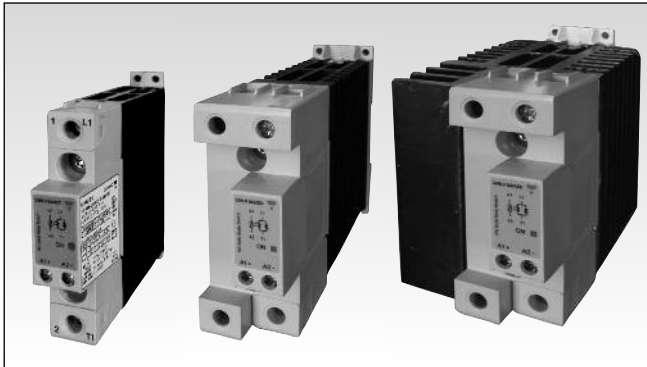


Solid State Relays Zero Switching Types RGH Solid State Contactor 'E' Connection



- Rated Operational voltage: Up to 600 VAC
- Rated Operational current: Up to 60 AAC @ 40°C
- Up to 6600 A²s for I²t and 1600Vp blocking voltage
- Control voltages: 4-32 VDC, 20-275 VAC (24-190 VDC)
- IP20 protection
- Design according to IEC60947-4-2, IEC60947-4-3, EN62314,
- Conformance to UL508, CSA22-2 No14-10
- Integrated voltage transient protection with Varistor
- RoHS compliant

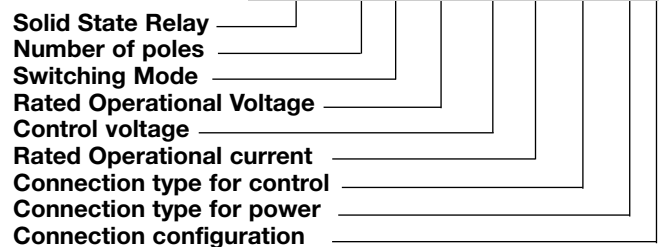
Product Description

This range of Solid State contactors offers the possibility of 1600Vp blocking voltage as well as the use of a less expensive means for short circuit protection due to the use of semiconductors with high I²t ratings combined with a small

width dimension for the product which can go as narrow as 17.5mm for the 20A version. The nominal current ratings are at 40°C.

Specifications are stated at 25°C unless otherwise stated.

Ordering Key **RGH 1 A 60 A 30 K K E**



Ordering Key

1Phase SSR with heatsink	Rated Voltage	Control Voltage	Rated Current	I ² t	Connection Control	Power	Connection configuration
RGH1A: ZC	60: 600V +10% - 15%, 1600Vp	D: 4-32VDC A: 20-275VAC, 24-190VDC	2: 20AAC 3: 30AAC 4: 40AAC 6: 60AAC	0: Standard 1: High	K: Screw	K: Screw G: Box Clamp	E: Contactor

Selection Guide (ZC: Zero Crossing)

Rated Output Voltage	Blocking Voltage	Connection Control/ Power	Control Voltage	Rated Operational Current @ 40°C (I ² t value in brackets)	
600VAC, ZC	1600Vp	Screw/ Screw	DC	20 AAC (1800 A ² s)	30 AAC (6600 A ² s)
600VAC, ZC	1600Vp	Screw/ Screw	AC	RGH1A60D20KKE RGH1A60A20KKE	RGH1A60D31KKE RGH1A60A31KKE
Rated Output Voltage	Blocking Voltage	Connection Control/ Power	Control Voltage	Rated Operational Current @ 40°C (I ² t value in brackets)	
600VAC, ZC	1600Vp	Screw/ Box clamp	DC	40 AAC (1800 A ² s)	40 AAC (6600 A ² s)
600VAC, ZC	1600Vp	Screw/ Box clamp	AC	RGH1A60D40KGE RGH1A60A40KGE	RGH1A60D41KGE RGH1A60A41KGE
Rated Output Voltage	Blocking Voltage	Connection Control/ Power	Control Voltage	Rated Operational Current @ 40°C (I ² t value in brackets)	
600VAC, ZC	1600Vp	Screw/ Box clamp	DC	60 AAC (6600 A ² s)	
600VAC, ZC	1600Vp	Screw/ Box clamp	AC	RGH1A60D60KGE RGH1A60A60KGE	

Output Voltage Specifications

Operational voltage range	42-600 VAC, +10% -15% on maximum
Blocking voltage	1600 Vp
Internal varistor	680 V

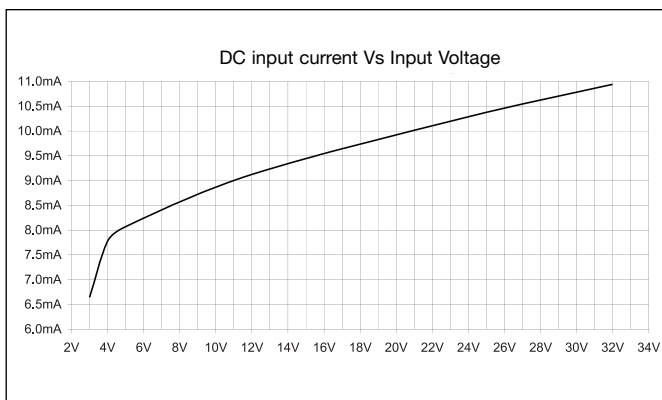
General Specifications

Latching voltage (across L1-T1)	≤20V	Pollution degree	2 (non-conductive pollution with possibilities of condensation)
Operational frequency range	45 to 65Hz	Over-voltage category	III (fixed installations)
Power factor	> 0.5 @ Vrated	Isolation	
Finger Protection	IP20	Input to Output	4000Vrms
Control input status	continuously ON Green LED, when control input is applied	Input&Output to Case	4000Vrms

Input specifications

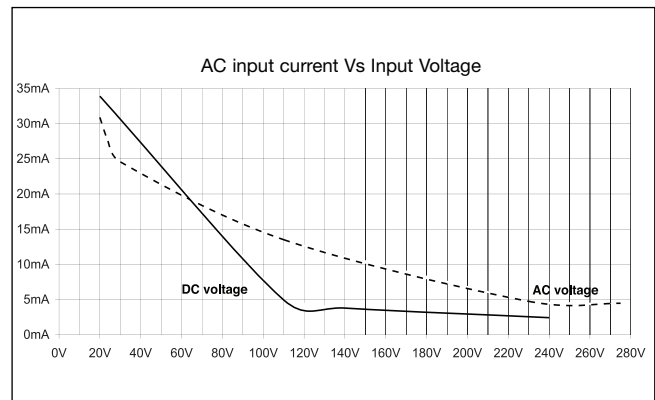
	RGH..D.. ¹	RGH..A..
Control voltage range	4 - 32 VDC	20 - 275 VAC, 24 (-10%) - 190 VDC
Pick-up voltage	3.8 VDC	20 VAC/DC
Drop-out voltage	1.2 VDC	5 VAC/DC
Maximum Reverse voltage	32 VDC	-
Response time pick-up ZC (RGH1A..)	0.5 cycle + 500µs @ 24VDC	1 cycle @ 230VAC/110VDC
Response time drop-out	0.5 cycle + 500µs @ 24VDC	0.5 cycle + 40ms
Input current @ 40°C	See diagrams below	See diagrams below

RG..D..



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

RG..A..



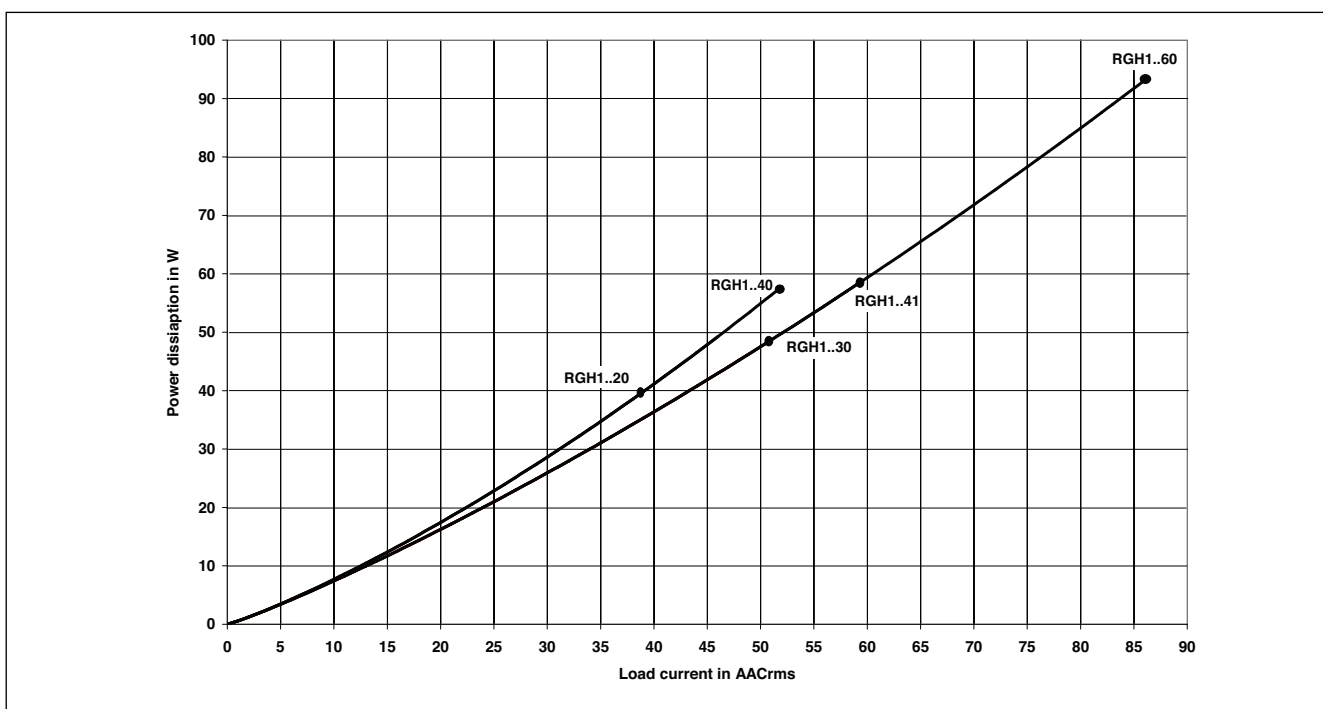
Motor Ratings: HP (UL508) / kW (IEC60947-4-2) @ 40°C

	115 VAC	230 VAC	400 VAC	480 VAC	600 VAC
RGH..20	½HP / 0.18kW	1-½HP / 0.37kW	2HP / 0.75kW	3HP / 1.1kW	3HP / 1.5kW
RGH..31	¾HP / 0.37kW	2HP / 1.1kW	3HP / 1.5kW	5HP / 2.2kW	5HP / 3.7kW
RGH..40	¾HP / 0.37kW	2HP / 1.1kW	3HP / 1.5kW	5HP / 2.2kW	5HP / 3.7kW
RGH..41	1½HP / 0.56kW	3HP / 1.5kW	5HP / 2.2kW	7½HP / 3.7kW	10HP / 4kW
RGH..60	2HP / 0.75kW	3HP / 1.5kW	5HP / 4kW	7½HP / 4kW	10HP / 5.5kW

Output Specifications

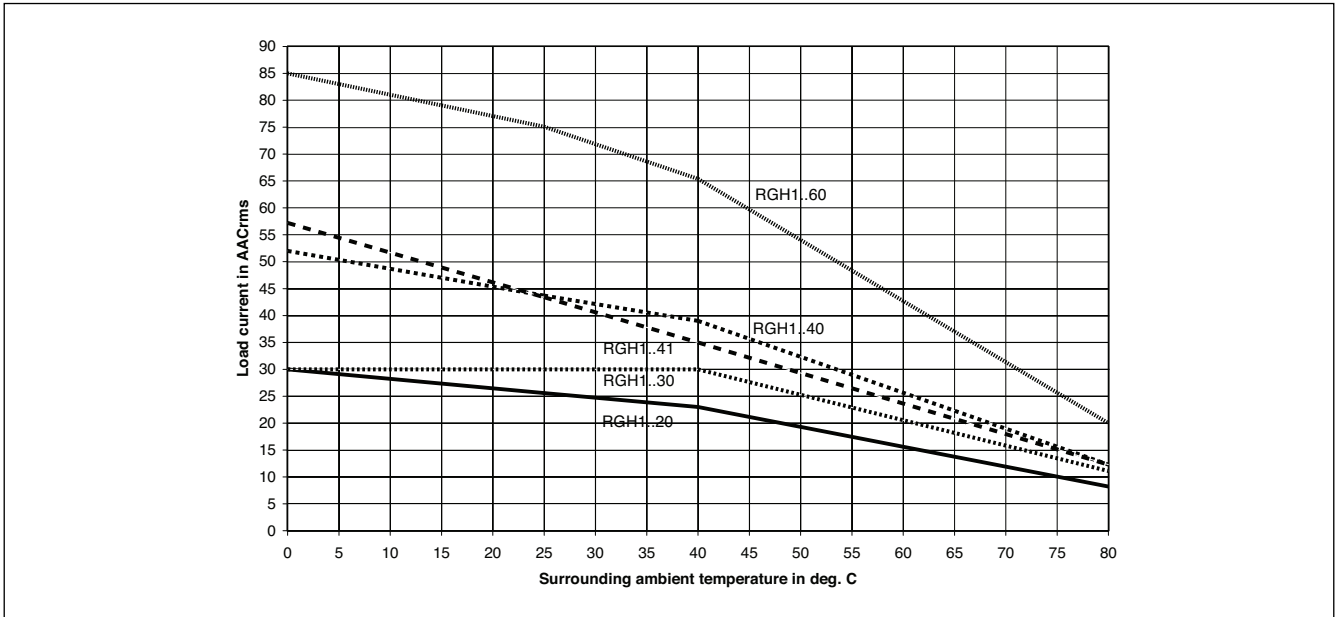
	RGH..20	RGH..31	RGH..40	RGH..41	RGH..60
Rated operational current AC-51 rating @ Ta=40°C	20 AAC	30 AAC	40 AAC	40 AAC	60 AAC
AC-53a rating @ Ta=40°C	5 AAC	10 AAC	10 AAC	13 AAC	18 AAC
Number of motor starts (x:6, Tx:6s, F:50%) at 40°C ²	30	30	30	30	30
Min. operational current	250 mAAC	400 mAAC	250 mAAC	400 mAAC	400 mAAC
Rep. overload current - (Motor Rating) PF = 0.4 - 0.5 UL508: T _{AMB} =40°C, t _{ON} =1s, t _{OFF} =9s, 50cycles	60 AAC	84 AAC	84 AAC	126 AAC	144 AAC
Maximum transient surge current (I _{TSM})	600 Ap	1150 Ap	600 Ap	1150 Ap	1150 Ap
Maximum off-state leakage current	3 mA	3 mA	3 mA	3 mA	3 mA
I ² t (10ms) Minimum	1800 A ² s	6600A ² s	1800A ² s	6600A ² s	6600A ² s
Critical dv/dt (@ Tj init = 25°C)	1000 V/us	1000 V/us	1000 V/us	1000 V/us	1000 V/us

Output Power Dissipation



2 Overload current profile definition:
x: multiple of AC53a rating, Tx: duration of current surge, F: duty cycle.

Current Derating



Agency Approvals and Conformances

Conformance	IEC/EN 62314 IEC/EN 60947-4-2 IEC/EN 60947-4-3	Agency Approvals	UL508 Listed (E172877) CUL Listed (E172877) VDE (pending)
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Electromagnetic Compatibility

EMC Immunity	IEC/EN 61000-6-4	Radiated Radio Frequency Immunity	IEC/EN 61000-4-3
Electrostatic Discharge (ESD) Immunity	IEC/EN 61000-4-2	10V/m, 80 - 1000 MHz	Performance Criteria 1
Air discharge, 8kV	Performance Criteria 1	10V/m, 1.0 - 2.7GHz	Performance Criteria 1
Contact, 4kV	Performance Criteria 1	Conducted Radio Frequency Immunity	IEC/EN 61000-4-6
Electrical Fast Transient (Burst) Immunity	IEC/EN 61000-4-4	10V/m, 0.15 - 80 MHz	Performance criteria 1
Output: 2kV, 5kHz	Performance Criteria 1	Voltage Dips Immunity	IEC/EN 61000-4-11
Input: 3kV, 5kHz	Performance Criteria 1	0% for 10ms/20ms,	Performance Criteria 2
Electrical Surge Immunity	IEC/EN 61000-4-5	40% for 200ms	Performance Criteria 2
Output, line to line, 1kV	Performance Criteria 1	70% for 500ms	Performance Criteria 2
Output, line to earth, 2kV	Performance Criteria 1	Voltage Interruptions Immunity	IEC/EN 61000-4-11
AC signal, line to line, 1kV	Performance Criteria 2	0% for 5000ms	Performance Criteria 2
AC signal, line to earth, 2kV	Performance Criteria 2		
DC signal, line to earth, 1kV	Performance Criteria 2		
EMC Emission	(EN/IEC 61000-6-2)	Radio Interference	
Radio Interference		Field Emission (Radiated)	IEC/EN 55011
Voltage Emission (Conducted)	IEC/EN 55011	30 - 1000MHz	Class A (industrial)
0.15 - 30MHz	Class A (industrial) with filters - see filter information		
	IEC/EN 60947-4-2, 60947-4-3		
	Class A (no filtering needed)		

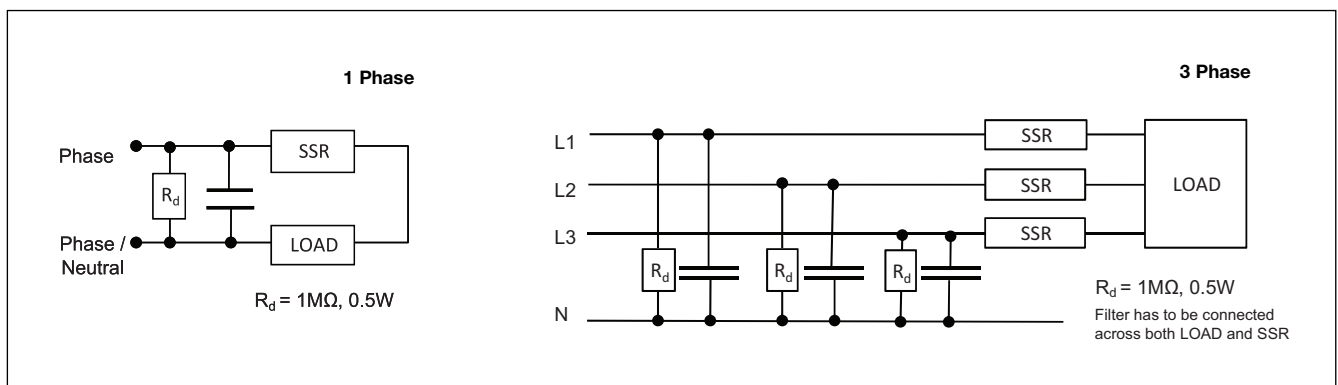
Filtering - EN / IEC 55011 Class A compliance (for class B compliance contact us)

Part Number	Suggested filter for compliance	Maximum Heater current
RGH1A60..20	150 nF / 760 V / X1	20A
RGH1A60..31	220 nF / 760 V / X1	30A
RGH1A60..40/41	330 nF / 760 V / X1	40A
RGH1A60..60	470 nF / 760 V / X1	60A

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.
- 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 Diagrams

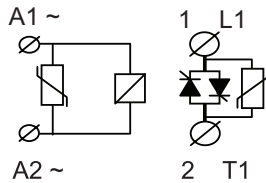


Environmental Specifications

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, EN50155)	5g
Relative humidity	95% non-condensing @ 40°C
UL flammability rating (housing)	UL 94 V0

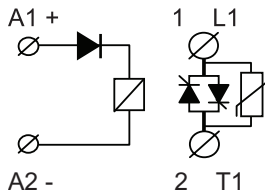
Connection Diagram

AC Controlled



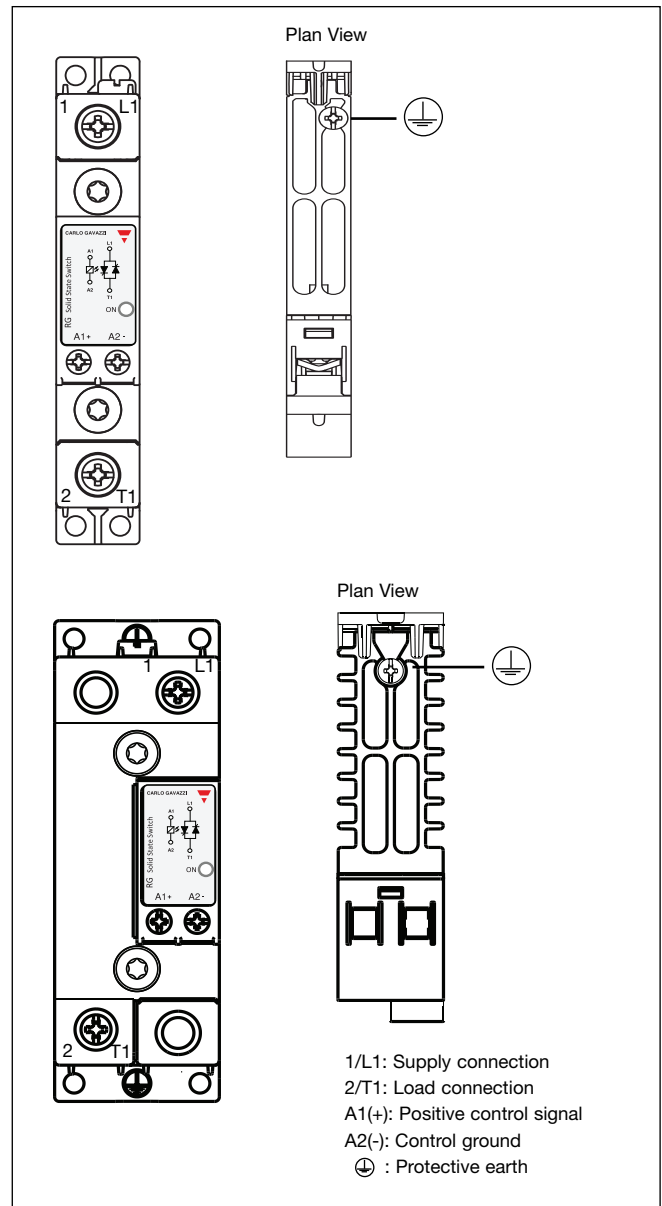
In AC controlled types only (RG..A..) a varistor is placed across A1/A2 terminals.

DC Controlled

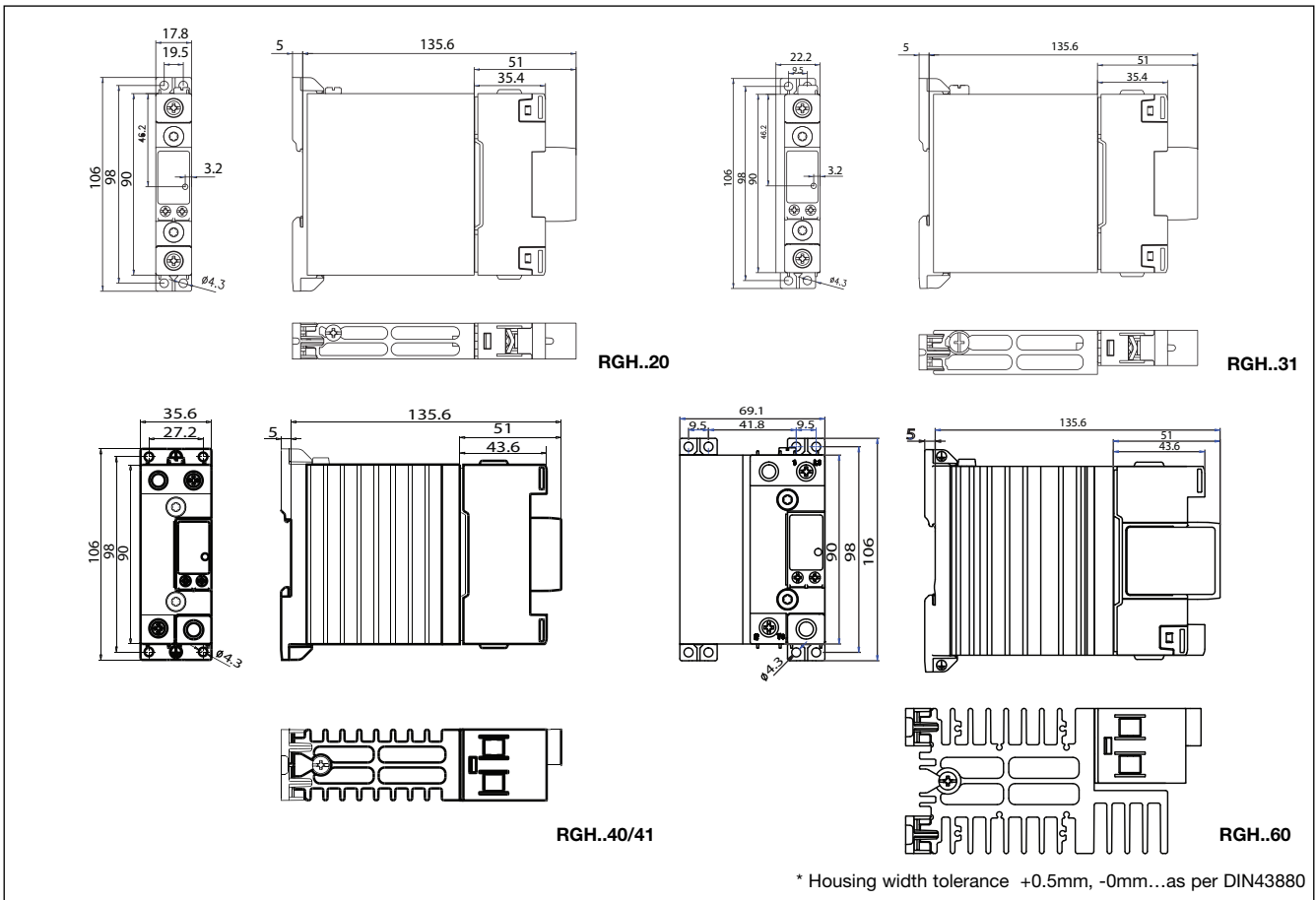


In DC controlled types only (RG..D..) a diode is placed in series with the control circuit for protection against reverse biased connection.

Terminal Layout



Dimensions



All dimensions in mm

Connection Specifications

POWER CONNECTIONS: 1/L1, 2 /T2
Use 75°C copper (Cu) conductors

	RGH..20; RGH..31	RGC..40/41; RGC..60
Stripping Length (X)	12mm	11mm
Connection type	M4 screw with captivated washer	M5 screw with box clamp
Rigid (Solid & Stranded) UL/ CSA rated data	 2 x 2.5..6 mm ² 2 x 14.. 10 AWG	 2 x 2.5..6 mm ² 1 x 14.. 10 AWG
Flexible with end sleeve	 2 x 2.5..4mm ² 2 x 14.. 12 AWG	 2 x 2.5..4mm ² 1 x 14.. 10 AWG
Flexible without end sleeve	 2 x 2.5.. 6mm ² 2 x 14.. 10 AWG	 1 x 2.5..16mm ² 1 x 14.. 6 AWG
Torque specifications	2 Nm (17.7 in-lb). M4, Pozidriv 2	2.5 Nm (22 in-lb). M5, Pozidriv 2
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) = 8mm

Rigid (Solid & Stranded)

 2 x 0.5..2.5mm ² 2 x 18..12 AWG	 1 x 0.5..2.5mm ² 1 x 18..12 AWG
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Flexible with end sleeve

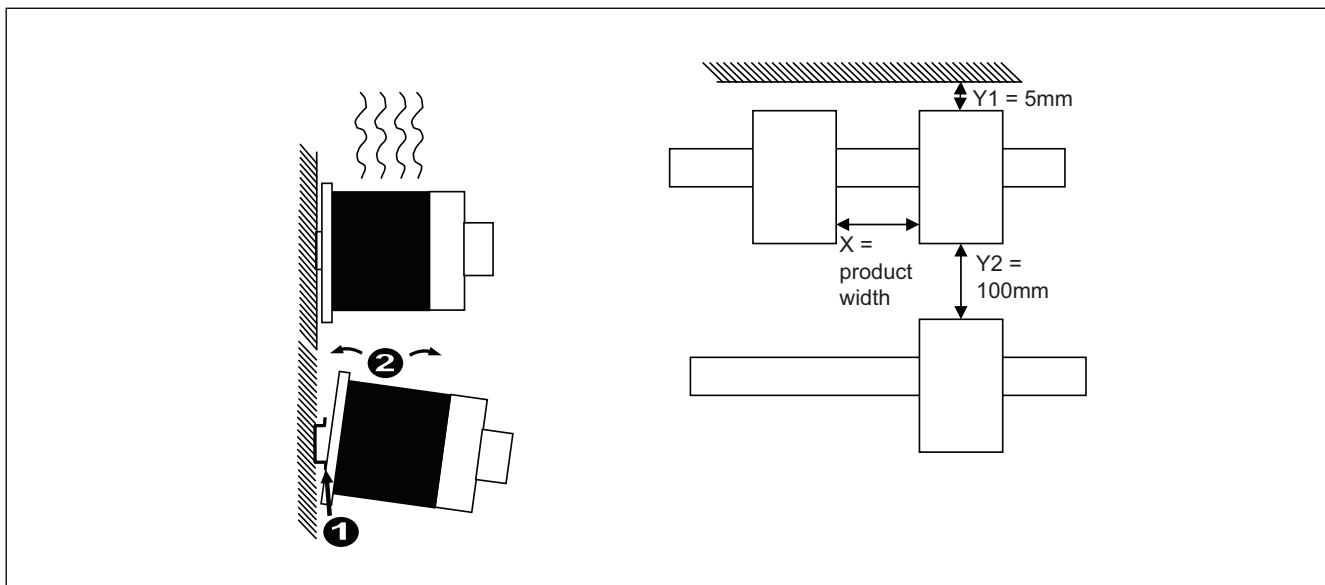
 2 x 0.5..2.5mm ² 2 x 18..12AWG	 1 x 0.5..2.5mm ² 1 x 18..12AWG
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Protective Earth Connection

RGC..20: M4, 1.5Nm (13.3 in-lb)
 RGC..30, 40, 60: M5, 1.5Nm (13.3 in-lb)

Note: Protective Earth connection must be connected whenever the product is intended to be used in Class 1 applications according to EN/IEC 61140.

Installation Instructions



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)

Part No.	Max. size [A]	Class	Current [kA]	Voltage [VAC]
RGH..20	30	RK5	5	Max. 600
RGH..31	30	RK5	5	Max. 600
RGH..40	30	RK5	5	Max. 600
RGH..41	50	RK5	5	Max. 600
RGH..60	50	RK5	5	Max. 600

Co-ordination type 2 (IEC EN 60947-4-2/ -4-3)

Part No.	Max. size [A]	Ferraz Shawmut Part Number	Current [kA]	Voltage [VAC]
RGC..20	40	A70QS40-4	5	Max. 600
RGC..31	40	A70QS40-4	5	Max. 600
RGC..40	50	A70QS50-4	5	Max. 600
RGC..41	70	A70QS70-4	5	Max. 600
RGC..60	100	A70QS100-4	5	Max. 600