Scanner SZ-V Series User's Manual".

SZ series

- SZ series [KEYENCE]

Connection

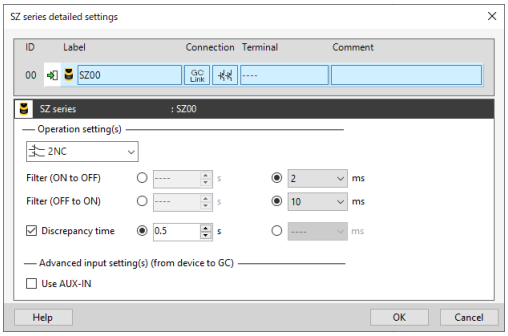
■ Compatible destinations

Input device	Input logic	GC-Link	Terminal block	GC-R45	GC-R48
SZ series	PNP 2 inputs	●	●	●	--

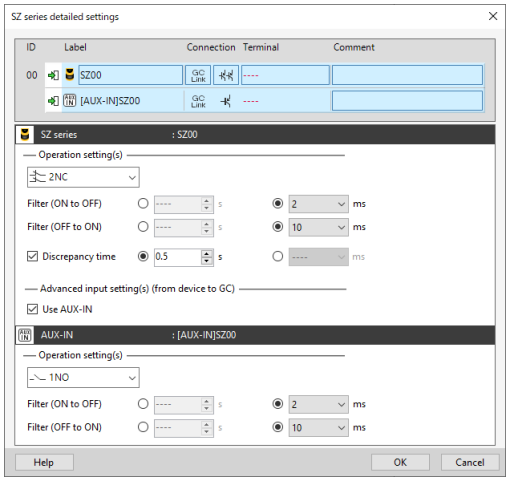
When connecting the SZ Series to a GC-Link port

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced input setting(s)	Use AUX-IN	Adds an "AUX-IN" input block when selected. The AUX output of the SZ Series can be used in a program. Set the function assigned to the AUX output using the SZ Configurator.* 1

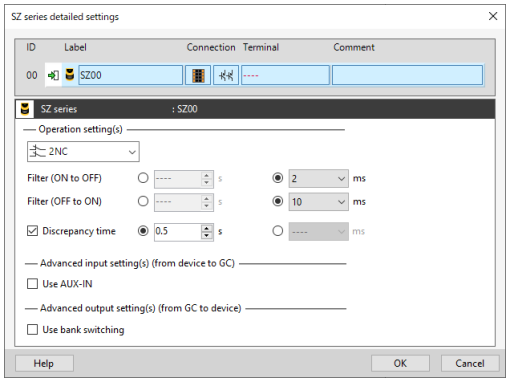
Item		Details
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]

*1 For more information about the SZ Series functions and settings, refer to the "Safety Laser Scanner SZ Series User's Manual".

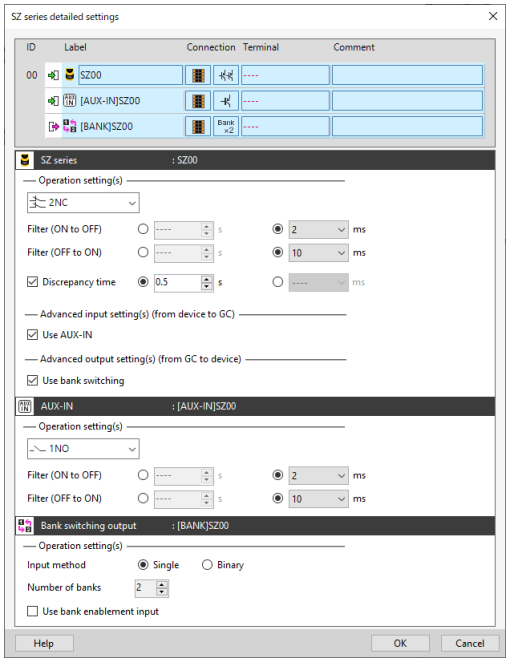
When connecting the SZ Series to a terminal block

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)

Item		Details
Advanced input setting(s)	Use AUX-IN	Adds an "AUX-IN" input block when selected. The AUX output of the SZ Series can be used in a program. Set the function assigned to the AUX output using the SZ Configurator.* 1
Advanced output setting(s)	Use bank switching*1	With the check box checked, the output block of "BANK" is added. You can switch the bank from the GC-Series.
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]
Bank switching output	Input method*1	Select [Single] or [Binary].
	Number of banks	Set the number of banks to switch. (Maximum: 16)
	Use bank enablement input	Allows you to use the bank enablement input when selected. An "EN (Enable)" port is added to the "BANK" output block.

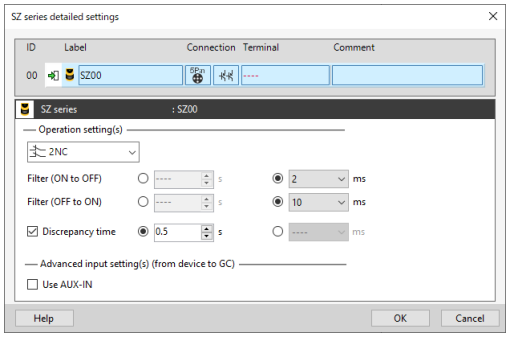
For more information about the SZ Series functions and settings, refer to the 🕮 "Safety Laser Scanner SZ Series User's Manual".

* For more information about how to use the advanced input/output function and the bank switching function in the GC Series, refer to 🕮 "6-5 Connecting KEYENCE Safety Sensors" (page 6-47).
The bank switching function cannot be used in EASY mode.

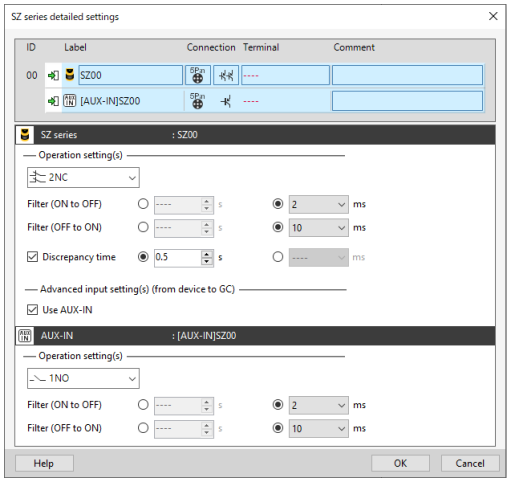
When connecting the SZ Series to the GC-R45

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



Item		Details
Operation setting(s)	Input logic	Fixed to [2NC].
	Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 2 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). (Default: 10 ms) • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
	Discrepancy time	Enables the mismatch detection when selected. (Default: 0.5 s) Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)
Advanced input setting(s)	Use AUX-IN	Adds an "AUX-IN" input block when selected. The AUX output of the SZ Series can be used in a program. Set the function assigned to the AUX output using the SZ Configurator.*1
AUX-IN	Input logic	Fixed to [1NO].
	Filter (ON to OFF)	Same as the above [Filter (ON to OFF)]
	Filter (OFF to ON)	Same as the above [Filter (OFF to ON)]

*1 For more information about the SZ Series functions and settings, refer to the "Safety Laser Scanner SZ Series User's Manual".

Emergency stop switch

Emergency stop switch

Overview

This is used to connect an emergency stop switch.

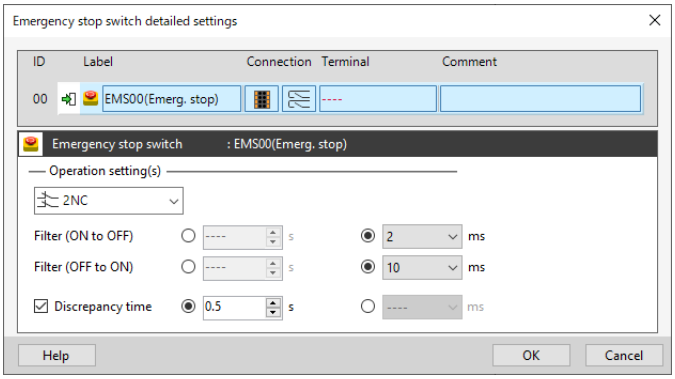
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic		
	Terminal block	GC-R45	GC-R48	2NC	NCNO	1NC
1 input	●	●		--	--	●
1 input 1 test output	●	●		--	--	●
2 inputs	●	●		●	●	--
2 inputs 1 test output	●	--		●	●	--
2 inputs 2 test outputs	●	●		●	●	--

GC Configurator detailed settings

[Default settings]



■ 2NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Setting item	Setting range	Default
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NCNO

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Limit switch

Limit switch

Overview

This is used to connect a limit switch.

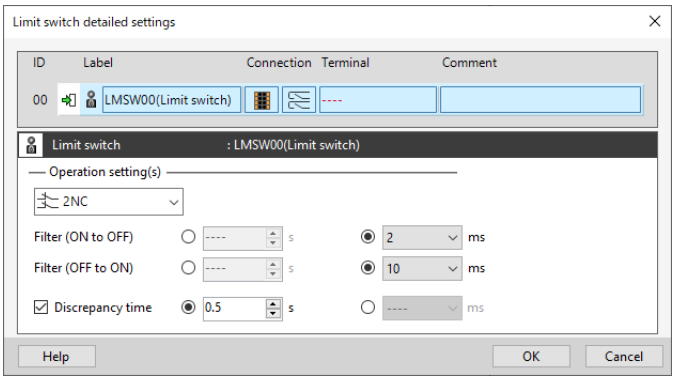
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic		
	Terminal block	GC-R45	GC-R48	2NC	NCNO	1NC
PNP 1 input	●	●		--	--	●
PNP 2 inputs	●	●		●	●	--
1 input	●	●		--	--	●
1 input 1 test output	●	●		--	--	●
2 inputs	●	●		●	●	--
2 inputs 1 test output	●	--		●	●	--
2 inputs 2 test outputs	●	●		●	●	--

GC Configurator detailed settings

[Default settings]



■ 2NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Setting item	Setting range	Default
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NCNO

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Interlock switch

Interlock switch

Overview

This is used to connect an interlock switch.

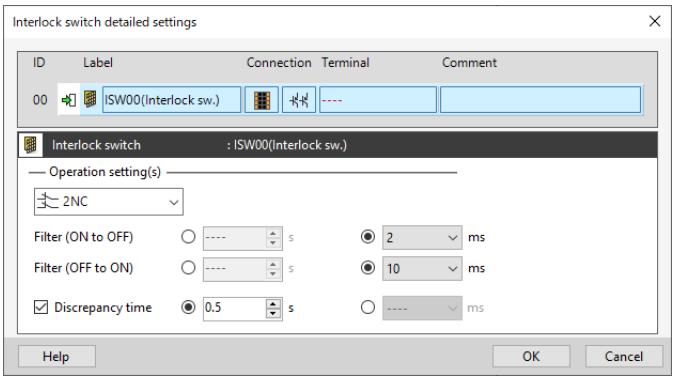
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic		
	Terminal block	GC-R45	GC-R48	2NC	NCNO	1NC
PNP 1 input	●	●		--	--	●
PNP 2 inputs	●	●		●	●	--
1 input	●	●		--	--	●
1 input 1 test output	●	●		--	--	●
2 inputs	●	●		●	●	--
2 inputs 1 test output	●	--		●	●	--
2 inputs 2 test outputs	●	●		●	●	--

GC Configurator detailed settings

[Default settings]



■ 2NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NCNO

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Guard locking switch

Guard locking switch

Overview

This is used to connect a guard locking switch. You can unlock the guard locking switch from the GC-Series.

Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic		
	Terminal block	GC-R45	GC-R48	2NC	NCNO	1NC
PNP 1 input	●		●	--	--	●
PNP 2 inputs	●		●	●	●	--
1 input	●		●	--	--	●
1 input 1 test output	●		●	--	--	●
2 inputs	●		●	●	●	--
2 inputs 1 test output	●		--	●	●	--
2 inputs 2 test outputs	●		●	●	●	--

■ Advanced input setting(s) (AUX-IN)

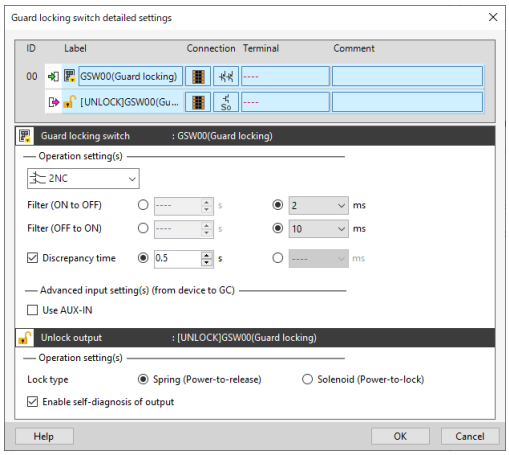
Connection type	Connection destination			Input logic
	Terminal block	GC-R45	GC-R48	1NO
PNP 1 input	●		●	●

■ Unlock output

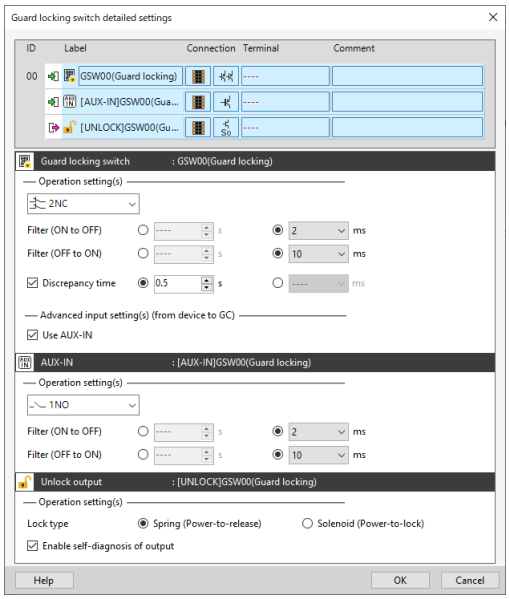
Connection type	Connection destination			Lock type		Self-diagnosis
	Terminal block	GC-R45	GC-R48	Spring	Solenoid	
Safety output x 1	●		●	●	●	●
Safety output x 2	●		●	●	●	●
AUX outputs	●		●	●	●	--

GC Configurator detailed settings

[Default settings]



[Advanced function setting(s)]



■2NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■NCNO

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms

Setting item	Setting range	Default
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

AUX-IN

■ 1NO

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Unlock output

Setting item	Setting range	Default
Lock type	Select the lock type of the interlock switch used. Option: Spring/Solenoid	Spring
Enable self-diagnosis of output.	Enables the output self-diagnosis function when selected.	Enable

Light curtain

Light curtain

Overview

This is used to connect a light curtain of the PNP output type.

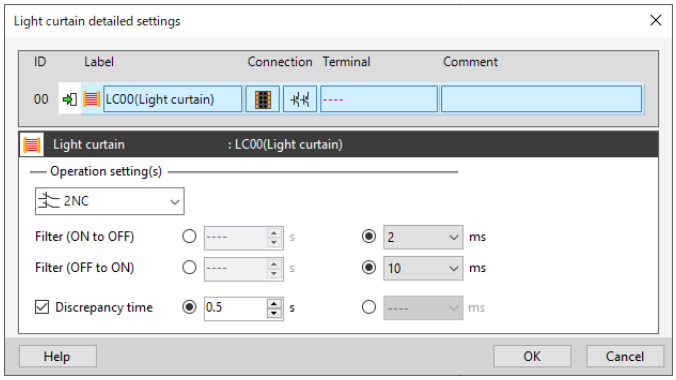
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic		
	Terminal block	GC-R45	GC-R48	2NC	NCNO	1NC
PNP 1 input	●	●		--	--	●
PNP 2 inputs	●	●		●	●	--

GC Configurator detailed settings

[Default settings]



■ 2NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Setting item	Setting range	Default
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NCNO

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Laser scanner

Laser scanner

Overview

This is used to connect a laser scanner of the PNP output type.

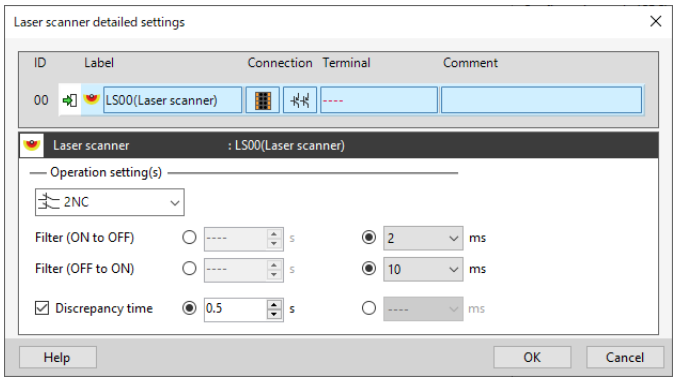
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic		
	Terminal block	GC-R45	GC-R48	2NC	NCNO	1NC
PNP 1 input	●	●		--	--	●
PNP 2 inputs	●	●		●	●	--

GC Configurator detailed settings

[Default settings]



■ 2NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s. • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NCNO

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Rope pull switch

Rope pull switch

Overview

This is used to connect a rope pull switch.

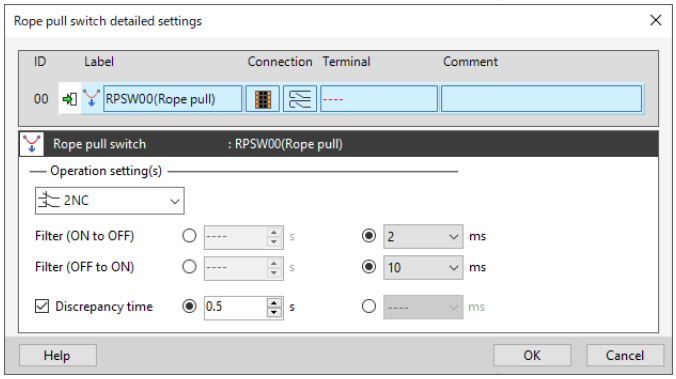
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic		
	Terminal block	GC-R45	GC-R48	2NC	NCNO	1NC
PNP 1 input	●	●		--	--	●
PNP 2 inputs	●	●		●	●	--
1 input	●	●		--	--	●
1 input 1 test output	●	●		--	--	●
2 inputs	●	●		●	●	--
2 inputs 1 test output	●	--		●	●	--
2 inputs 2 test outputs	●	●		●	●	--

GC Configurator detailed settings

[Default settings]



■ 2NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Setting item	Setting range	Default
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NCNO

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Safety mat

Safety mat

Overview

This is used to connect a safety mat.

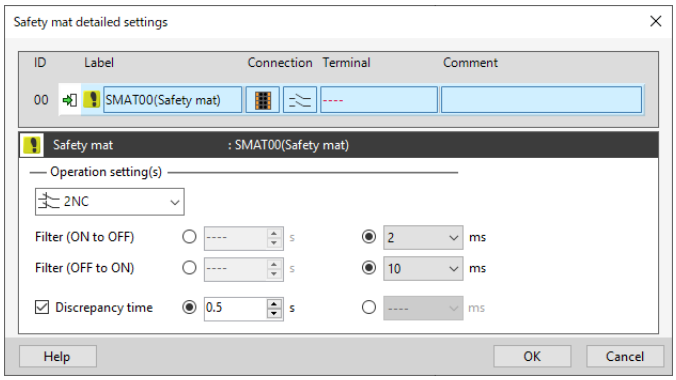
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic		
	Terminal block	GC-R45	GC-R48	2NC	NCNO	1NC
PNP 1 input	●	●		--	--	●
PNP 2 inputs	●	●		●	●	--
1 input	●	●		--	--	●
1 input 1 test output	●	●		--	--	●
2 inputs	●	●		●	●	--
2 inputs 1 test output	●	--		●	●	--
2 inputs 2 test outputs	●	●		●	●	--

GC Configurator detailed settings

[Default settings]



■ 2NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Setting item	Setting range	Default
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NCNO

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Two hand control device

Two hand control device

Overview

This is used to connect a two hand control device.

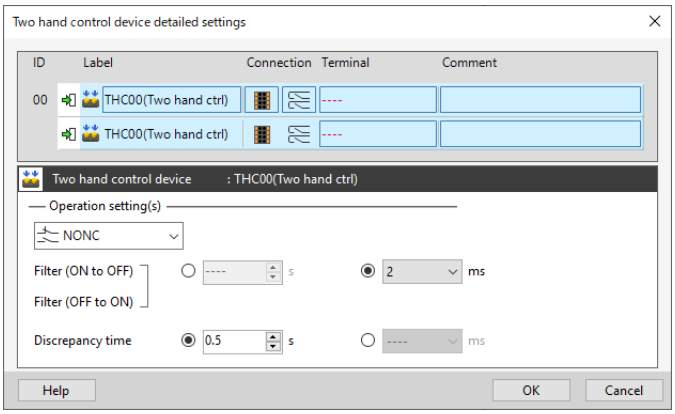
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic	
	Terminal block	GC-R45	GC-R48	2NO	NONC
PNP 2 inputs	●	●		●	●
2 inputs	●	●		●	●
2 inputs 1 test output	●	--		●	●
2 inputs 2 test outputs	●	●		●	●

GC Configurator detailed settings

[Default settings]



■ 2NO

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 0.5 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NONC

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 0.5 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

Point

A two hand control device input block is not turned ON even if the GC Series is turned ON (powered ON) with the two hand control device signal ON in order to prevent unexpected operation. The machine enters into the "Clear error upon input OFF" state, and requires that the input signal be turned OFF.

Enabling device

Enabling device

Overview

This is used to connect an enabling device.

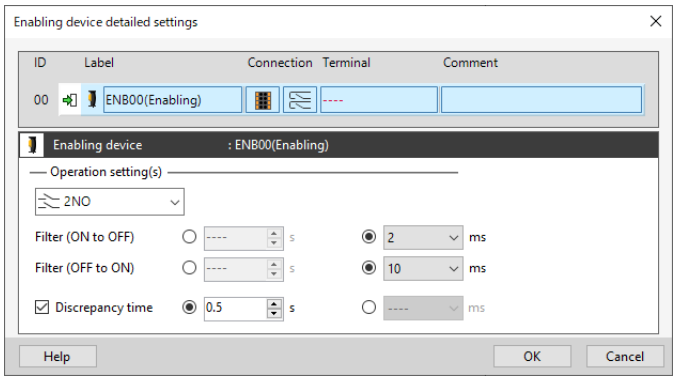
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic	
	Terminal block	GC-R45	GC-R48	2NO	NONC
2 inputs	●	●		●	●
2 inputs 1 test output	●	--		●	●
2 inputs 2 test outputs	●	●		●	●

GC Configurator detailed settings

[Default settings]



■ 2NO

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NONC

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

Point

An enabling device input block is not turned ON even if the GC Series is turned ON (powered ON) with the enabling device signal ON in order to prevent unexpected operation. The machine enters into the "Clear error upon input OFF" state, and requires that the input signal be turned OFF.

Other safety switch

Other safety switch

Overview

This is used to connect a safety switch of the contact type.

Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic			
	Terminal block	GC-R45	GC-R48	2NC	NCNO	2NO	NONC
2 inputs	●	●	●	●	●	●	●
2 inputs 1 test output	●	--	--	●	●	●	●
2 inputs 2 test outputs	●	●	●	●	●	●	●

■ Advanced input setting(s) (GC-R48)

Connection type	Connection destination			Input logic
	Terminal block	GC-R45	GC-R48	1NO
1 input	--	--	●	●

■ Advanced output setting(s) (GC-R48)

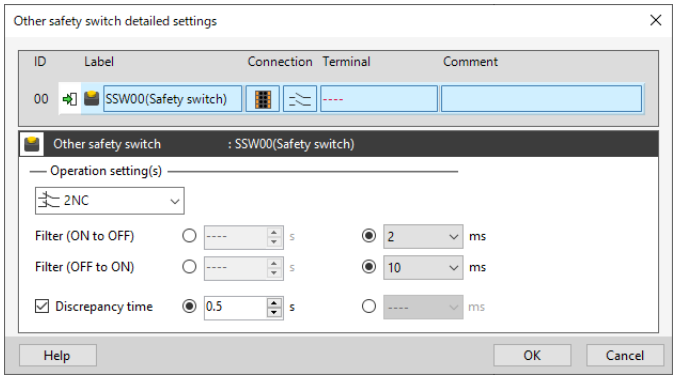
Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
Safety output x 1	--	--	●

GC Configurator detailed settings

■ Terminal block

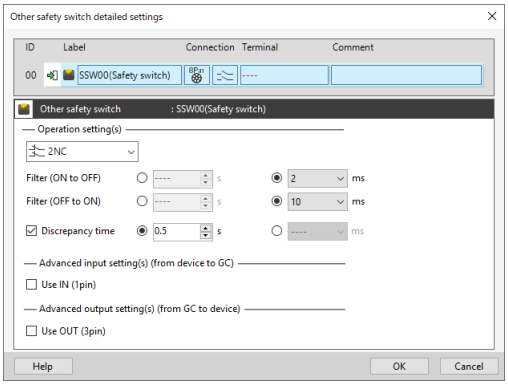
■ GC-R45 (M12 5-pin)

[Default settings]

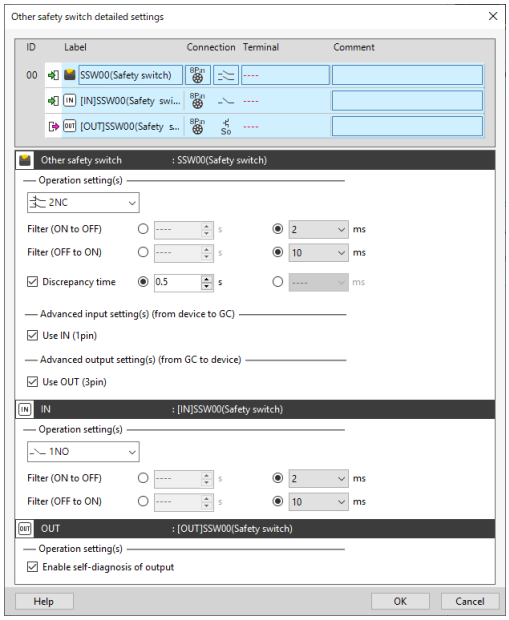


■ GC-R48 (M12 8-pin)

[Default settings]



[Advanced function setting(s)]



■ 2NC, 2NO

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NCNO, NONC

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

IN

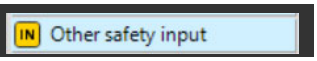
■ 1NO

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

OUT

Setting item	Setting range	Default
Enable self-diagnosis of output	Enables the output self-diagnosis function when selected.	Enable

Other safety input



Overview

This is used to connect a safety device designated as other type.

Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic			
	Terminal block	GC-R45	GC-R48	2NC	NCNO	2NO	NONC
PNP 2 inputs	●	●	●	●	●	●	●
2 inputs	●	●	●	●	●	●	●
2 inputs 1 test output	●	--	--	●	●	●	●
2 inputs 2 test outputs	●	●	●	●	●	●	●

■ Advanced input setting(s) (GC-R45/R48)

Connection type	Connection destination			Input logic
	Terminal block	GC-R45	GC-R48	1NO
1 input	--	--	●	●
PNP 1 input	--	●*	●	●

* An advanced input (IN) can be used only when [PNP 2 inputs] is selected.

■ Advanced output setting(s) (GC-R48)

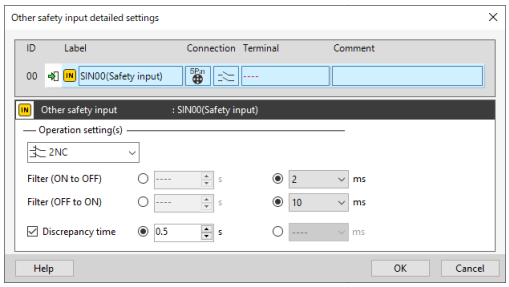
Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
Safety output x 1	--	--	●

GC Configurator detailed settings

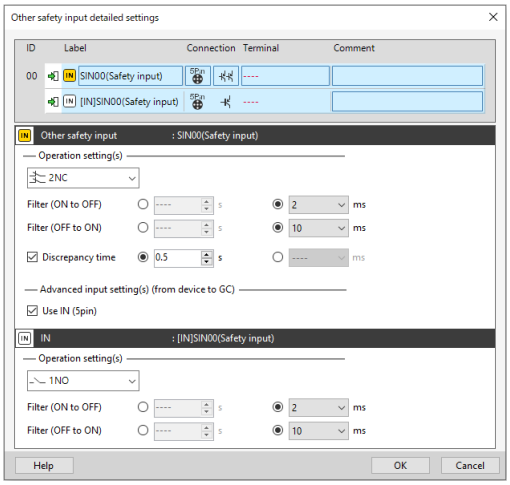
■ Terminal block

■ GC-R45 (M12 5-pin)

[Default settings]

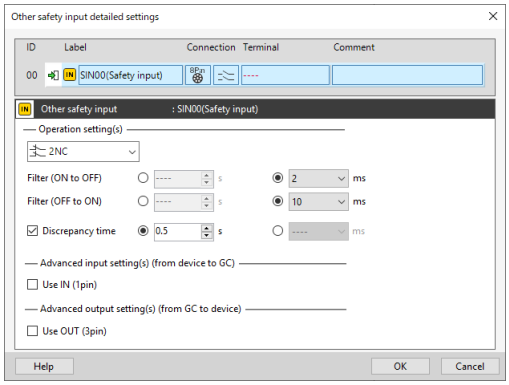


[Advanced function setting(s)] (GC-R45: When [PNP 2 inputs] is selected)

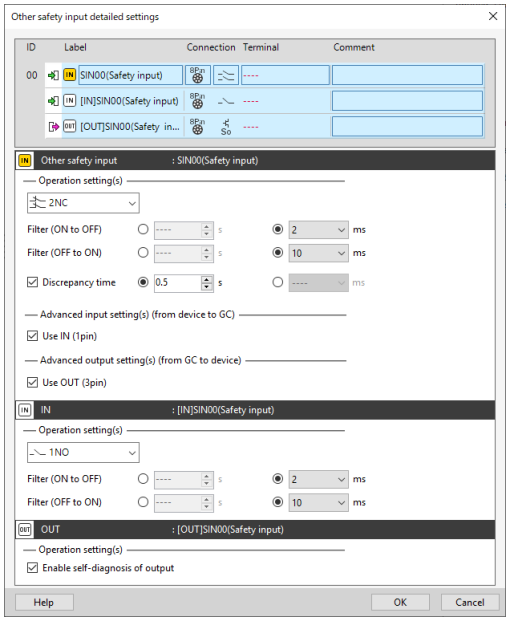


■ GC-R48 (M12 8-pin)

[Default settings]



[Advanced function setting(s)]



■ 2NC, 2NO

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

■ NCNO, NONC

Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Discrepancy time	Enable/Disable	Enable
	Enables the mismatch detection when selected. Set the detection time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s

IN

■ 1NO

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

OUT

Setting item	Setting range	Default
Enable self-diagnosis of output	Enables the output self-diagnosis function when selected.	Enable

Reset switch

Reset switch

Overview

This is used to connect a contact type reset switch.
"AUX output" can be selected in the advanced output setting(s) when the GC-R45 (M12 5-pin) is connected.

Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic
	Terminal block	GC-R45	GC-R48	1NO
1 input	●	●		●
1 input 1 test output	●	●		●

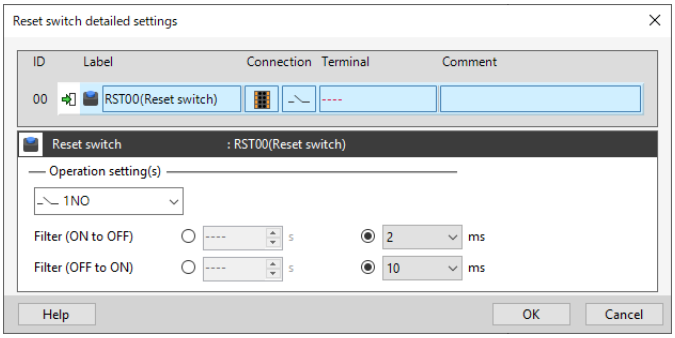
■ Advanced output setting(s) (GC-R45)

Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
AUX outputs	--	●	

GC Configurator detailed settings

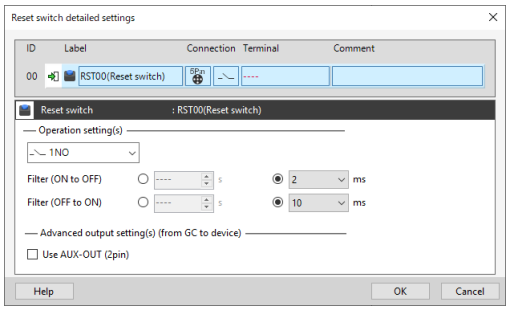
■ Terminal block

[Default settings]

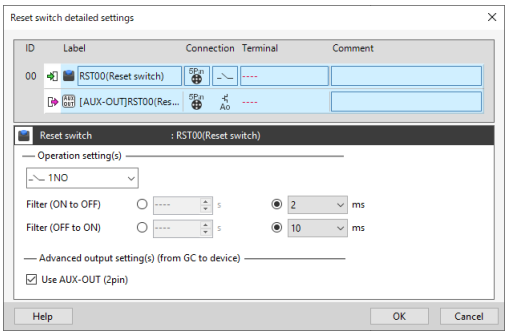


■ GC-R45 (M12 5-pin)

[Default settings]



[Advanced function setting(s)]



■ 1NO

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

AUX-OUT (2pin)

Setting item	Setting range	Default
Use AUX-OUT (2pin)	Enables the AUX-OUT output (2-pin) when selected.	Disable

Mode selecting switch

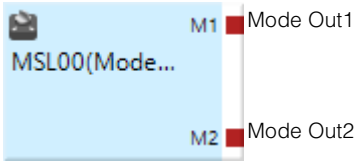
Mode selecting switch

Overview

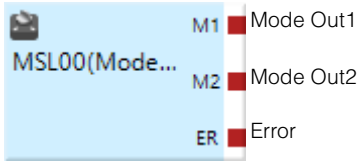
This is used to connect a mode selecting switch.

Operation

[Default settings]

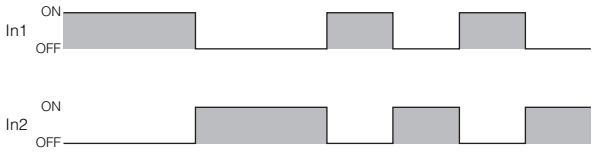


[Error output settings]

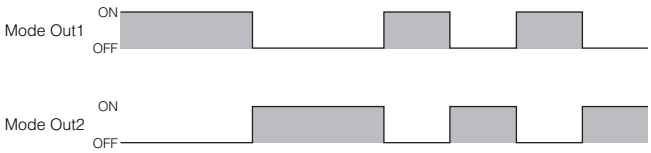


- When In1 is set to ON and In2 is set to OFF, Mode Out1 is set to ON and Mode Out2 is set to OFF.
- When In1 is set to OFF and In2 is set to ON, Mode Out1 is set to OFF and Mode Out2 is set to ON.

<Input>



<Output>



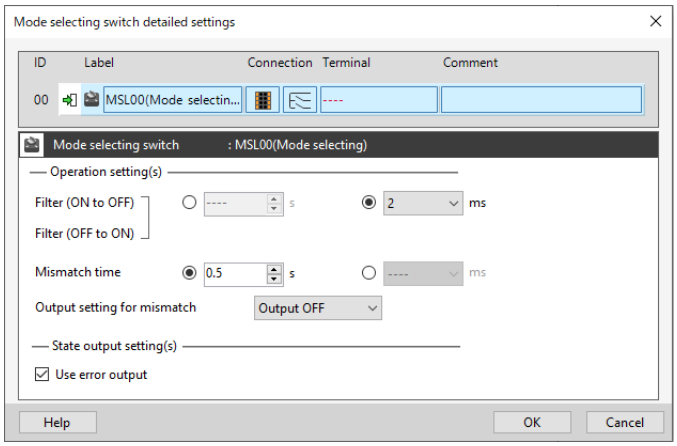
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
2 inputs	●	●	
2 inputs 1 test output	●	--	
2 inputs 2 test outputs	●	●	

GC Configurator detailed settings

[Default settings]



Setting item	Setting range	Default
Filter (ON to OFF)/ Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Mismatch time	Set the error detection time in seconds (s) or milliseconds (ms) when there is a mismatch between two inputs. • Unit s (seconds): 0.1 to 30.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	0.5s
Output setting for mismatch	Set the output when an input mismatch error occurs. Option: Output OFF/MODE_1/MODE2	Output OFF
Use error output	Enables the output to be turned ON when an input mismatch error occurs, when selected.* 1	Disable

*1 This cannot be used in EASY mode.

EDM input

EDM input

Overview

This is used to connect an EDM input.

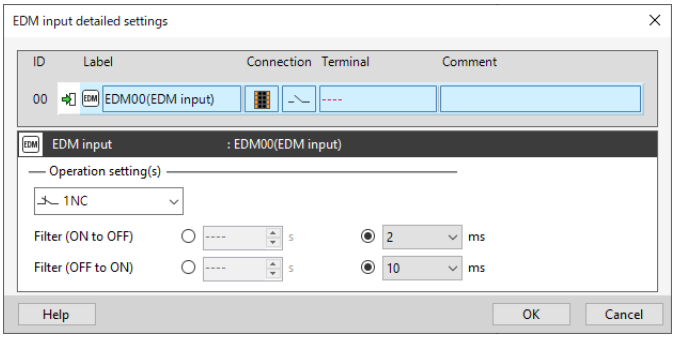
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic
	Terminal block	GC-R45	GC-R48	1NC
1 input	●	●		●
1 input 1 test output	●	●		●

GC Configurator detailed settings

[Default settings]



■ 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Muting input

Muting input

Overview

This is used to connect a muting sensor.

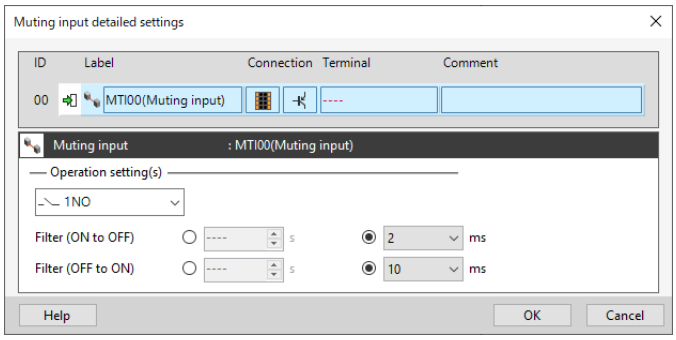
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic
	Terminal block	GC-R45	GC-R48	1NO
PNP 1 input	●	●		●
1 input	●	●		●
1 input 1 test output	●	●		●

GC Configurator detailed settings

[Default settings]



■ 1NO

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Safety plug

Safety plug

Overview

This is used to connect a safety plug.

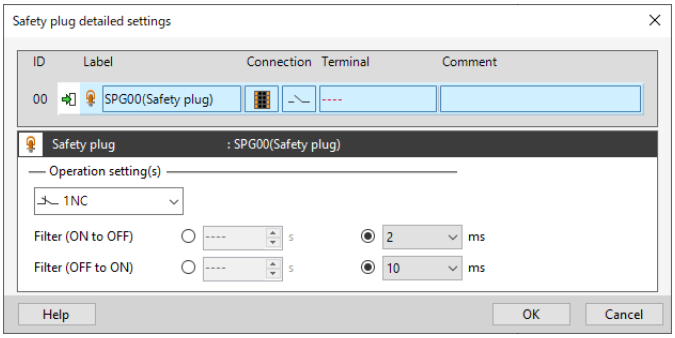
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic
	Terminal block	GC-R45	GC-R48	1NC
1 input	●	●		●
1 input 1 test output	●	●		●

GC Configurator detailed settings

[Default settings]



■ 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Hold-to-run switch

Hold-to-run switch

Overview

This is used to connect a hold-to-run switch.

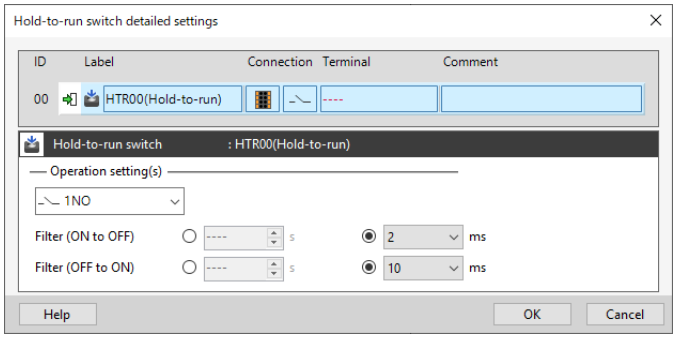
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic
	Terminal block	GC-R45	GC-R48	1NO
1 input	●	●		●
1 input 1 test output	●	●		●

GC Configurator detailed settings

[Default settings]



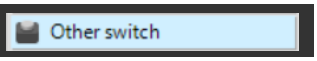
■ 1NO

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Point

A hold-to-run switch input block is not turned ON even if the GC Series is turned ON (powered ON) with the hold-to-run switch signal ON in order to prevent unexpected operation. The machine enters into the "Clear error upon input OFF" state, and requires that the input signal be turned OFF.

Other switch



Overview

This is used to connect a switch designated as other contact type.

Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic	
	Terminal block	GC-R45	GC-R48	1NC	1NO
1 input	●	●	●	●	●
1 input 1 test output	●	●	●	●	●

■ Advanced input setting(s) (GC-R48)

Connection type	Connection destination			Input logic
	Terminal block	GC-R45	GC-R48	1NO
1 input	--	--	●*	●

* IN1 (6-pin) or IN2 (1-pin) can be used.

■ Advanced output setting(s) (GC-R45)

Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
AUX outputs	--	●	--

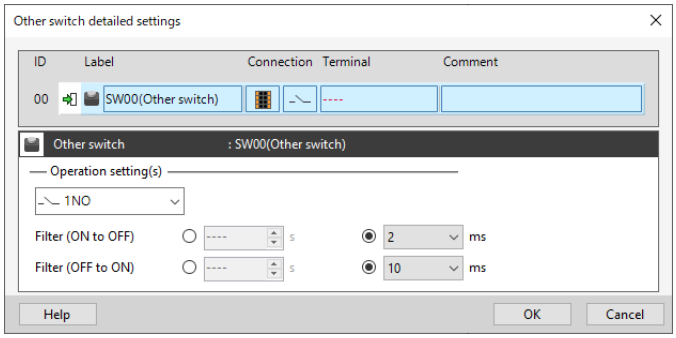
■ Advanced output setting(s) (GC-R48)

Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
Safety output x 1	--	--	●

GC Configurator detailed settings

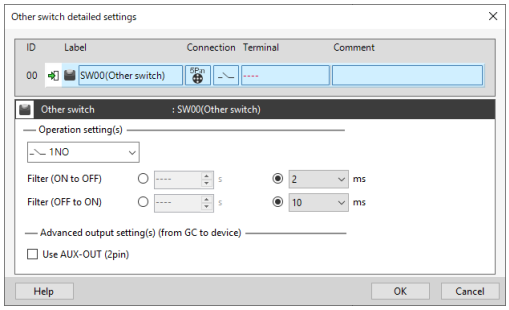
■ Terminal block

[Default settings]

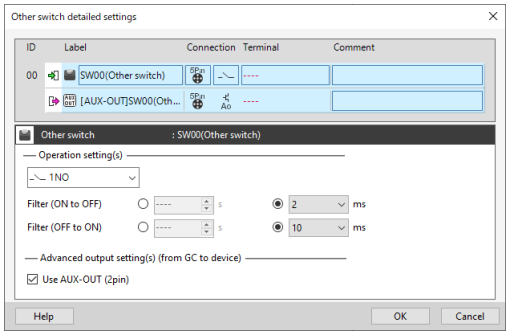


■ GC-R45 (M12 5-pin)

[Default settings]

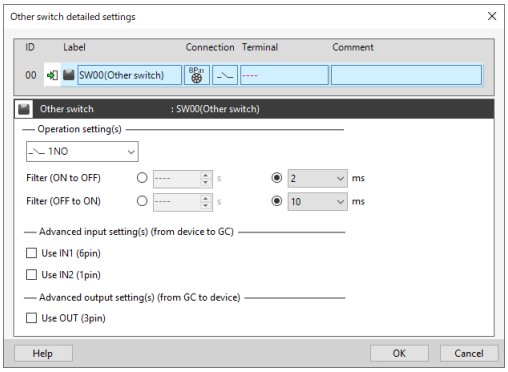


[Advanced function setting(s)]

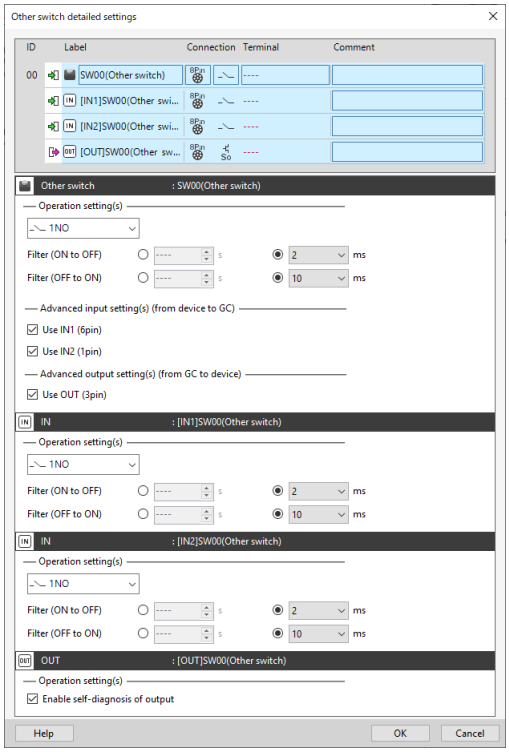


■ GC-R48 (M12 8-pin)

[Default settings]



[Advanced function setting(s)]



■ 1NO, 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

AUX outputs (GC-R45 2-pin)

Setting item	Setting range	Default
Use AUX-OUT (2pin)	Enables the AUX outputs (2-pin) when selected.	Disable

Safety output (GC-R48 3-pin)

Setting item	Setting range	Default
Enable self-diagnosis of output	Enables the output self-diagnosis function when selected.	Enabled

Other input

Other input

Overview

This is used to connect an external device designated as other type.

Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination			Input logic	
	Terminal block	GC-R45	GC-R48	1NC	1NO
PNP 1 input	●	●	●	●	●
1 input	●	●	●	●	●
1 input 1 test output	●	●	●	●	●

■ Advanced input setting(s)

Connection type	Connection destination			Input logic
	Terminal block	GC-R45	GC-R48	1NO
PNP 1 input	--	●*1	●*3	●
1 input	--	●*2	●*3	●

*1 IN1 (2-pin) or IN2 (5-pin) can be used when [PNP 1 input] is selected for the connection type.

*2 IN1 (2-pin) can be used when [1 input] or [1 input 1 test output] is selected for the connection type.

*3 IN1 (6-pin) or IN2 (1-pin) can be used.

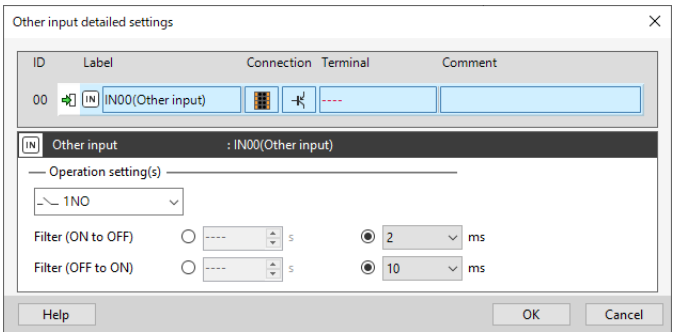
■ Advanced output setting(s) (GC-R48)

Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
Safety output x 1	--	--	●

GC Configurator detailed settings

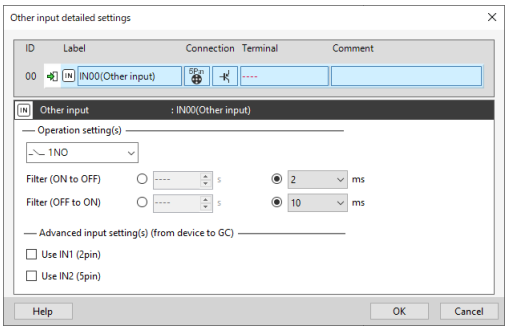
■ Terminal block

[Default settings]

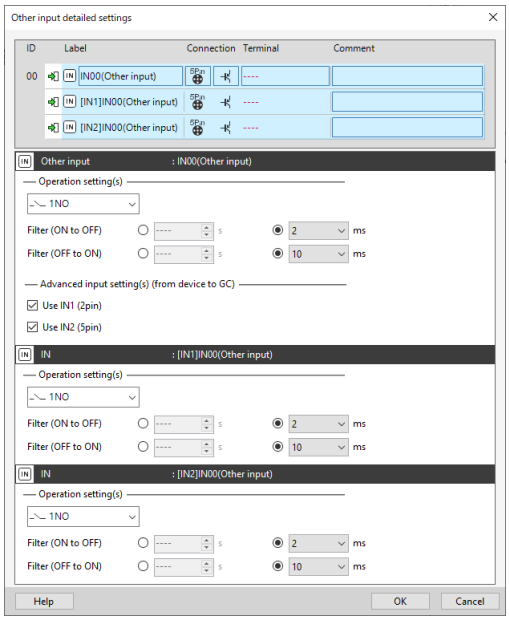


■ GC-R45 (M12 5-pin)

[Default settings]

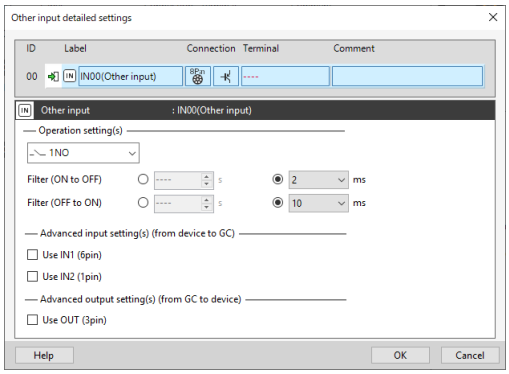


[Advanced function setting(s)]

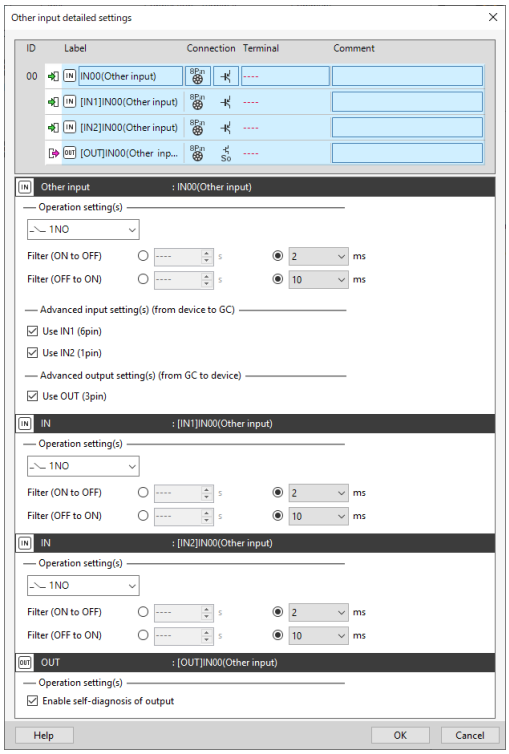


■ GC-R48 (M12 8-pin)

[Default settings]



[Advanced function setting(s)]



■ 1NO, 1NC

Setting item	Setting range	Default
Filter (ON to OFF)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	2ms
Filter (OFF to ON)	Set the filter time in seconds (s) or milliseconds (ms). • Unit s (seconds): 0.1 to 1.0 s in increments of 0.1 s • Unit ms (milliseconds): Option (0.5/1/2/4/6/8/10/12/14/16/18/20/30/40/50/60/70/80/90/100 ms)	10ms

Safety output (GC-R48 3-pin)

Setting item	Setting range	Default
Enable self-diagnosis of output	Enables the output self-diagnosis function when selected.	Disable

Power supply port

Power supply port

Overview

This is only used to supply power to an external device when the remote I/O module "GC-R45" or "GC-R48" is used.

Connection

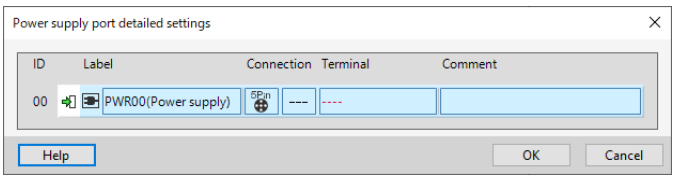
■ Compatible destinations and selectable input logics

Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
Unassigned*		●	●

* There is no connection type assignment.

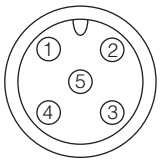
GC Configurator detailed settings

[Default settings]



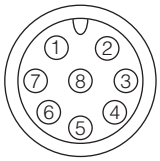
Terminal assignment

■ GC-R45



Pin number	Function
Pin 1	24V
Pin 2	--
Pin 3	0V
Pin 4	--
Pin 5	--

■ GC-R48



Pin number	Function
Pin 1	--
Pin 2	24V
Pin 3	--
Pin 4	--
Pin 5	--
Pin 6	--
Pin 7	0V
Pin 8	--

A-3 Output Device List

This section describes the output devices that can be connected to the GC Series.

Output device			Connection destination		
			Terminal block	GC-R45 (M12 5-pin)	GC-R48 (M12 8-pin)
Safety outputs	S-OUT	Safety output x 1	●*1	--	
		Safety output x 2	●*1	--	
	S-OUT EDM enabled	Safety output x 1	●*1	--	
		Safety output x 2	●*1	--	
	S-OUT (Relay output)	Relay output	●*2	--	
	S-OUT (Relay output) EDM enabled	Relay output	●*2	--	
Other outputs	AUX-OUT		●*3	●	

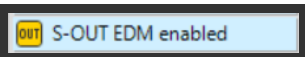
*1 A device can be assigned to the So terminal of the GC-1000, GC-1000R, and GC-S84.

*2 A device can be assigned to the SRo terminal of the GC-1000R and GC-S1R.

*3 A device can be assigned to the Ao terminal of the GC-1000, GC-1000R, and GC-A16.

S-OUT

S-OUT EDM enabled



Overview

This output block is used as the safety output to an external device.

Reference

The difference between the safety outputs "S-OUT" and "S-OUT EDM enabled" is whether [Use EDM input] in the detailed settings is disabled or enabled by default. Even when "S-OUT" is used, if the [Use EDM input] check box is selected in the detailed settings, the EDM input function is enabled.

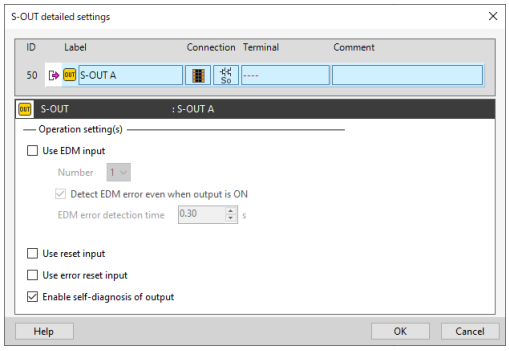
Connection

■ Compatible destinations and selectable input logics

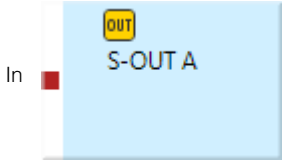
Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
Safety output x 1	●		
Safety output x 2	●		

GC Configurator detailed settings

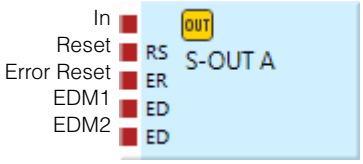
[Default settings]



[Default settings]



[Advanced function setting(s)]



Setting item	Setting range	Default
Use EDM input	Enables the EDM function when selected.	*1
Number	Set the number of inputs connected to the EDM. Option: 1/2	1
Detect EDM error even when output is ON	Detects an EDM error even when the S-OUT output is turned ON, when selected.	Enable
EDM error detection time	Set the EDM error detection time. Setting range: 0.15 to 3.00 s in increments of 0.05 s (seconds)	0.30 s

Setting item	Setting range	Default
Use reset input*2	Enables the reset input when selected.	Disable
Use error reset input	Enables the error reset input when selected.	Disable
Enable self-diagnosis of output	Enables the output self-diagnosis function when selected.	Enable

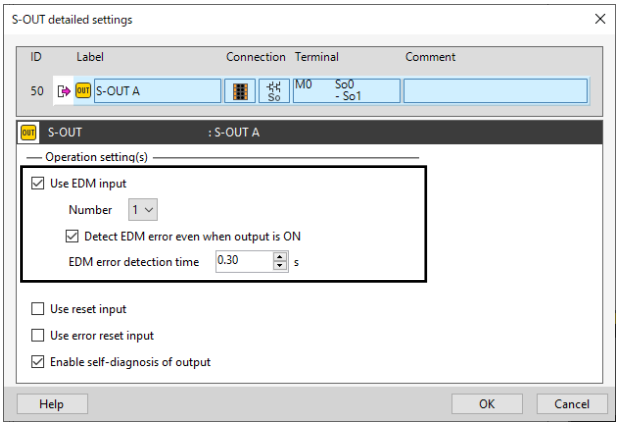
*1 Default "S-OUT": Disable, Default "S-OUT EDM enabled": Enable

*2 This cannot be used in EASY mode.

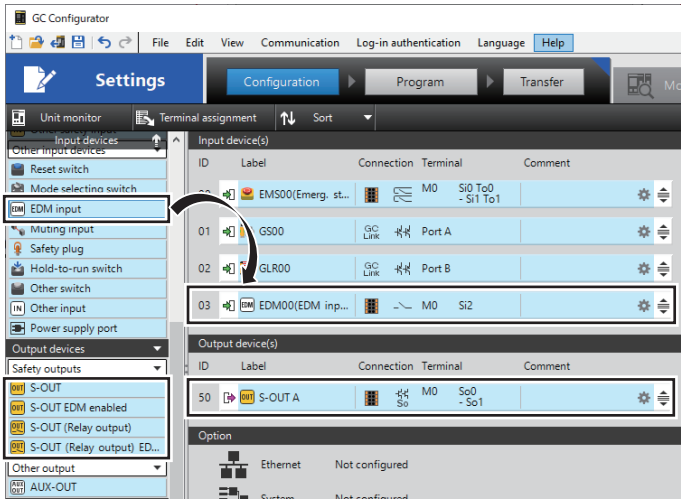
Procedure for using the EDM function

To use the EDM function, configure the settings as follows:

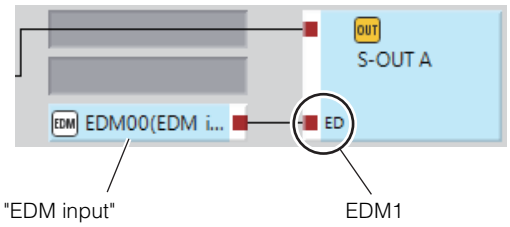
1 Set the EDM function in [S-OUT detailed settings].



2 On the configuration screen, register [EDM input] for terminal assignment.



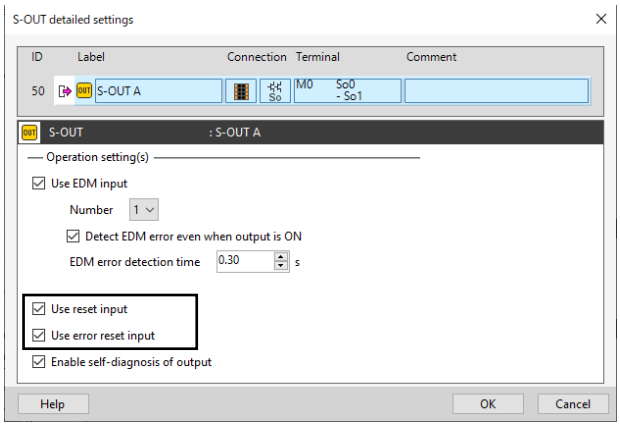
3 On the program screen, form a wiring connection between the "EDM input" input block and the "S-OUT" (EDM1) output block.



Procedure for using the reset input or error reset input

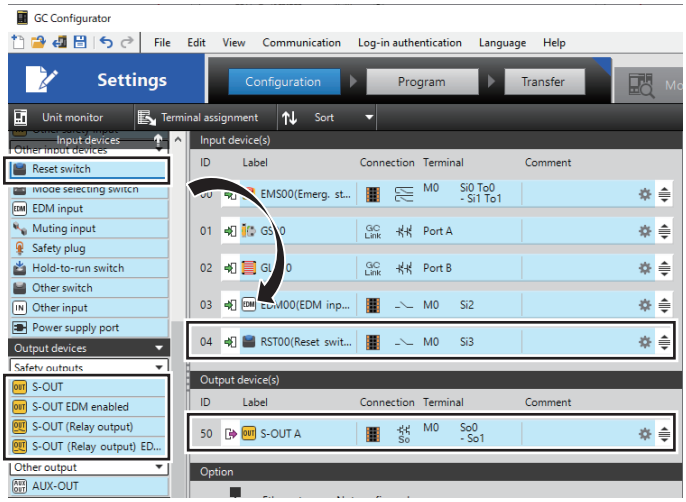
To use the reset input or error reset input, configure the settings as follows:

1 Select the [Use reset input] (Use error reset input) check box in [S-OUT detailed settings].

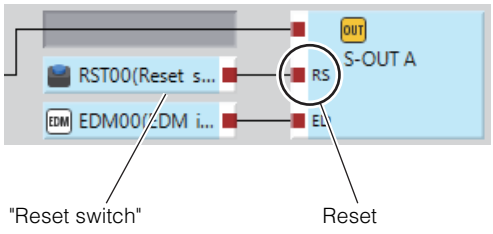


2 On the configuration screen, register [Reset switch]* for terminal assignment.

* Select an input device according to your environment.



3 On the program screen, form a wiring connection between the "Reset switch" input block and the "S-OUT" (Reset) output block.



S-OUT (Relay output)

S-OUT (Relay output)

S-OUT (Relay output) EDM enabled

S-OUT (Relay output) ED...

Overview

This output block is used as the safety relay output to an external device.

Reference

The difference between the safety outputs "S-OUT (Relay output)" and "S-OUT (Relay output) EDM enabled" is whether [Use EDM input] in the detailed settings is disabled or enabled by default. Even when "S-OUT (Relay output)" is used, if the [Use EDM input] check box is selected in the detailed settings, the EDM input function is enabled.

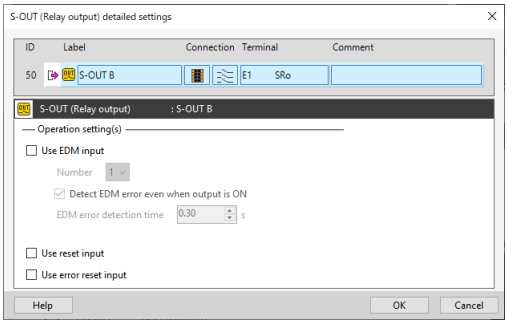
Connection

■ Compatible destinations and selectable input logics

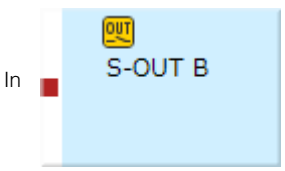
Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
Relay output	●		

GC Configurator detailed settings

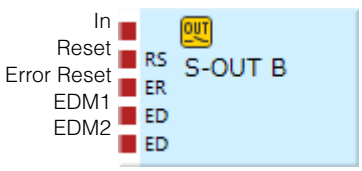
[Default settings]



[Default settings]



[Advanced function setting(s)]



Setting item	Setting range	Default
Use EDM input	Enables the EDM function when selected.	*1
Number	Set the number of inputs connected to the EDM. Option: 1/2	1
Detect EDM error even when output is ON	Detects an EDM error even when the S-OUT output is turned ON, when selected.	Enable
EDM error detection time	Set the EDM error detection time. Setting range: 0.15 to 3.00 s in increments of 0.05 s (seconds)	0.30 s
Use reset input *2	Enables the reset input when selected.	Disable

Setting item	Setting range	Default
Use error reset input	Enables the error reset input when selected.	Disable

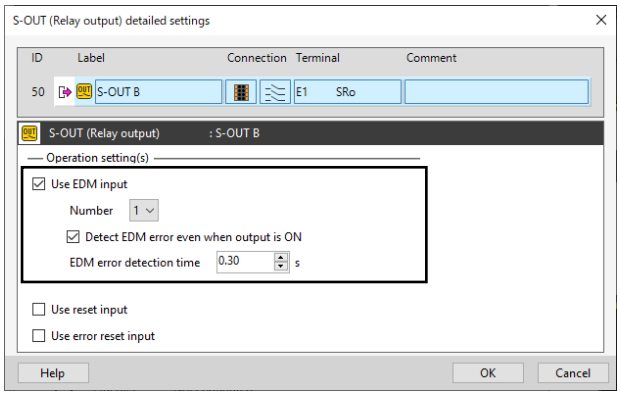
*1 Default "S-OUT (Relay output)": Disable, Default "S-OUT (Relay output) EDM enabled": Enable

*2 This cannot be used in EASY mode.

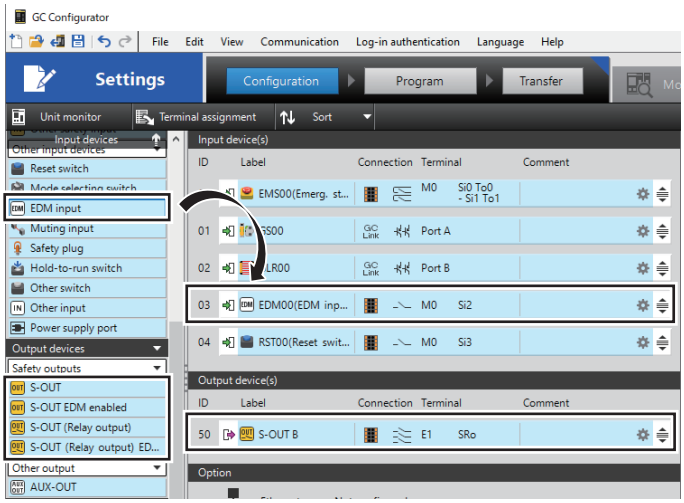
Procedure for using the EDM function

To use the EDM function, configure the settings as follows:

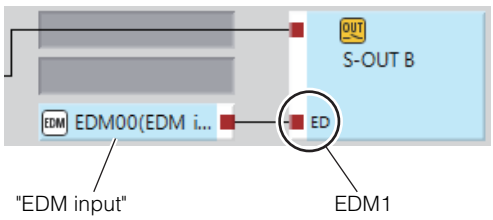
1 Set the EDM function in [S-OUT (Relay output) detailed settings].



2 On the configuration screen, register [EDM input] for terminal assignment.



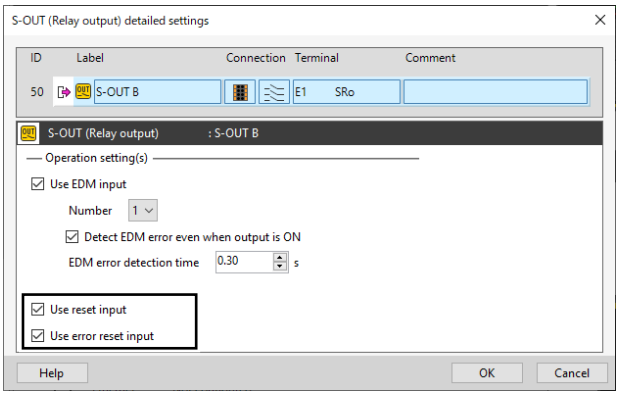
3 On the program screen, connect the ports between the "EDM input" input block and the "S-OUT" (EDM1) output block.



Procedure for using the reset input or error reset input

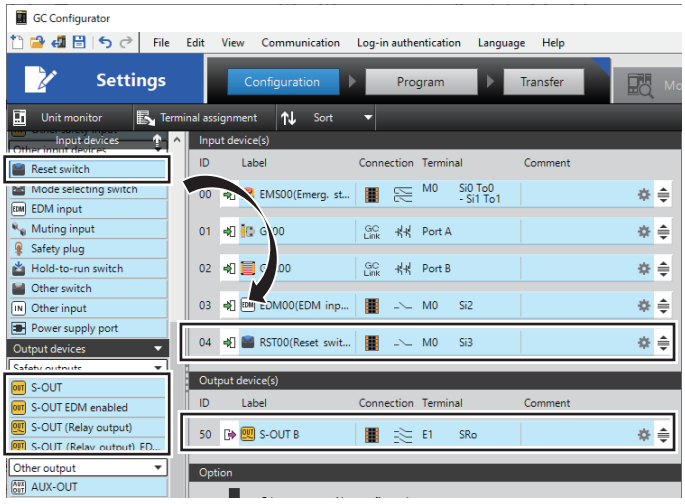
To use the reset input or error reset input, configure the settings as follows:

1 Select the [Use reset input] (Use error reset input) check box in [S-OUT (Relay output) detailed settings].

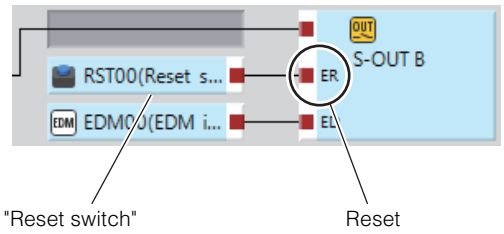


2 On the configuration screen, register [Reset switch]* for terminal assignment.

* Select an input device according to your environment.



3 On the program screen, connect the ports between the "Reset switch" input block and the "S-OUT" (Reset) output block.



AUX-OUT

AUX-OUT

Overview

This output block is used as the AUX output to an external device.

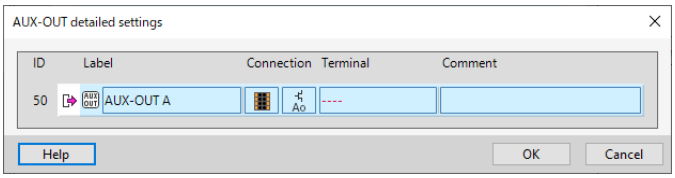
Connection

■ Compatible destinations and selectable input logics

Connection type	Connection destination		
	Terminal block	GC-R45	GC-R48
AUX outputs	●	●	

GC Configurator detailed settings

There are no configurable items on the [AUX-OUT detailed settings] screen.



[Default settings]

In AUX-OUT A

A-4 Open License

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A-6 Revision history

Print of printing	Version	Revision contents
January 2020	1st edition	
April 2020	Revised 1st edition	Supported network added, misdescription revised
September 2020	Revised 2nd edition	UL certification added, misdescription revised
September 2021	Revised 3rd edition	Misdescription revised
August 2022	2nd revision 1st edition	The GS-M series added, misdescription revised

Document Control No. 1404AAE202-02

A-7 Warranty

1. Products Under Warranty

The following warranty shall be applied to the products that KEYENCE manufacture and sell (covered products).
Note that the consumables that are built-in to the target products, such as relays and batteries, are not covered by the warranty.

2. Warranty Period

The warranty period for the covered products shall be one year after delivery.

3. Scope of the Warranty

(1) If a failure occurs in the above warranty period that we are liable for, replacements or repairs shall be free of charge. However, the warranty is not applicable in the following cases even during the warranty period. Note that the start of the warranty shall be the first delivery date of the product even if the product was replaced or repaired.

(1) Failures that were caused by improper conditions, environment, handling, and use that are not described in manuals and specifications provided separately.

(2) Failures that were caused not by the products but by customer devices or software settings.

(3) Failures that were caused by remodeling or repair performed by other parties.

(4) Failures that could have been prevented if consumables described in the manuals were correctly maintained and replaced.

(5) Failures that were impossible to foresee by our scientific and technical standards at the time of shipping.

(6) Failures that were caused by external factors for which we are not liable, such as fires, earthquakes, and floods.

(2) The warranty range shall only be applied to (1) above, and secondary damage and any other damage caused by customers that might damage products (damage to devices, opportunity cost, and lost profits), and any other damages are outside of the scope of the warranty.

4. Applications

Our products are designed and manufactured as general-purpose products for general industry.
Our products are not intended to be used for the following purposes.
However, if you contact us before use, review the specifications of products, understand the standards and performances, and take the necessary safety precautions at your own risk, our products may be used for those applications.
Note that the scope of warranty in this case shall be the same as above.

(1) Equipment that may have a great impact on people's lives or property, such as nuclear power plants, aviation, railroads, marine vessels, vehicles, and medical devices.

(2) Public utilities, such as electricity, gas, and water.

(3) Use in conditions and environments, such as outdoors, that are not described in the manual.

(4) Uses that require a high level of care and caution for the safety of (1) and (2) above.

MEMO

Specifications are subject to change without notice.

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