

# Regen Resistor Guide

Motors convert *electrical energy* into *mechanical energy* and vice-versa.

When a motor is moving its load in the same direction as gravity, or when decelerating its load, that motor may generate more electrical energy than is consumed by friction and resistance or is stored by capacitance.

If the motor is controlled by an electronic drive, the drive's internal voltage rises. When the drive's internal voltage rises above a certain level, a transistor turns on. Power is conducted through the drive's internal regeneration resistor, where it converts to heat. As the bus voltage drops, the transistor turns off.

If there's more energy than the built-in resistor can safely handle, then we install an external resistor. The exact resistance ( $\Omega$ , ohms) is less important than the resistor's power rating (W, watts). **The only sure way to spec a resistor is to do the engineering calculations.**

The purpose of removing the jumper (where noted) is to take the internal resistor out of the circuit so that the larger external resistor can be put into the circuit.

**Powerohm** resistors are available to us via Graybar Electric Supply. Powerohm makes resistors for many drive OEMs, including Schneider and Yaskawa. Nearly any configuration is available. Leadtime is typically 3 weeks, however. [www.powerohm.com](http://www.powerohm.com) [case resistor](#)

<M:\Sales\Calculators\Electrical Panel Calc 2.0.xlsm> - See the tab "BRAKE RESISTOR"

## TECO

TECO Drive	Min $\Omega$	Min W	Chassis Mount Resistor						
			$\Omega$	W	MFR	MFR PN	Vendor	Cost	LT
TSTA-20	41	60	47	125	TE	<a href="#">TJT25047RJ</a>	Digikey	46.60	Stk
			47	200	Powerohm	CR200-47	Graybar	58.75	3 wk
TSTA-30	23	60	33	250	TE	<a href="#">TJT50033RJ</a>	Digikey	57.63	Stk
			30	200	Powerohm	CR200-30	Graybar	58.75	3 wk
TSTA-50	15	200	20	200	Powerohm	CR200-20	Graybar	58.75	3 wk
			15	250	TE	<a href="#">TJT50015RJ</a>	Digikey	57.63	Stk
TSTA-75	9	200	10	300	Powerohm	CR300-10	Graybar	67.60	3 wk
			10	250	TE	<a href="#">TJT50010RJ</a>	Digikey	57.63	Stk
TSTA-100	10	200	10	400	Powerohm	CR400-10	Graybar	83.75	3 wk
			?	?	TE	<a href="#">TJT50010RJ</a>	Digikey	57.63	Stk

<b>Set this Parameter</b> to the External Resistor's Power Rating (Watts):	Cn012
<b>Remove Jumper</b> Between:	PC and P1
<b>Connect External Resistor</b> to:	P and PC
Instruction Manual: Teco TSTA manual (blue book), § 5-6-7, page 5-69	

YASKAWA

Drive SGD V-	Min Ω	Min W	Chassis Mount Resistor					
			Ω	W	MFR	MFR PN	Vendor	Cost
R70, R90, 1R6A, 2R8A	40	-	47	125	TE	<a href="#">TJT25047RJ</a>	Digikey	46.60
			47	100	Powerohm	CR100-47	Graybar	
3R8A, 5R5A, 7R6A	40	40	47	125	TE	<a href="#">TJT25047RJ</a>	Digikey	46.60
			47	200	Powerohm	CR200-47	Graybar	58.75
120A	20	50	22	75	TE	<a href="#">TJT15022RJ</a>	Digikey	43.28
			22	75	TE	<a href="#">TJT15022RJ</a>	Digikey	46.60
180A, 200A	12	80	15	150	TE	<a href="#">TJT30015RJ</a>	Digikey	52.54
330A	8	180	10	250	TE	<a href="#">TJT500RJ1</a>	Digikey	57.63
1R9D, 3R5D, 5R4D	73	70	75	150	Powerohm	CR150-75	Graybar	
			75	150	TE	<a href="#">TJT150150RJ Qty2</a>	Digikey	<b>86.56</b>
8R4D, 120D	44	140	47	125	TE	<a href="#">TJT25047RJ</a>	Digikey	46.60
170D	28	180	33	250	TE	<a href="#">TJT50033RJ</a>	Digikey	57.63

**NOTE: Qty 2** – Use 2 Resistors in Parallel

<b>Set this Parameter</b> to the External Resistor's Power Rating:	Pn600 (After Connecting-Some)
<b>Remove Jumper</b> Between:	B2 and B3
<b>Connect External Resistor</b> to:	B1 and B2
Instruction Manual: SIEP S800000 60E (Σ-V User Manual), § 3.7, page 3-32	
Source of Table Below: KAEPS 8000042L (Σ-V Catalog), page 409	

Applicable SERVOPACK SGD V-		Specifications of Built-in Resistor		Regenerative Power Processed by Built-in Resistor*1 W	Minimum Allowable Resistance Ω
		Resistance Ω	Capacity W		
Single-phase 100 V	□□□F	-	-	-	40
	R70A, R90A, 1R6A, 2R8A	-	-	-	40
Single-phase 200 V	5R5A	50	40	8	40
	120A	20	50	10	20
	R70A, R90A, 1R6A, 2R8A	-	-	-	40
Three-phase 200 V	3R8A, 5R5A, 7R6A	50	40	8	40
	120A	20	50	10	20
	180A, 200A	12	80	16	12
	330A	8	180	36	8
	470A	(6.25) *2	(880) *2	(180) *2	5.8
	550A, 590A, 780A	(3.13) *3	(1760) *3	(350) *3	2.9
	1R9D, 3R5D, 5R4D	108	70	14	73
Three-phase 400 V	8R4D, 120D	45	140	28	44
	170D	32	180	36	28
	210D, 260D	(18) *4	(880) *4	(180) *4	18
	280D, 370D	(14.25) *5	(1760) *5	(350) *5	14.25

\*1: The average regenerative power that can be handled is 20% of the rated capacity of the regenerative resistor built into the SERVOPACK.  
 \*2: For the optional JUSP-RA04-E regenerative resistor unit.  
 \*3: For the optional JUSP-RA05-E regenerative resistor unit.  
 \*4: For the optional JUSP-RA18-E regenerative resistor unit.  
 \*5: For the optional JUSP-RA19-E regenerative resistor unit.

**mitsubishi J4 Servos**

For Mitsubishi servos, the regenerative braking resistor is specified as an option from the manufacturer, so there is not a selection table here.

200V	<b>Mitsubishi MR-J4-500B and lower</b> 200 V class, 5 kW or less		
	<b>Set This Parameter</b> (See manual, § 5, "Parameters")		PA02
	<b>Remove Jumper</b> Between:		P+ and D
	<b>Connect External Resistor</b> to		P+ and C

200V	<b>Mitsubishi MR-J4-700</b> 200 V class, 7 kW		
	<b>Set This Parameter</b> (See manual, § 5, "Parameters")		PA02
	<b>Remove Jumper</b> Between:		<i>(Not applicable)</i>
	<b>Disconnect Wires</b> to Built-in Resistor:		P+ and C
<b>Connect External Resistor</b> to		P+ and C	

200 V and 400V	<b>Mitsubishi MR-J4-11K, -15K, -22K</b> 200 V and 400 V		
	<b>Set This Parameter</b> (See manual, § 5, "Parameters")		PA02
	<b>Remove Jumper</b> Between:		<i>(Not applicable)</i>
<b>Connect External Resistor</b> to		P+ and C	

400V	<b>Mitsubishi MR-J4-350B and lower</b> 400 V class, 3.5 kW or less		
	<b>Set This Parameter</b> (See manual, § 5, "Parameters")		PA02
	<b>Remove Jumper</b> Between:		P+ and D
	<b>Connect External Resistor</b> to		P+ and C

400V	<b>Mitsubishi MR-J4-500B or -700B</b> 400 V class, 5 kW or 7 kW		
	<b>Set This Parameter</b> (See manual, § 5, "Parameters")		PA02
	<b>Remove Jumper</b> Between:		<i>(Not applicable)</i>
	<b>Disconnect Wires</b> to Built-in Resistor:		P+ and C
<b>Connect External Resistor</b> to		P+ and C	

**MITSUBISHI FR-D700-Series Inverter**

For Mitsubishi inverter drives (VFDs), the regenerative braking resistor is specified as an option from the manufacturer, so there is not a selection table here.

200 V and 400V	<b>Mitsubishi FR-D700 series</b> 200 V and 400 V, using FR-ABR or MYS or MRS type resistor option		
	<b>Set Parameter 30</b> ("Regenerative Function Selection") to:		1
	<b>Set Parameter 70</b> ("Regen Brake Duty") to:	-7.5K and lower models	10%
		-11K and higher models	6%
	<b>Remove Jumper</b> Between:		<i>(Not applicable)</i>
<b>Connect External Resistor</b> to		P/+ and PR	

NOTES:

1. Do not connect a resistor directly to the DC terminals P/+ and N/-. Doing so could cause a fire.
2. Resistor cannot be connected to -0.1K and -0.2K models.
3. Jumper across P1 and P/+ is for DC reactor, so do not remove when wiring a brake resistor.

DELTA ASDA-A and -B Series

Drive kW	Min $\Omega$	Min W	Chassis Mount Resistor					
			$\Omega$	W	MFR	MFR PN	Vendor	Cost
0.1, 0.2	60	-	68	250	TE	<a href="#">TJT25068RJ</a>	Digikey	46.60
0.4, 0.75	60	60	68	250	TE	<a href="#">TJT25068RJ</a>	Digikey	46.60
1, 1.5	30	60	50	700	Ohmite	BA232050R0KE	Mouser	78.79
2, 3	15	100	22	1000	Ohmite	BA326622R0KE	Mouser	116.87

<b>Set this Parameter</b> to the External Resistor's Resistance (Ohms)	P1-52
<b>Set this Parameter</b> to the External Resistor's Power Rating (Watts)	P1-53
<b>Remove Jumper</b> Between:	P and D
<b>Connect External Resistor</b> to:	P and C

NOTES:

1. The drive will process regenerative power at 50% of the resistor's rating, whether a built-in or external resistor is used.