

Solid State Relays Zero Switching Types RGS Solid State Relay 'E' (Contactor) connection



- 17.5mm width
- Rated Operational voltage: Up to 600Vrms
- Rated Operational current: Up to 90Arms
- Up to 6600A²s for I²t
- Control voltages: 3-32 VDC (24-190VDC), 20-275 VAC
- Input connection: Screw clamp/screw terminal
- Output connection: Screw clamp/screw terminal
- design according to IEC60947-4-2, IEC60947-4-3, IEC62314, UL508, CSA22.2 No. 14-05
- Integrated voltage transient protection with varistor
- RoHS compliant

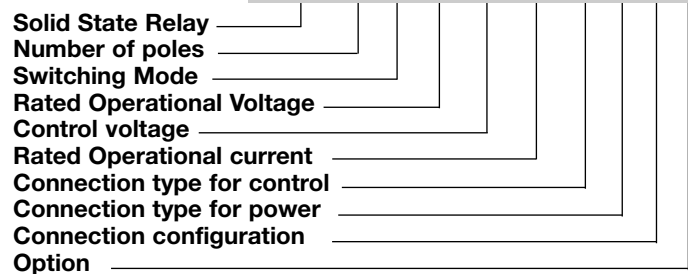
Product Description

Aim of this solid state switching device is to switch heater loads and motor loads frequently. The range offers solutions up to 90AAC in 17.5mm width. Input and output connections are via a screw connection, having a captivated washer allowing for safe looping.

Other options with integrated heatsink are available in RGC ranges

Specifications are at a surrounding temperature of 25°C unless otherwise specified.

Ordering Key **RGS 1 A 60 D 75 K K E**



Ordering Key

1Phase SSR with no heatsink	Rated Voltage	Control Voltage	Rated Current	Connection Control	Connection Power	Connection Configuration
RGS1A: ZC	23: 230V +10% - 15%	D: 3 - 32 VDC (4-32VDC)	25: 25A, 1200Vp 50: 50A, 1200Vp	K: Screw	K: Screw	E: Contactor
RGS1B: IO	60: 600V +10% -15%	A: 20 - 275VAC (24-190 VDC)	51: 50A, 1600Vp 75: 75A, 1200Vp 71: 75A, 1600Vp 90: 90A, 1200Vp 91: 90A, 1600Vp			

Selection Guide (ZC: Zero Cross Switching, IO = Instant-On Switching)

Rated Output Voltage	Blocking Voltage	Connection Control/ Power	Control Voltage	Rated operational current			
				25 AAC	50 AAC	75 AAC	90 AAC
230 VAC, ZC	800Vp	Screw/Screw	3-32 VDC	RGS1A23D25KKE	RGS1A23D50KKE	RGS1A23D75KKE	-
		Screw/Screw	20-275 VAC, 24-190 VDC	RGS1A23A25KKE	RGS1A23A50KKE	RGS1A23A75KKE	-
600 VAC, ZC	1200Vp	Screw/Screw	4-32 VDC	RGS1A60D25KKE	RGS1A60D50KKE	RGS1A60D75KKE	RGS1A60D90KKE
		Screw/Screw	20-275 VAC, 24-190 VDC	RGS1A60A25KKE	RGS1A60A50KKE	RGS1A60A75KKE	RGS1A60A90KKE
	1600Vp	Screw/Screw	4-32 VDC	-	RGS1A60D51KKE	RGS1A60D71KKE	RGS1A60D91KKE
		Screw/Screw	20-275 VAC, 24-190 VDC	-	RGS1A60A51KKE	RGS1A60A71KKE	RGS1A60A91KKE
600 VAC, IO	1200Vp	Screw/Screw	4-32 VDC	RGS1B60D25KKE	RGS1B60D50KKE	RGS1B60D75KKE	RGS1B60D90KKE

Output Voltage Specifications

		RGS..23..	RGS..60..
Operational Voltage Range		24-240 VAC, +10%, -15% on max	42-600 VAC, +10% -15% on max
Blocking Voltage	RGS..25/50/75/90 RGS..51/71/91	800Vp -	1200 Vp 1600 Vp
Internal Varistor		275V	680V

General Specifications

Latching voltage (across L1-T1)	≤20V
Operational frequency range	45 to 65Hz
Power factor	> 0.5 @ Vrated
CE marking	Yes
Finger Protection	IP20
Control input status	continuously ON Green LED, when control input is applied
Pollution degree	2 (non-conductive pollution with possibilities of condensation)
Over-voltage category	III (fixed installations)

Isolation

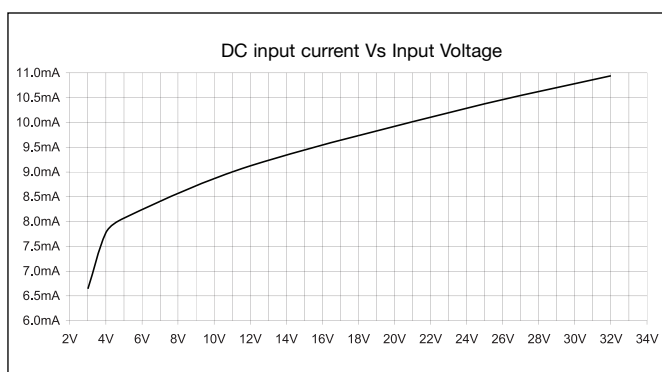
Input to Output	4000Vrms
Input&Output to Case	4000Vrms

Input specifications (@ 25°C unless otherwise specified)

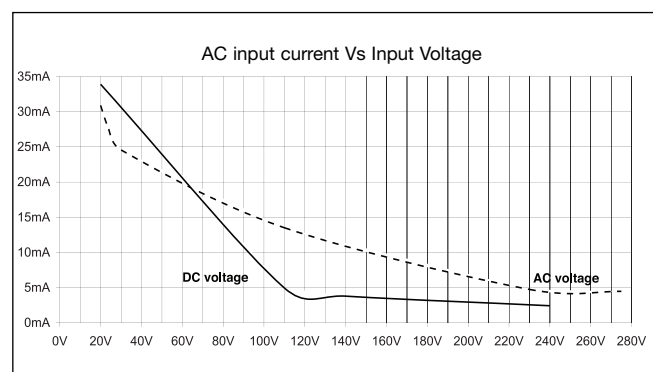
		RGS..D.. ¹	RGS..A..
Control voltage range	RGS..23..	3 - 32 VDC	20 - 275 VAC, 24 (-10%) - 190 VDC
	RGS..60..	4 - 32 VDC	20-280 VAC, 24 (-10%) - 190 VDC
Pick-up voltage	RGS..23..	3.0 VDC	20 VAC/DC
	RGS..60..	3.8 VDC	
Drop-out voltage	RGS..23..	1.2 VDC	5 VAC/DC
	RGS..60..	1.2 VDC	
Maximum Reverse voltage		32 VDC	-
Response time pick-up ZC (RGS1A..)		0.5 cycle + 500µs @ 24VDC	0.5 cycle + 40µs @ 230VAC/110VDC
Response time pick-up IO (RGS1B..)		350µs @ 24 VDC	N/A
Response time drop-out		0.5 cycle + 500µs @ 24VDC	2 cycles
Input current @ 40°C		See diagrams below	See diagrams below

1: DC control to be supplied by a Class 2 power source

RG..D..



RG..A..



Motor Ratings²: HP (UL508) / kW (IEC60947-4-2) @ 40°C

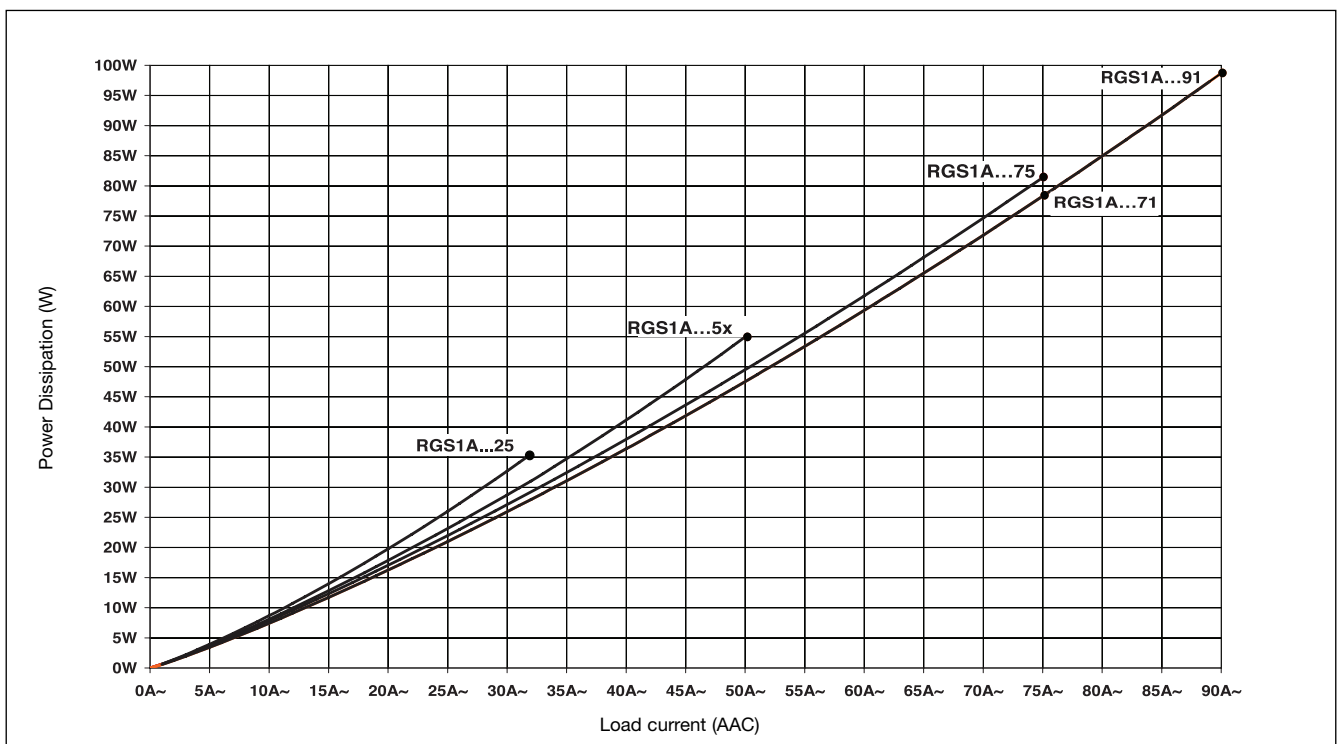
	115 VAC	230 VAC	400 VAC	480 VAC	600 VAC
RGC..25	½HP / 0.18kW	1-½HP / 0.37kW	3HP / 0.75kW	3HP / 1.1kW	5HP / 1.5kW
RGC..50/51	1HP / 0.37kW	3HP / 1.1kW	5HP / 1.5kW	5HP / 2.2kW	7-½HP / 3.7kW
RGC..75/71	1-½HP / 0.56kW	3HP / 1.5kW	5HP / 3kW	7-½HP / 4kW	10HP / 4kW
RGC..90/91	2HP / 0.75kW	5HP / 2.2kW	7-½HP / 4kW	10HP / 4kW	15HP / 5.5kW

2: Refer to heatsink selection table

Output specifications

	RGS..25..	RGS..50/51..	RGS..75/71..	RGS..90/91..
Rated operational current AC51 @ Ta=40°C (IEC60947-4-3/UL508) ²	25 AAC	50 AAC	75 AAC	90 AAC
AC-53a rating @ Ta=40°C (IEC60947-4-2/ UL508)	5 AAC	10 AAC	14.8 AAC	18 AAC
Number of motor starts (x:6, Tx:6s, F:50%) at 40°C ^{2, 3}	30	30	30	30
Min. operational current	150 mAAC	250 mAAC	400 mAAC	400 mAAC
Rep. overload current - UL508: T _{AMB} =40°C, t _{ON} =1s, t _{OFF} =9s, 50cycles	67 AAC	107 AAC	126 AAC	168 AAC
Maximum Transient Surge Current (I _{TSM})	325Ap	600Ap	800Ap	1150Ap
Maximum Off-state leakage current	3 mAAC	3 mAAC	3 mAAC	3 mAAC
I ² t (10ms) Typical	525 A ² s	1800A ² s	RG..75: 3200A ² s RG..71: 6 600A ² s	6600A ² s
Critical dv/dt (@ T _j init = 40°C)	1000V/us	1000V/us	1000V/us	1000V/us

Output Power Dissipation



3 x: multiple of AC-53a current rating, Tx: duration of current surge, F: duty cycle.

Agency Approvals and Electromagnetic Compatibility

Conformance	IEC/EN 62314 IEC/EN 60947-4-2 IEC/EN 60947-4-3	Agency Approvals	UL508 Recognised (E172877) CSA22.2 14-05 (pending) VDE (pending)
EMC Immunity	IEC/EN 61000-6-4	Radiated Radio Frequency Immunity	IEC/EN 61000-4-3 Performance Criteria 1
EMC Emission	IEC/EN 61000-6-2	10V/m, 80 - 1000 Mhz 10V/m, 1.4 - 2.0GHz 1V/m, 2.0 - 2.7GHz	Performance Criteria 1 Performance Criteria 1
Electrostatic Discharge (ESD) Immunity	IEC/EN 61000-4-2	Conducted Radio Frequency Immunity	IEC/EN 61000-4-6 Performance criteria 1
Air discharge	8kV, Performance Criteria 2	Voltage Dips Immunity	IEC/EN 61000-4-11
Contact	4kV, Performance Criteria 2	10V/m, 0.15 - 80 MHz	Performance Criteria 2 Performance Criteria 2
Electrical Fast Transient Burst Immunity	IEC/EN 61000-4-4	Voltage Interruptions Immunity	IEC/EN 61000-4-11 Performance Criteria 2
Output	2kV, Performance Criteria 1	0% for 10ms/20ms, 70% for 500ms 40% for 200ms	
Input	1kV, Performance Criteria 1	Radio Interference voltage emission (conducted)	IEC/EN 55011 Class A (industrial) - see filter information
Electrical Surge Immunity	IEC/EN 61000-4-5	0.15 - 30MHz	
Output, line to line	1kV, Performance Criteria 1		
Output, line to earth	2kV, Performance Criteria 1		
Input, line to line	1kV, Performance Criteria 2		
Input, line to earth	2kV, Performance Criteria 2		
Radio Interference voltage emission (conducted)	IEC/EN 55011 Class A (industrial) - see filter information IEC/EN 60747-4-X Class A (no filtering needed)		
0.15 - 30MHz			

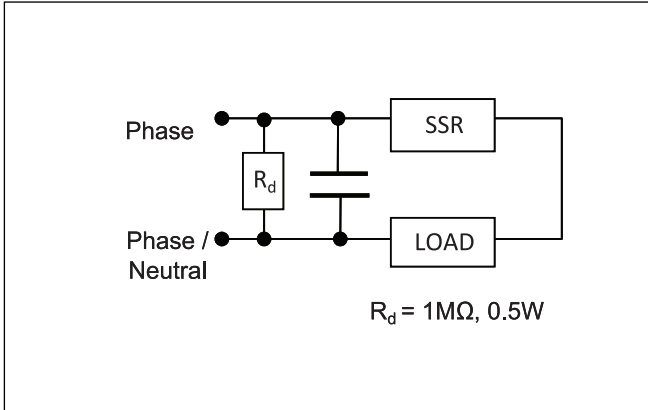
Filtering - EN / IEC 55011 Class A compliance (for class B compliance contact us)

Part Number	Suggested filter for compliance	Maximum Heater current
RGS1A23..25	100 nF / 275 V / X1	25A
RGS1A23..50	220 nF / 275 V / X1	30A
RGS1A23..50	150 nF / 275 V / X1	20A
RGS1A23..75	330 nF / 275 V / X1	30A
RGS1A23..90	330 nF / 275 V / X1	30A
RGS1A60..25	150 nF / 1000 V / X1	25A
RGS1A60..50	330 nF / 1000 V / X1	30A
RGS1A60..50	220 nF / 1000 V / X1	25A
RGS1A60..75	220 nF / 1000 V / X1	30A
RGS1A60..90	220 nF / 1000 V / X1	30A

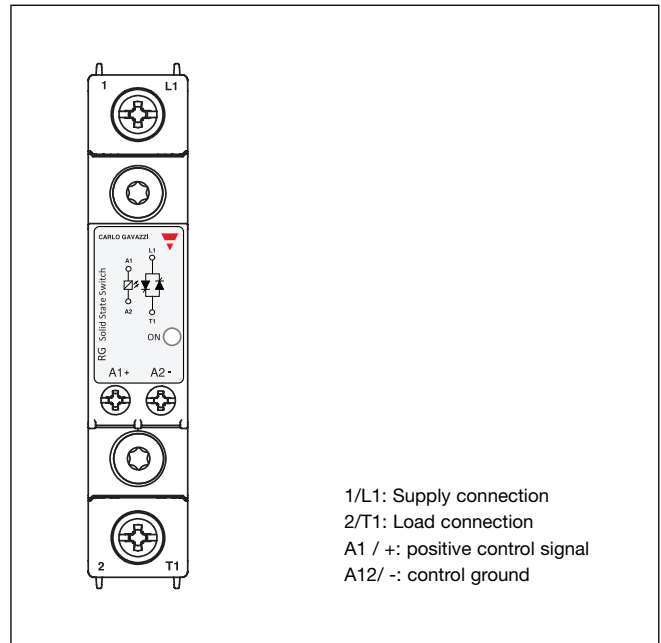
Note:

- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference. Use of AC solid state relays may, according to the application and the load current, cause conducted radio interferences. Use of mains filters may be necessary for cases where the user must meet E.M.C requirements. The capacitor values given inside the filtering specification tables should be taken only as indications, the filter attenuation will depend on the final application. DC input type require surge suppression for full compliance to EN55011.
- Performance Criteria 1: No degradation of performance or loss of function is allowed when the product is operated as intended.
- Performance Criteria 2: During the test, degradation of performance or partial loss of function is allowed. However when the test is complete the product should return operating as intended by itself.
- Performance Criteria 3: Temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.

Filter Connection diagram



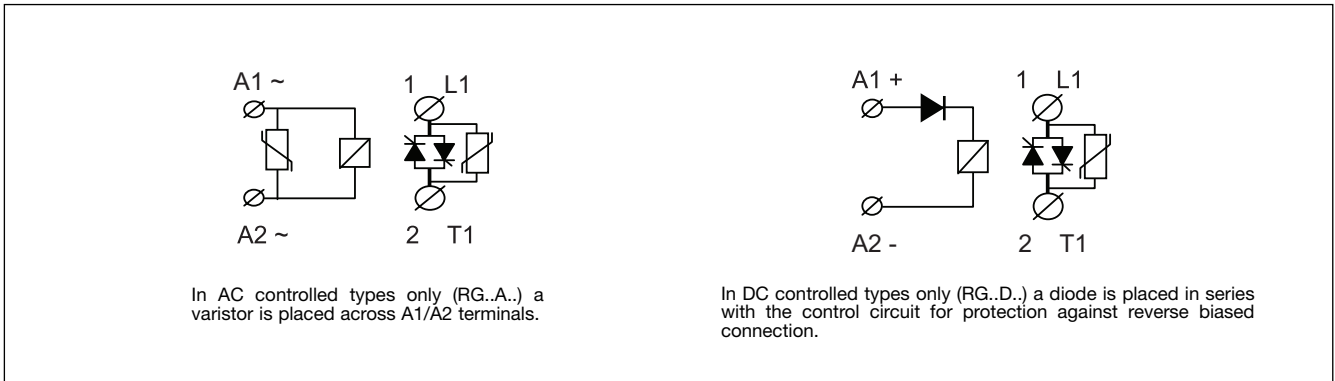
Terminal Layout



Environmental Specifications

Operating Temperature	-40°C to 80°C (-40°F to +176°F)
Storage Temperature	-40°C to 100°C (-40°F to +212°F)
RoHS (2002/95/EC)	Compliant
Impact resistance (IEC60068-2-27)	15/11 g/ms
Vibration resistance (2-100Hz, IEC60068-2-26)	5g
Relative humidity	95% non-condensing @ 40°C
UL flammability rating (housing)	UL 94 V0

Connection Diagram



Connection Specifications

POWER CONNECTIONS: 1/L1, 2 /T2

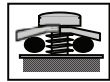
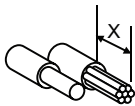
Torque specifications



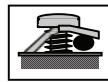
2 Nm (17.7 in-lb)
M4, Pozidriv 2
Use 75°C copper (Cu)
conductors
Stripping Length (X) = 11mm

Rigid (Solid & Stranded)

UL/ CSA rated data



2 x 2.5..6 mm²
2 x 14..10 AWG



2 x 2.5..6 mm²
1 x 14..10 AWG

Flexible with end sleeve



2 x 2.5..4mm²
2 x 14..12AWG

Flexible without end sleeve



2 x 2.5..6 mm²
2 x 14..10 AWG

Aperture for termination lug 12.3mm

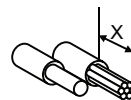
CONTROL CONNECTIONS: A1(+), A2(-)

Torque specifications

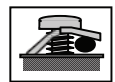


0.5 Nm (4.4 in-lb)
M3, Pozidriv 1
Use 60/75°C copper (Cu)
conductors
Stripping Length (X) = 6mm

Rigid (Solid & Stranded)



2 x 0.5..2.5mm²
2 x 18..12 AWG



1 x 0.5..2.5mm²
1 x 18..12 AWG

Flexible with end sleeve



2 x 0.5..2.5mm²
2 x 18..12AWG

Heatsink mounting screws



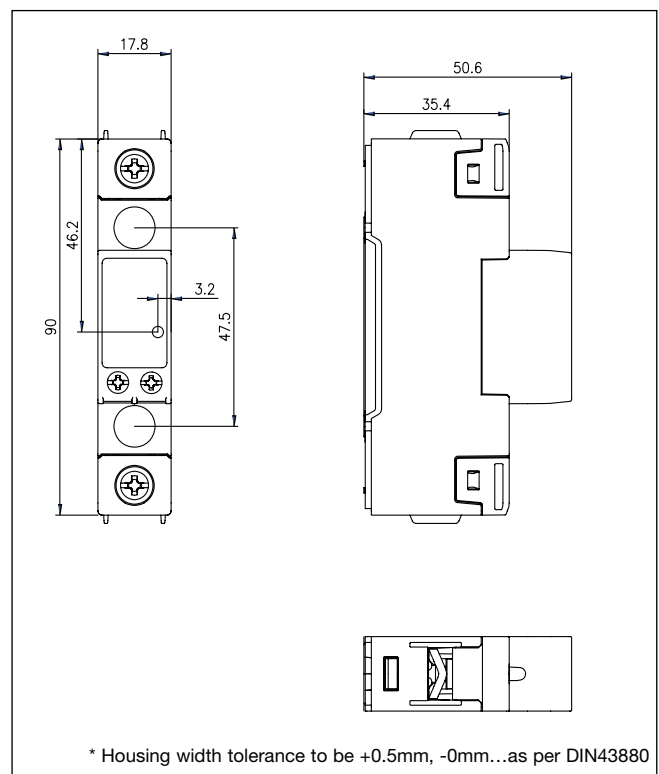
2Nm (17.7 in-lb)
M5 with spring and flat washer
min. overall length: 30mm

Installation Instructions

Thermal stress will reduce the lifetime of the SSR. Therefore it is necessary to select the appropriate heatsinks, taking into account the surrounding temperature, load current and the duty cycle.

A small amount of thermally conductive silicone grease must be applied to the center of the metal baseplate. RGS should be mounted on the heatsink with two M5 screws. Gradually tighten each screw (alternating between the two) until both are tightened with a torque of 0.75Nm. For optimal results wait one hour to allow excess grease to pressed out and then tighten both screws to their final mounting torque of 2Nm.

Dimensions



All dimensions in mm

Heatsink Selection

A small amount of thermally conductive silicone grease must be applied to the center of the metal base plate before mounting RGS to a heatsink. Alternatively, thermal conductive tape may be used.

RGS1A..25

Load current [A]	Thermal resistance [K/W]							Power dissipation [W]
	20	30	40	50	60	70	80	
32.0	2.27	1.96	1.70	1.41	1.13	0.85	0.57	35.3
28.8	2.60	2.27	1.95	1.62	1.30	0.97	0.65	30.8
25.6	3.02	2.64	2.62	1.89	1.51	1.13	0.75	26.5
22.4	3.57	3.12	2.68	2.23	1.78	1.34	0.89	22.4
19.2	4.32	3.78	3.24	2.70	2.16	1.62	1.08	18.5
16.0	5.39	4.72	4.04	3.37	2.69	2.02	1.35	14.8
12.8	7.04	6.16	5.28	4.40	3.52	2.64	1.76	11.4
9.6	9.89	8.65	7.41	6.18	4.94	3.708	2.47	8.1
6.4	15.81	13.84	11.86	9.88	7.90	5.93	3.95	5.1
3.2	34.76	30.42	26.07	21.73	17.38	13.04	8.69	2.3
	T_A							
	Ambient temp [°C]							

RGS1A..5x

Load current [A]	Thermal resistance [K/W]							Power dissipation [W]
	20	30	40	50	60	70	80	
50.0	1.45	1.28	1.09	0.91	0.73	0.55	0.37	54.8
45.0	1.68	1.47	1.26	1.05	0.84	0.63	0.42	47.7
40.0	1.96	1.71	1.47	1.22	0.98	0.73	0.49	40.9
35.0	2.32	2.03	1.74	1.45	1.61	0.87	0.58	34.5
30.0	2.82	2.47	2.12	1.76	1.41	1.06	0.71	28.3
25.0	5.52	3.08	2.64	2.20	1.76	1.32	0.88	22.7
20.0	4.58	4.01	3.44	2.87	2.29	1.72	1.15	17.5
15.0	6.40	5.60	4.80	4.00	3.20	2.40	1.60	12.5
10.0	10.19	8.92	7.64	6.37	5.10	3.82	2.55	7.8
5.0	22.30	19.51	16.72	13.94	11.15	8.36	5.57	3.6
	T_A							
	Ambient temp [°C]							

RGS1A..71

Load current [A]	Thermal resistance [K/W]							Power dissipation [W]
	20	30	40	50	60	70	80	
75.0	1.03	0.90	0.77	0.64	0.51	0.39	0.26	77.9
67.5	1.17	1.03	0.88	0.73	0.59	0.44	0.29	68.2
60.0	1.36	1.90	1.02	0.85	0.68	0.51	0.34	58.9
52.5	1.60	1.40	1.20	1.00	0.80	0.60	0.40	49.9
45.0	1.93	1.69	1.45	1.21	0.97	0.73	0.48	41.4
37.5	2.41	2.11	1.81	1.51	1.20	0.90	0.60	33.2
30.0	3.14	2.75	2.35	1.96	1.57	1.18	0.78	25.5
22.5	4.39	3.84	3.29	2.74	2.19	1.65	1.10	18.2
15.0	6.99	6.12	5.24	4.37	3.50	2.62	1.75	11.4
7.2	15.29	13.38	11.47	9.56	7.65	5.73	3.82	5.2
	T_A							
	Ambient temp [°C]							

RGS1A..75

Load current [A]	Thermal resistance [K/W]							Power dissipation [W]
	20	30	40	50	60	70	80	
75.0	0.95	0.83	0.70	0.58	0.46	0.33	0.21	80.7
67.5	1.13	0.99	0.85	0.71	0.57	0.42	0.28	70.7
60.0	1.31	1.15	0.98	0.82	0.66	0.49	0.33	61.0
52.5	1.55	1.35	1.16	0.97	0.77	0.60	0.39	51.8
45.0	1.86	1.63	1.40	1.16	0.93	0.70	0.47	42.9
37.5	2.32	2.03	1.74	1.45	1.16	0.87	0.58	34.5
30.0	3.02	2.64	2.26	1.88	1.51	1.13	0.75	26.5
22.5	4.21	3.68	3.16	2.63	2.11	1.58	1.05	19.0
15.0	6.68	5.85	5.01	4.18	3.34	2.51	1.67	12.0
7.2	14.53	12.71	10.89	9.08	7.26	5.45	3.63	5.5
	T_A							
	Ambient temp [°C]							

Heatsink Selection (cont.)

RGS1A..9x

Load current [A]	Thermal resistance [K/W]							Power dissipation [W]
	20	30	40	50	60	70	80	
90.0	0.77	0.67	0.56	0.46	0.36	0.26	0.16	98.4
81.0	0.92	0.80	0.69	0.57	0.46	0.34	0.22	85.9
72.0	1.08	0.95	0.81	0.68	0.54	0.41	0.27	74.0
63.0	1.28	1.12	0.96	0.80	0.64	0.48	0.32	62.5
54.0	1.55	1.36	1.61	0.96	0.77	0.58	0.39	51.7
45.0	1.93	1.69	1.45	1.21	0.97	0.73	0.48	41.4
36.0	2.53	2.21	1.89	1.58	1.26	0.94	0.63	31.6
27.0	3.55	3.11	2.66	2.218	1.78	1.33	0.89	22.5
18.0	5.68	4.97	4.26	3.55	2.84	2.13	1.42	14.1
9.0	12.46	10.90	9.34	7.79	6.23	4.67	3.12	6.4

T_A
Ambient temp [°C]

Short Circuit Protection

Protection Co-ordination, Type 1 vs Type 2:

Type 1 protection implies that after a short circuit, the device under test will no longer be in a functioning state. In type 2 co-ordination the device under test will still be functional after the short circuit. In both cases, however the short circuit has to be interrupted. The fuse between enclosure and supply shall not open. The door or cover of the enclosure shall not be blown open. There shall be no damage to conductors or terminals and the conductors shall not separate from terminals. There shall be no breakage or cracking of insulating bases to the extent that the integrity of the mounting of live parts is impaired. Discharge of parts or any risk of fire shall not occur.

The product variants listed in the table hereunder are suitable for use on a circuit capable of delivering not more than 5,000 A rms Symmetrical Amperes, 600 Volts maximum when protected by fuses. Tests at 5,000 A were performed with RK5 fuses, time delay; please refer to the table below for maximum allowed ampere rating of the fuse. Use fuses only.

Co-ordination type 1 (UL508)

Max. size [A]	Class	Current [kA]	Voltage [V]	
RGS..25	30	RK5	5	Max. 600 VAC
RGS..50 / 51	30	RK5	5	Max. 600 VAC
RGS..75 / 71	30	RK5	5	Max. 600 VAC
RGS..90 / 91	30	RK5	5	Max. 600 VAC

Note: For the RGS..50,51,75,71,90,91, the fuse rating are according to the motor rating as required by the UL standard.