

Braking Resistors for Variable Frequency Drives

APPLICATION

AC variable frequency drives are commonly used with a general purpose AC induction motor to form a reliable variable speed drive system. For applications that require faster deceleration rates, or where motor speeds are exceeding the synchronous speed set by the output frequency of the drive (an overhauling load condition), a braking resistor is required. Braking resistors increase the braking torque capability of a variable frequency drive, producing faster and more controlled braking. The resistor dissipates regenerated power to keep the bus voltage from exceeding the rated limit of the drive.

SELECTING A STANDARD DESIGN

Powerohm offers a standard selection of braking resistors for 230V, 460V and 575V drives. These braking resistors are designed to produce either 100% or 150% braking torque and are available in five standard duty cycles. The following information is required to select a standard design:

Data Requirements:

- Drive Horsepower
- Drive Input Voltage
- Braking Torque
- Duty Cycle
- Minimum ohm rating specified for your drive or braking module, or maximum allowable braking current.

Braking Torque: The resistance determines the braking torque and thus the deceleration rate of the motor. It is important that the resistance value must be within the allowable limits of the drive or braking module (too low of a value may cause harm to the drive or chopper). Also, when the braking module activates, the resistance value will produce a specific braking current. The peak braking currents of each standard design are listed with each resistor design and must not exceed the rated limits of your drive or braking module.

Duty Cycle: The duty cycle determines the power rating of the braking resistor. Duty cycle is calculated by dividing the braking stop time by the total cycle time as follows:

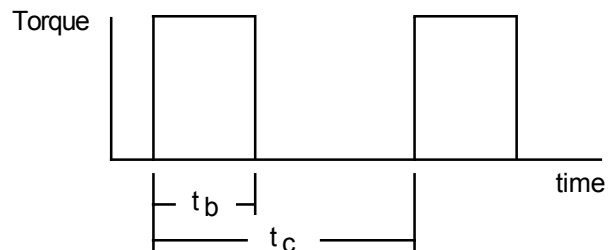
$$\text{Duty Cycle} = t_b / t_c \times 100\%$$

Also, it is important to determine whether your application is an overhauling load cycle or a deceleration braking cycle (refer to the graphs for proper identification).

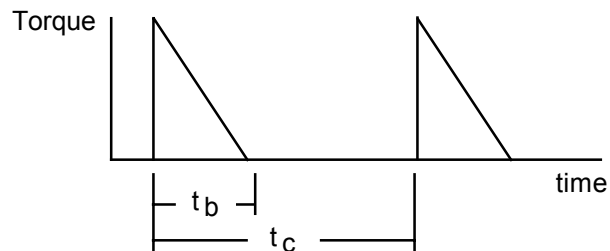
Typical Dynamic Braking Resistor Assembly



Overhauling Load Cycle: Requires the braking resistor to keep the motor from increasing speed beyond the synchronous speed set by the drive. During an overhauling load cycle, the required braking torque remains constant, therefore, approximately twice the power of an deceleration braking cycle is required of the braking resistor.



Deceleration Braking Cycle: Requires the braking resistor to stop or reduce the speed of the motor. During deceleration braking, the required braking torque reduces with speed, therefore, approximately one-half the power of an overhauling load cycle is required of the braking resistor.



CUSTOM RATINGS

Powerohm offers a complete selection of standard size braking resistors to meet a wide variety of applications. We can, however, customize a braking resistor to meet your specific application requirements. Please call us with your specification.

Braking Resistors for 230 Volt Drives - 100% Braking Torque

SPECIFY PART NUMBERS AS FOLLOWS: R2 -

"01" for 10% Duty Cycle
 "02" for 20% Duty Cycle
 "03" for 30% Duty Cycle
 "05" for 50% Duty Cycle
 "10" for 100% Duty Cycle

Drive HP
 "A" For 100%
 Braking Torque
 "B" For 150%
 Braking Torque

"L" for an Outdoor Louvered Enclosure

"T1" for a N.C. Thermal Switch
 "T2" for a N.O. Thermal Switch
 "T3" for a Therm-Trip® Circuit Board

For example, the part number of a braking resistor rated for a 1/2 HP, 230V drive requiring 100% braking torque with a 100% duty cycle and an optional thermal switch with normally open contacts is R2-.5A10T2.

CONSTRUCTION: Standard units include resistors installed in a screened enclosure with a galvanized finish. All enclosures are assembled with stainless steel hardware. Units are furnished with resistors wired to a terminal block with high temperature silicone or teflon wire. Refer to the Enclosure Section of the catalog for enclosure details and finish options.

BRAKING RESISTORS FOR 230V DRIVES REQUIRING 100% BRAKING TORQUE

PART NO. PREFIX	H.P.	OHMS	BRAKING AMPS	ENCLOSURE REQUIRED FOR SPECIFIED DUTY CYCLE				
				10% DUTY	20% DUTY	30% DUTY	50% DUTY	100% DUTY
R2-.5A R2-.75A	.50 .75	375.0 250.0	1.1 1.6	GCE1 GCE1	GCE1 GCE1	GCE1 GCE1	GCE1 GCE2	GCE2 GCE2
R2-1A R2-1.5A	1 1.5	190.0 125.0	2.1 3.2	GCE1 GCE1	GCE1 GCE1	GCE2 GCE2	GCE2 GCE3	GCE3 GCE4
R2-2A R2-3A	2 3	95.0 63.0	4.2 6.3	GCE1 GCE1	GCE2 GCE2	GCE2 GCE3	GCE3 GCE4	GCE4 GCE6
R2-5A R2-7.5A	5 7.5	38.0 26.0	11.0 15.0	GCE1 GCE2	GCE3 GCE4	GCE4 GCE6	GCE8 GCE12	GCE10 GCE12
R2-10A R2-15A	10 15	19.0 12.6	21.0 32.0	GCE2 GCE3	GCE5 GCE6	GCE9 GCE9	GCE12 GCE15	GCE15 GCE24
R2-20A R2-25A	20 25	9.6 7.5	42.0 53.0	GCE4 GCE5	GCE6 GCE8	GCE12 GCE15	GCE24 GCE24	GCE30 GCE30
R2-30A R2-40A	30 40	6.3 4.9	63.0 82.0	GCE6 GCE6	GCE12 GCE15	GCE18 GCE24	GCE30 GCE30	EE2 EE3
R2-50A R2-60A	50 60	3.9 3.3	100.0 120.0	GCE8 GCE8	GCE18 GCE18	GCE24 EE2	EE3 EE3	EE3 EE4
R2-75A R2-100A	75 100	2.7 1.9	150.0 210.0	GCE8 GCE10	GCE24 GCE24	EE2 EE3	EE4 EE5	EE6 EE6
R2-125A R2-150A	125 150	1.6 1.3	250.0 310.0	GCE18 GCE18	EE3 EE4	EE4 EE4	EE5 EE7	EE8 EE8
R2-200A R2-250A	200 250	1.0 0.8	400.0 500.0	GCE24 GCE30	EE4 EE4	EE6 EE8	EE9 EE9	(2)EE6 (2)EE8

Braking Resistors for 230 Volt Drives - 150% Braking Torque

RATINGS: Powerohm braking resistors are available in either 100% or 150% braking torque and (5) duty cycles based on a cycle time of one minute. Powerohm braking resistors are designed for a 375°C temperature rise when operating at the maximum rated duty cycle. The resistance values are measured at 25°C and have a + 10% tolerance.

CAUTION: It is very important to insure that the resistance listed in the chart below is greater than the minimum specified for your drive or braking module. Installing a braking resistor with too low of a resistance value will cause permanent damage to your drive or braking module. Please call the factory if you need assistance.

MAXIMUM BRAKING TIMES OF DUTY CYCLES		
Duty Cycle	Maximum Braking Time	
	Overhauling Load	Deceleration Braking
10%	6 sec.	12 sec.
20%	12 sec.	24 sec.
30%	18 sec.	36 sec.
50%	30 sec.	Continuous
100%	Continuous	Continuous

BRAKING RESISTORS FOR 230V DRIVES REQUIRING 150% BRAKING TORQUE								
PART NO. PREFIX	H.P.	OHMS	BRAKING AMPS	ENCLOSURE REQUIRED FOR SPECIFIED DUTY CYCLE				
				10% DUTY	20% DUTY	30% DUTY	50% DUTY	100% DUTY
R2-.5B R2-.75B	.50 .75	250.0 170.0	1.6 2.4	GCE1 GCE1	GCE1 GCE1	GCE1 GCE2	GCE2 GCE2	GCE2 GCE3
R2-1B R2-1.5B	1 1.5	125.0 85.0	3.2 4.7	GCE1 GCE1	GCE1 GCE2	GCE2 GCE3	GCE3 GCE4	GCE4 GCE5
R2-2B R2-3B	2 3	63.0 42.0	6.3 9.5	GCE1 GCE1	GCE2 GCE3	GCE3 GCE4	GCE4 GCE8	GCE6 GCE9
R2-5B R2-7.5B	5 7.5	25.0 16.8	16.0 24.0	GCE2 GCE2	GCE4 GCE6	GCE6 GCE9	GCE12 GCE12	GCE12 GCE15
R2-10B R2-15B	10 15	12.6 8.4	32.0 48.0	GCE3 GCE5	GCE6 GCE8	GCE9 GCE15	GCE15 GCE24	GCE24 GCE30
R2-20B R2-25B	20 25	6.3 5.0	63.0 80.0	GCE6 GCE6	GCE12 GCE15	GCE18 GCE24	GCE30 EE2	EE2 EE3
R2-30B R2-40B	30 40	4.2 3.2	95.0 125.0	GCE8 GCE8	GCE15 GCE18	GCE24 EE2	EE3 EE3	EE3 EE4
R2-50B R2-60B	50 60	2.5 2.1	160.0 190.0	GCE8 GCE10	GCE30 GCE30	EE2 EE3	EE3 EE5	EE7 EE7
R2-75B R2-100B	75 100	1.7 1.3	235.0 310.0	GCE12 GCE18	EE3 EE3	EE4 EE4	EE5 EE7	EE9 EE9
R2-125B R2-150B	125 150	1.0 0.85	400.0 470.0	GCE24 GCE24	EE3 EE4	EE5 EE6	EE7 (2)EE5	(2)EE6 (2)EE8
R2-200B R2-250B	200 250	0.65 0.50	610.0 800.0	EE2 EE3	EE4 EE5	EE8 (2)EE5	(2)EE7 (2)EE7	(2)EE8 (3)EE8

Braking Resistors for 460 Volt Drives - 100% Braking Torque

SPECIFY PART NUMBERS AS FOLLOWS: R4 -

"01" for 10% Duty Cycle
 "02" for 20% Duty Cycle
 "03" for 30% Duty Cycle
 "05" for 50% Duty Cycle
 "10" for 100% Duty Cycle

DriveHP —
 "A" For 100%
 Braking Torque
 "B" For 150%
 Braking Torque

"L" for an Outdoor Louvered Enclosure

"T1" for a N.C. Thermal Switch

"T2" for a N.O. Thermal Switch

"T3" for a Therm-Trip® Circuit Board

For example, the part number of a braking resistor rated for a 100 HP, 460V drive requiring 150% braking torque with a 50% duty cycle and an optional thermal switch with normally closed contacts is R4-100B05-T1.

CONSTRUCTION: Standard units include resistors installed in a screened enclosure with a galvanized finish. All enclosures are assembled with stainless steel hardware. Units are furnished with resistors wired to a terminal block with high temperature silicone or teflon wire. Refer to the Enclosure Section of the catalog for enclosure details and finish options.

BRAKING RESISTORS FOR 460V DRIVES REQUIRING 100% BRAKING TORQUE

PART NO. PREFIX	H.P.	OHMS	BRAKING AMPS	ENCLOSURE REQUIRED FOR SPECIFIED DUTY CYCLE				
				10% DUTY	20% DUTY	30% DUTY	50% DUTY	100% DUTY
R4-.5A R4-.75A	.50 .75	1500.0 1000.0	0.5 0.8	GCE1 GCE1	GCE1 GCE1	GCE1 GCE1	GCE1 GCE1	GCE1 GCE2
R4-1A R4-1.5A	1 1.5	750.0 500.0	1.1 1.6	GCE1 GCE1	GCE1 GCE1	GCE1 GCE2	GCE2 GCE3	GCE3 GCE4
R4-2A R4-3A	2 3	375.0 250.0	2.1 3.2	GCE1 GCE1	GCE2 GCE2	GCE3 GCE4	GCE4 GCE5	GCE6 GCE8
R4-5A R4-7.5A	5 7.5	150.0 100.0	5.3 8.0	GCE2 GCE2	GCE3 GCE4	GCE5 GCE6	GCE8 GCE10	GCE10 GCE15
R4-10A R4-15A	10 15	75.0 50.0	11.0 16.0	GCE2 GCE3	GCE5 GCE8	GCE8 GCE12	GCE15 GCE24	GCE18 GCE24
R4-20A R4-25A	20 25	38.0 30.0	21.0 27.0	GCE4 GCE5	GCE10 GCE12	GCE18 GCE18	GCE24 GCE30	GCE30 EE2
R4-30A R4-40A	30 40	25.0 19.0	32.0 42.0	GCE6 GCE8	GCE12 GCE15	GCE18 GCE24	GCE30 EE3	EE3 EE3
R4-50A R4-60A	50 60	15.0 12.6	53.0 63.0	GCE8 GCE8	GCE18 GCE24	GCE30 EE2	EE3 EE3	EE4 EE4
R4-75A R4-100A	75 100	10.0 7.5	80.0 110.0	GCE9 GCE15	GCE30 GCE30	EE3 EE3	EE4 EE4	EE6 EE6
R4-125A R4-150A	125 150	6.0 5.0	130.0 160.0	GCE18 GCE18	EE3 EE3	EE4 EE4	EE4 EE6	EE8 EE8
R4-200A R4-250A	200 250	3.8 3.0	210.0 270.0	GCE24 GCE30	EE3 EE4	EE6 EE8	EE9 EE9	(2)EE6 (2)EE8
R4-300A R4-350A	300 350	2.5 2.2	320.0 360.0	GCE30 GCE30	EE4 EE6	EE8 EE8	(2)EE7 (2)EE7	(2)EE8 (3)EE8
R4-400A R4-500A	400 500	1.9 1.5	420.0 530.0	EE3 EE4	EE6 EE8	EE9 EE9	(3)EE7 (3)EE7	(3)EE8 (4)EE8

Braking Resistors for 460 Volt Drives - 150% Braking Torque

RATINGS: Powerohm braking resistors are available in either 100% or 150% braking torque and (5) duty cycles based on a cycle time of one minute. Powerohm braking resistors are designed for a 375°C temperature rise when operating at the maximum rated duty cycle. The resistance values are measured at 25°C and have a + 10% tolerance.

CAUTION: It is very important to insure that the resistance listed in the chart below is greater than the minimum specified for your drive or braking module. Installing a braking resistor with too low of a resistance value will cause permanent damage to your drive or braking module. Please call the factory if you need assistance.

MAXIMUM BRAKING TIMES OF DUTY CYCLES		
Duty Cycle	Maximum Braking Time	
	Overhauling Load	Deceleration Braking
10%	6 sec.	12 sec.
20%	12 sec.	24 sec.
30%	18 sec.	36 sec.
50%	30 sec.	Continuous
100%	Continuous	Continuous

BRAKING RESISTORS FOR 460V DRIVES REQUIRING 150% BRAKING TORQUE								
PART NO. PREFIX	H.P.	OHMS	BRAKING AMPS	ENCLOSURE REQUIRED FOR SPECIFIED DUTY CYCLE				
				10% DUTY	20% DUTY	30% DUTY	50% DUTY	100% DUTY
R4-.5B R4-.75B	.50 .75	1000.0 675.0	0.8 1.2	GCE1 GCE1	GCE1 GCE1	GCE1 GCE1	GCE1 GCE2	GCE2 GCE3
R4-1B R4-1.5B	1 1.5	500.0 335.0	1.6 2.4	GCE1 GCE1	GCE1 GCE2	GCE2 GCE3	GCE2 GCE4	GCE4 GCE6
R4-2B R4-3B	2 3	250.0 170.0	3.2 4.7	GCE1 GCE1	GCE2 GCE3	GCE4 GCE5	GCE5 GCE8	GCE8 GCE9
R4-5B R4-7.5B	5 7.5	100.0 67.0	8.0 12.0	GCE2 GCE3	GCE4 GCE6	GCE8 GCE10	GCE10 GCE15	GCE15 GCE24
R4-10B R4-15B	10 15	50.0 34.0	16.0 24.0	GCE3 GCE4	GCE8 GCE12	GCE12 GCE18	GCE24 GCE24	GCE24 GCE30
R4-20B R4-25B	20 25	25.0 20.0	32.0 40.0	GCE6 GCE8	GCE12 GCE15	GCE18 GCE24	GCE30 EE2	EE3 EE3
R4-30B R4-40B	30 40	17.0 12.6	47.0 63.0	GCE9 GCE9	GCE15 GCE24	GCE30 EE2	EE3 EE3	EE3 EE4
R4-50B R4-60B	50 60	10.0 8.4	80.0 95.0	GCE9 GCE15	GCE30 GCE30	EE3 EE3	EE4 EE5	EE6 EE6
R4-75B R4-100B	75 100	6.7 5.0	120.0 160.0	GCE15 GCE18	EE2 EE3	EE4 EE4	EE5 EE8	EE8 (2)EE6
R4-125B R4-150B	125 150	4.0 3.4	200.0 235.0	GCE24 GCE24	EE3 EE4	EE5 EE6	(2)EE5 (2)EE5	(2)EE6 (2)EE8
R4-200B R4-250B	200 250	2.5 2.0	320.0 400.0	GCE30 EE3	EE6 EE6	EE8 (2)EE5	(2)EE6 (2)EE6	(2)EE8 (3)EE8
R4-300B R4-350B	300 350	1.7 1.5	470.0 530.0	EE3 EE4	EE6 EE8	(2)EE5 (2)EE8	(3)EE7 (3)EE9	(4)EE8 (4)EE9
R4-400B R4-500B	400 500	1.3 1.0	610.0 800.0	EE4 EE5	EE8 (2)EE6	(2)EE8 (3)EE7	(4)EE8 (4)EE8	(4)EE9 (5)EE9

Braking Resistors for 575 Volt Drives - 100% Braking Torque

SPECIFY PART NUMBERS AS FOLLOWS: R5 -

"01" for 10% Duty Cycle
 "02" for 20% Duty Cycle
 "03" for 30% Duty Cycle
 "05" for 50% Duty Cycle
 "10" for 100% Duty Cycle

Drive HP
 "A" For 100%
 Braking Torque
 "B" For 150%
 Braking Torque

"L" for an Outdoor Louvered Enclosure
 "T1" for a N.C. Thermal Switch
 "T2" for a N.O. Thermal Switch
 "T3" for a Therm-Trip® Circuit Board

For example, the part number of a braking resistor rated for a 250 HP, 575V drive requiring 150% braking torque with a 10% duty cycle and an optional thermal switch with normally closed contacts is R5-250B01-T1.

CONSTRUCTION: Standard units include resistors installed in a screened enclosure with a galvanized finish. All enclosures are assembled with stainless steel hardware. Units are furnished with resistors wired to a terminal block with high temperature silicone or teflon wire. Refer to the Enclosure Section of the catalog for enclosure details and finish options.

BRAKING RESISTORS FOR 575V DRIVES REQUIRING 100% BRAKING TORQUE

PART NO. PREFIX	H.P.	OHMS	BRAKING AMPS	ENCLOSURE REQUIRED FOR SPECIFIED DUTY CYCLE				
				10% DUTY	20% DUTY	30% DUTY	50% DUTY	100% DUTY
R5-.5A R5-.75A	.50 .75	2000.0 1500.0	0.5 0.7	GCE1 GCE1	GCE1 GCE1	GCE1 GCE1	GCE1 GCE1	GCE1 GCE2
R5-1A R5-1.5A	1 1.5	1200.0 800.0	0.8 1.3	GCE1 GCE1	GCE1 GCE1	GCE1 GCE2	GCE2 GCE2	GCE3 GCE4
R5-2A R5-3A	2 3	575.0 400.0	1.7 2.5	GCE1 GCE1	GCE1 GCE2	GCE2 GCE4	GCE3 GCE5	GCE6 GCE8
R5-5A R5-7.5A	5 7.5	235.0 150.0	4.3 6.7	GCE1 GCE2	GCE3 GCE4	GCE5 GCE6	GCE8 GCE10	GCE10 GCE15
R5-10A R5-15A	10 15	120.0 78.0	8.3 13.0	GCE3 GCE3	GCE5 GCE8	GCE8 GCE15	GCE15 GCE24	GCE24 GCE30
R5-20A R5-25A	20 25	59.0 47.0	17.0 21.0	GCE4 GCE5	GCE10 GCE12	GCE18 GCE24	GCE30 GCE30	GCE30 EE2
R5-30A R5-40A	30 40	39.0 29.0	26.0 34.0	GCE6 GCE8	GCE15 GCE15	GCE24 GCE30	GCE30 EE3	EE3 EE3
R5-50A R5-60A	50 60	23.0 20.0	43.0 50.0	GCE9 GCE12	GCE18 GCE24	GCE30 EE2	EE3 EE4	EE4 EE5
R5-75A R5-100A	75 100	15.6 11.7	64.0 85.0	GCE12 GCE15	GCE30 EE2	EE3 EE3	EE4 EE4	EE5 EE7
R5-125A R5-150A	125 150	9.3 7.8	110.0 130.0	GCE18 GCE18	EE2 EE3	EE4 EE4	EE6 EE6	EE8 (2)EE5
R5-200A R5-250A	200 250	5.9 4.7	170.0 210.0	GCE24 GCE24	EE3 EE3	EE4 EE6	EE9 (2)EE6	(2)EE7 (2)EE8

Braking Resistors for 575 Volt Drives - 150% Braking Torque

RATINGS: Powerohm braking resistors are available in either 100% or 150% braking torque and (5) duty cycles based on a cycle time of one minute. Powerohm braking resistors are designed for a 375°C temperature rise when operating at the maximum rated duty cycle. The resistance values are measured at 25°C and have a + 10% tolerance.

CAUTION: It is very important to insure that the resistance listed in the chart below is greater than the minimum specified for your drive or braking module. Installing a braking resistor with too low of a resistance value will cause permanent damage to your drive or braking module. Please call the factory if you need assistance.

MAXIMUM BRAKING TIMES OF DUTY CYCLES		
Duty Cycle	Maximum Braking Time	
	Overhauling Load	Deceleration Braking
10%	6 sec.	12 sec.
20%	12 sec.	24 sec.
30%	18 sec.	36 sec.
50%	30 sec.	Continuous
100%	Continuous	Continuous

BRAKING RESISTORS FOR 575V DRIVES REQUIRING 150% BRAKING TORQUE								
PART NO. PREFIX	H.P.	OHMS	BRAKING AMPS	ENCLOSURE REQUIRED FOR SPECIFIED DUTY CYCLE				
				10% DUTY	20% DUTY	30% DUTY	50% DUTY	100% DUTY
R5-.5B R5-.75B	.50 .75	1500.0 1000.0	0.7 1.0	GCE1 GCE1	GCE1 GCE1	GCE1 GCE1	GCE1 GCE2	GCE2 GCE3
R5-1B R5-1.5B	1 1.5	800.0 525.0	1.3 1.9	GCE1 GCE1	GCE1 GCE2	GCE2 GCE2	GCE2 GCE4	GCE4 GCE6
R5-2B R5-3B	2 3	400.0 260.0	2.5 3.8	GCE1 GCE1	GCE2 GCE3	GCE4 GCE6	GCE6 GCE8	GCE9 GCE10
R5-5B R5-7.5B	5 7.5	160.0 100.0	6.3 10.0	GCE2 GCE3	GCE4 GCE6	GCE8 GCE9	GCE12 GCE18	GCE15 GCE24
R5-10B R5-15B	10 15	80.0 52.0	13.0 19.0	GCE3 GCE4	GCE8 GCE12	GCE15 GCE18	GCE24 GCE30	GCE30 GCE30
R5-20B R5-25B	20 25	39.0 32.0	26.0 31.0	GCE6 GCE8	GCE15 GCE15	GCE18 GCE24	GCE30 EE2	EE3 EE4
R5-30B R5-40B	30 40	26.0 20.0	38.0 50.0	GCE9 GCE12	GCE18 GCE24	GCE30 EE2	EE3 EE3	EE4 EE5
R5-50B R5-60B	50 60	16.0 13.0	63.0 77.0	GCE12 GCE12	GCE30 GCE30	EE3 EE3	EE4 EE4	EE5 EE5
R5-75B R5-100B	75 100	10.4 7.8	96.0 130.0	GCE18 GCE18	EE2 EE3	EE3 EE4	EE6 EE6	EE7 (2)EE5
R5-125B R5-150B	125 150	6.3 5.2	160.0 190.0	GCE24 GCE30	EE3 EE4	EE5 EE6	EE8 (20)EE6	(2)EE6 (2)EE7
R5-200B R5-250B	200 250	3.9 3.2	150.0 310.0	GCE30 GCE30	EE5 EE5	EE9 EE9	(2)EE6 (2)EE8	(2)EE9 (3)EE7

Protective Over-Temperature Options

Powerohm braking resistors are available with several options for sensing an over-temperature condition. When an over-temperature condition occurs, it may be necessary to remove power from the braking resistor or the drive. The thermal switch may be used to provide an over-temperature alarm control signal.

THERMAL SWITCHES - OPTION "T1" & "T2"



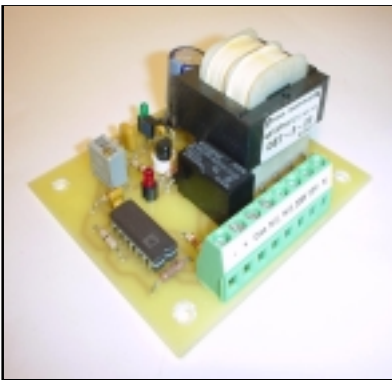
Option "T1": Includes a normally closed thermal switch for sensing an over-temperature condition. Option includes the over-temperature switch installed in the terminal compartment of the Type GCE enclosure or wired to a terminal block located in the bottom of a Type EE enclosure.

Option "T2": Includes a normally open thermal switch for sensing an over-temperature condition. Option includes the over-temperature switch installed in the terminal compartment of the Type GCE enclosure or wired to a terminal block located in the bottom of a Type EE enclosure.

Output Terminals: Includes (2) 1/4 inch quick-connecting terminals.

Output Electrical Ratings: 120VAC/ 10A or 240VAC/ 5A

THERM-TRIP[®] CIRCUIT BOARD - OPTION "T3"



Option "T3": Includes our Therm-Trip[®] circuit board with a K type thermocouple input to sense an over-temperature condition. This open circuit board monitors the temperature of the resistor elements in real time. Option includes the circuit board installed in our Type GCE or EE enclosures, complete with the thermocouple welded directly to the resistor elements.

Control Power: Either 115VAC or 230VAC power required (<1.5VA).

Temperature Setpoint: Factory set at 500°C (adjustable from 50 to 600°C).

Indicators: Green LED indicates control power present.

Red LED indicates temperature input exceeds setpoint.

Terminals: Accepts wire sizes 22-14AWG.

Output Contacts: Form C relay provides both N.O. and N.C. contacts.

Output Electrical Ratings: 120VAC/ 0.5A or 24VDC/ 1.0A