Solid State Relays
Industrial, 1-Phase, 17.5mm with built-in varistor
'U' type connection
Types RGS..U, RGS..UDIN

- Zero cross or Instant on switching AC solid state relay
- Rated operational voltage: up to 660 VAC
- Rated operational current: up to 30 AAC
- Up to 1800 A²s for I²t
- Control voltages: 4-32 VDC, 20-275 VAC (24-190 VDC)
- Integrated overvoltage protection with varistor
- Design according to IEC/EN60947-4-2, IEC/EN60947-4-3, IEC/EN62314, UL508, CSA22.2 No. 14-13
- Conformance to railway standards
- 100kA short circuit current rating according to UL508
- Option for DIN mounting (RGS...DIN)

Product Description

Aim of this solid state switching device is to switch heater loads and motor loads frequently. The range offers solutions up to 30 AAC in 17.5 mm width.

Output connections are provided via a box clamp. Input connections are via a screw connection having a captivated washer allowing for safe looping.

Options with integrated heatsink are available in the RGC range. **The RGS...DIN** provides an option for DIN mounting of the RGS series with a rating of 10 AAC @ 40°C.

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

Ordering Key

RGS 1 A 60 D 30 K G U _

- Solid state relay
- Number of poles
- Switching mode
- Rated operational voltage
- Control voltage
- Rated operational current
- Connection type for control
- Connection type for power
- Connection configuration
- Option

Ordering Key

1-Phase SSR with no heatsink	Rated voltage	Control voltage	Rated current, Blocking voltage	Connection control	Connection power	Connection configuration	Options[4]
RGS1A: ZC[1]	60: 600 VAC +10% - 15%	D: 4-32 VDC	20: 10 A, 1200 Vp[3]	K: Screw	G: Box clamp	U: SSR	HT: Thermal pad
RGS1B: IO[2]		A: 20 - 275 VAC, 24-190 VDC	30: 30 A, 1200 Vp				DIN: DIN rail mount
							X40: Bulk packaging of 40 pcs.

1: ZC: Zero cross switching

2: IO: Instant-On switching

3: Available with DIN rail mount accessory only

4: Add suffix 'HT' to RGS part number for RGS with attached thermal pad. Add suffix 'DIN' to RGS part number for DIN rail mountable RGS.

Selection Guide - RGS..

Rated voltage, Blocking voltage, Switching mode	Control voltage	Connection control/ power	Max. rated operational current (I²t value)
			30 AAC (1800 A²s)
600V, 1200Vp, ZC	4-32VDC	Screw/Box clamp	**RGS1A60D30KGU**
	20-275VAC, 24-190VDC	Screw/Box clamp	**RGS1A60A30KGU**
600V, 1200Vp, IO	4-32VDC	Screw/Box clamp	**RGS1B60D30KGU**

Selection Guide - RGS..DIN (RGS for DIN Rail Mounting)

Rated voltage, Blocking voltage, Switching mode	Control voltage	Connection control/ power	Max. rated operational current (I²t value)
			10 AAC (525 A²s)
600V, 1200Vp, ZC	4-32VDC	Screw/Box clamp	**RGS1A60D20KGUDIN**

Output Voltage Specifications

Operational voltage range	42-600 VAC +10%, -15% on max.
Blocking voltage	1200 Vp
Internal varistor	625V

General Specifications

Latching voltage (across L1-T1)	20V
Operational frequency range	45 to 65Hz
Power factor	> 0.5 @ Vrated
CE marking	Yes
Touch protection	IP20
Control input status	continuously ON Green LED, when control input is applied

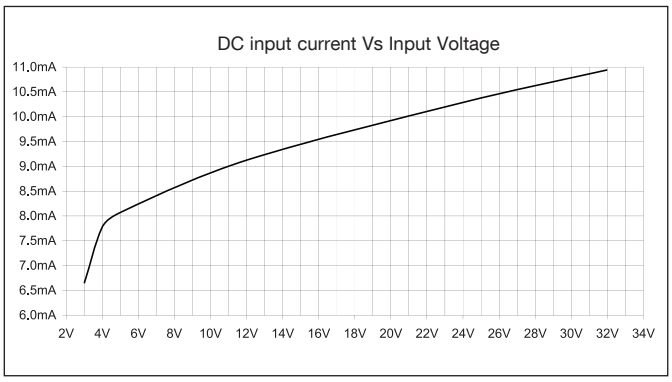
Pollution degree	2 (non-conductive pollution with possibilities of condensation)
Rated impulse withstand	6 kV (1.2/50µs) for voltage, Uimp
Overvoltage Category	III (fixed installations)
Isolation Input to Output Input & Output to Case	 4000Vrms 4000Vrms

Input Specifications

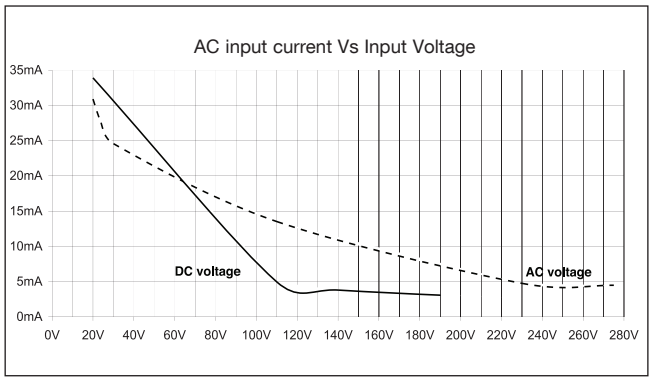
	RGS..D..	RGS..A..
Control voltage range[5]	4 - 32 VDC	20 - 275 VAC, 24 (-10%) - 190 VDC
Pick-up voltage	3.8 VDC	
Drop-out voltage	1 VDC	5 VAC/DC
Maximum reverse voltage	32 VDC	-
Response time pick-up (RGS1A..)	0.5 cycle + 500 µs @ 24VDC	2 cycles @ 230 VAC/110 VDC
Response time pick-up (RGS1B..)	350 µs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

5: DC control to be supplied by a Class 2 power source according to UL1310

RG..D..



RG..A..



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Motor Ratings[6]: HP (UL 508) / kW (EN/IEC 60947-4-2) @ 40°C

	115 VAC	230 VAC	400 VAC	480 VAC	600 VAC
RGS..30	¾HP / 0.37kW	2HP / 1.1kW	3HP / 1.5kW	5HP / 2.2kW	5HP / 3.7kW

6: Refer to Heatsink Selection Table

Output Specifications

Rated operational current AC-51 rating @ Ta=40°C, (IEC60947-4-3/UL508)[6]	30 AAC
AC-53a rating @ Ta=40°C , (IEC60947-4-2/ UL508)	8 AAC
Number of motor starts per hour (x:6, Tx:6s, F:50%) at 40°C [6,7]	30
Minimum operational current	250 mAAC
Rep. overload current - (Motor rating) PF = 0.4-0.5, UL508: T_{AMB}=40°C, t_{ON}=1s, t_{OFF}=9s, 50 cycles	84 AAC
Maximum trasient surge current (I_{TSM}), t=10ms	600 Ap
Maximum off-state leakage current @ rated voltage	3 mAAC
I^2t for fusing (t=10ms), Minimum	1800 A^2s
Crititcal dv/dt (@ Tj init = 40°C)	1000 V/us

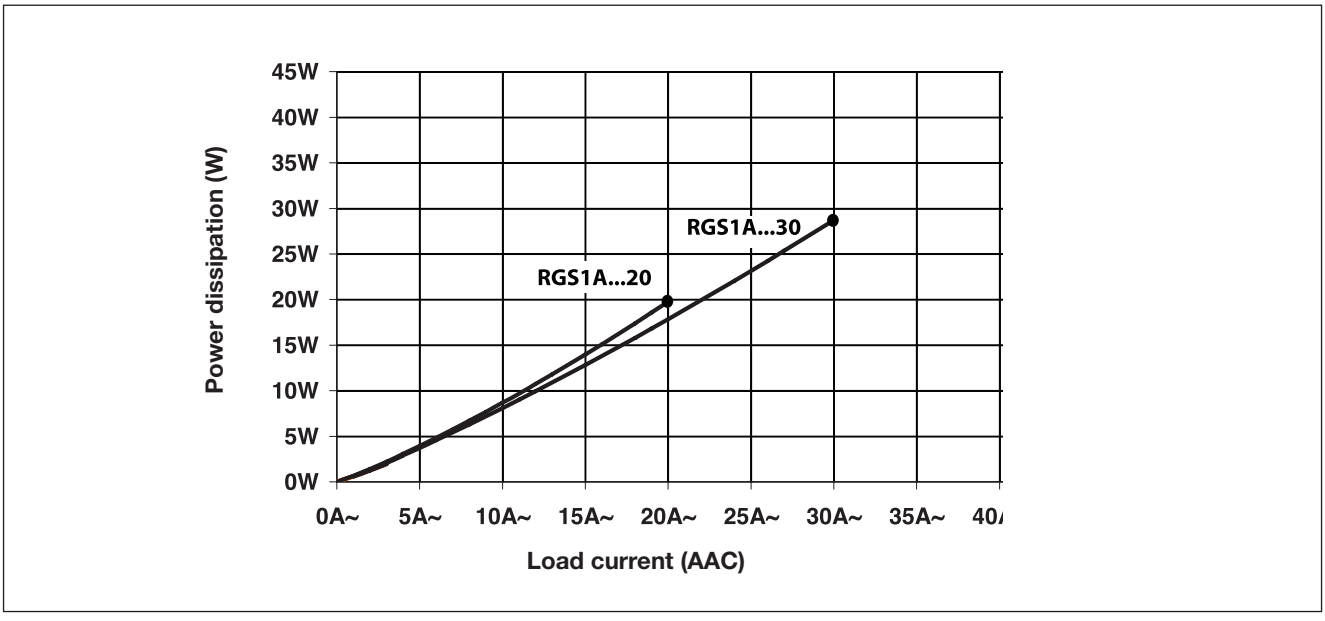
7 Overload profile for AC-53a: Ie: AC-53a: x-Tx: F-S,
where Ie = nominal current (AC-53a AAC), x = overload current factor, Tx = duration of overload current (s), F = duty cycle (%), S = number of starts per hour.
Example; 8A: AC-53a: 6 - 6 : 50 - 30 = max. 30 starts for the RGS..30 with an overload profile of 48A for 6 seconds with a duty cycle of 50%

Output Specifications for RGS1A60D20KGUDIN

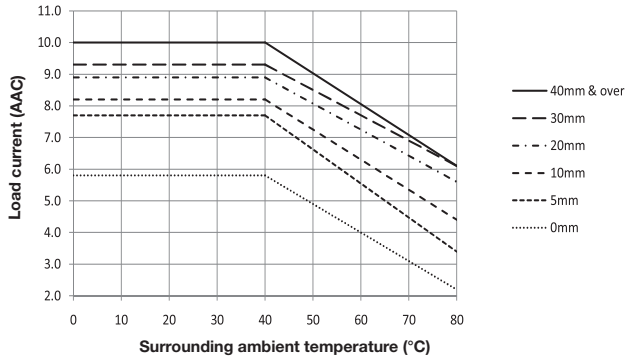
Rated operational current AC-51 rating @ Ta=40°C, (IEC60947-4-3/UL508)[8]	10 AAC
Minimum operational current	150 mAAC
Maximum trasient surge current (I_{TSM}), t=10ms	325 Ap
Maximum off-state leakage current @ rated voltage	3 mAAC
I^2t for fusing (t=10ms), Minimum	525 A^2s
Crititcal dv/dt (@ Tj init = 40°C)	1000 V/us

8: Refer to Derating vs. Spacing Curves

Output Power Dissipation



Derating vs. Spacing Curves for RGS...DIN



Heatsink Selection

RGS1..30

Load current [A]	Thermal resistance [°C/W]						
32	2.6	2.3	2.0	1.6	1.3	0.98	0.66
29	3.0	2.6	2.2	1.9	1.5	1.1	0.74
25.5	3.4	3.0	2.6	2.1	1.7	1.3	0.86
22.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
19	4.8	4.2	3.6	3.0	2.4	1.8	1.2
16	5.9	5.2	4.5	3.7	3.0	2.2	1.5
13	7.7	6.7	5.8	4.8	3.8	2.9	1.9
9.5	10.7	9.3	8.0	6.7	5.3	4.0	2.7
6.5	16.9	14.8	12.7	10.6	8.5	6.3	4.2
3.2	---	---	---	---	18.4	13.8	9.2
	20	30	40	50	60	70	80 T_A

Ambient temp [°C]

RGS1..30..HT

Load current [A]	Thermal resistance [°C/W]						
32	2.3	2.0	1.6	1.3	0.98	0.65	0.33
29	2.8	2.4	2.0	1.6	1.3	0.9	0.52
25.5	3.4	2.9	2.5	2.1	1.6	1.2	0.78
22.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
19	4.8	4.2	3.6	3.0	2.4	1.8	1.2
16	5.9	5.2	4.5	3.7	3.0	2.2	1.5
13	7.7	6.7	5.8	4.8	3.8	2.96	1.9
9.5	10.7	9.3	8.0	6.7	5.3	4.0	2.7
6.5	16.9	14.8	12.7	10.6	8.5	6.3	4.2
3.2	---	---	---	---	18.4	13.8	9.2
	20	30	40	50	60	70	80 T_A

Ambient temp [°C]

Maximum junction temperature	125°C
Heatsink temperature	100°C
Junction to case thermal resistance, Rthjc	<0.3 °C/W
Case to heatsink thermal resistance, Rthcs[9]	< 0.25 °C/W

Maximum junction temperature	125°C
Heatsink temperature	100°C
Junction to case thermal resistance, Rthjc	<0.3 °C/W
Case to heatsink thermal resistance, Rthcs	< 0.85 °C/W

9: Thermal resistance case to heatsink valves are applicable upon application of a fine layer of silicon based thermal paste HTS02S from Electrolube between SSR and heatsink.

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Agency Approvals and Conformance

Conformance	IEC/EN 62314 IEC/EN 60947-4-2 IEC/EN 60947-4-3	Agency Approvals	UL508 Recognised (E172877) CSA 22.2 No.14-13 (204075) VDE 0660-109
		Short circuit current rating	100kA, UL508

Electromagnetic Compatibility

EMC Immunity	EN 60947-4-3	**Radiated Radio Frequency Immunity**	IEC/EN 61000-4-3
Electrostatic Discharge (ESD) Immunity	IEC/EN 61000-4-2	10V/m, 80 - 1000 MHz 10V/m, 1.4 - 2.0GHz 3 V/m, 2.0 - 2.7GHz	Performance Criteria 1 Performance Criteria 1 Performance Criteria 1
Air discharge, 8kV	Performance Criteria 1	**Conducted Radio Frequency Immunity**	IEC/EN 61000-4-6
Contact, 4kV	Performance Criteria 1	10V/m, 0.15 - 80 MHz	Performance Criteria 1
Electrical Fast Transient (Burst) Immunity	IEC/EN 61000-4-4	**Voltage Dips Immunity**	IEC/EN 61000-4-11
Output: 2kV, 5kHz	Performance Criteria 1	0% for 0.5, 1 cycle 40% for 10 cycles 70% for 25 cycles 80% for 250 cycles	Performance Criteria 2 Performance Criteria 2 Performance Criteria 2 Performance Criteria 2
Input: 1kV, 5kHz	Performance Criteria 1	**Voltage Interruptions Immunity**	IEC/EN 61000-4-11
Electrical Surge Immunity	IEC/EN 61000-4-5	0% for 5000ms	Performance Criteria 2
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		

EMC Emission	EN 60947-4-3	**Radio Interference Field Emission (Radiated) 30 - 1000MHz**	IEC/EN 55011 Class A (industrial)
Radio Interference Voltage Emission (Conducted) 0.15 - 30MHz	IEC/EN 55011 Class A (industrial) with filters - see filter information		

Notes:

- Control input lines must be installed together to maintain products' susceptability 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 in 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.

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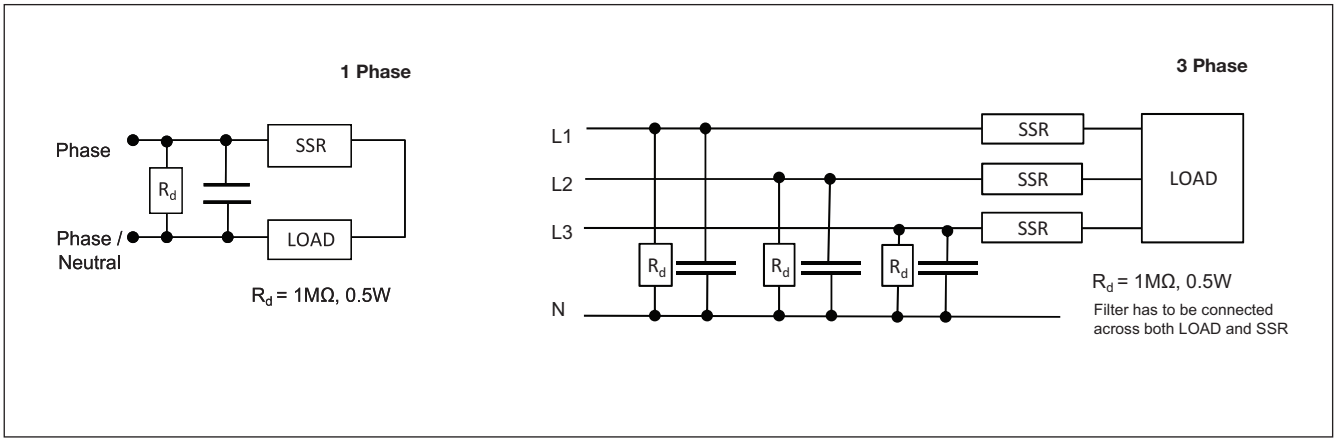
Filtering - IEC/EN 55011 Class A compliance (for class B compliance contact us)

Part Number	Suggested filter for compliance	Maximum Heater current
RGS1..20	100 nF / 760 V / X1	10 A
RGS1..30	330 nF / 760 V / X1	30 A

Filter Connection Diagram



Additional Conformance to Railway Standards

Applicable to variants	RGS..
Additional conformance specific to Railway applications	EN 50155 EN 45545-2 EN 50121-3-2
Hazardous level conformance according to EN 45545-2	HL1, HL2 for requirement R23 HL1 for requirement R22
Operating temperature class according to EN 50155	OT3 (-25 °C to +70 °C)
Vibration and shock	EN 61373 Category 1, Class B

Additional EMC conformance	according to EN 50121-3-2
Radiated radio frequency Immunity	IEC/EN 61000-4-3
20V/m, 80 MHz - 1 GHz	Performance Criteria 1
10V/m, 1.4 - 2 GHz	Performance Criteria 1
5V/m, 2 - 2.7 GHz	Performance Criteria 1
3V/m, 5.1 - 6 GHz	Performance Criteria 1
Power Quality Measurement 50 Hz - 2 kHz, <8% THD	IEC/EN 61000-4-30 Pass

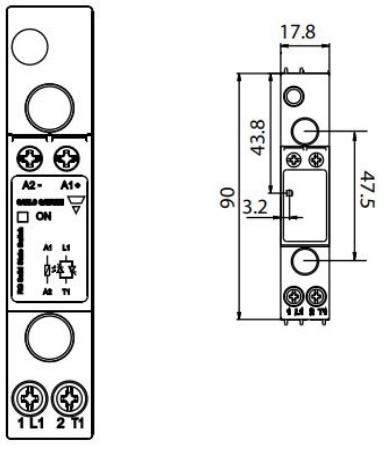
Environmental Specifications

Operating temperature	-40°C to 80°C (-40°F to +176°F)
Storage temperature	-40°C to 100°C (-40°F to +212°F)
EU RoHS compliant	Yes
China RoHS compliant	Refer to Environmental Information (page 10)
Impact resistance (EN 50155, EN 61373)	15/11 g/ms
Vibration resistance (2-100Hz, IEC60068-2-6, EN 50155, EN 61373)	5g per axis

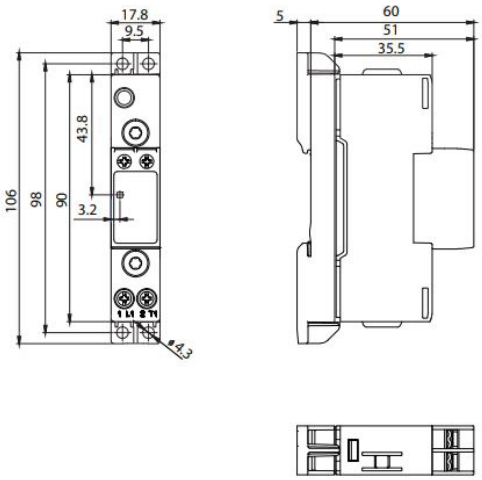
Relative humidity	95% non-condensing @ 40°C
UL flammability rating (housing)	UL 94 V0 Glow wire ignition temperature and Glow wire flammability index conform to EN 60335-1 requirements
Installation altitude	0-1000m. Above 1000m derate linearly by 1% of FLC per 100m up to a maximum of 2000m
Weight RGS...DIN	approx. 103g approx. 155g

Terminal Layout and Dimensions

RGS..KGU



RGS..KGUDIN

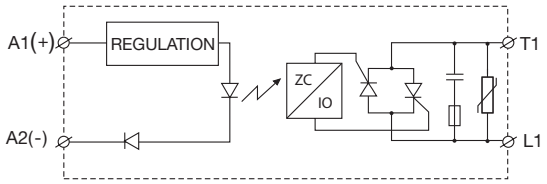


1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
A2 (-): Control ground

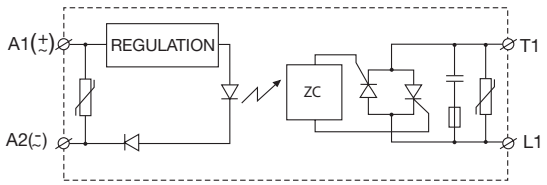
Housing width tolerance +0.5mm, -0mm…as per DIN43880
All other tolerances: ± 0.5mm
All dimensions in mm

Functional Diagram

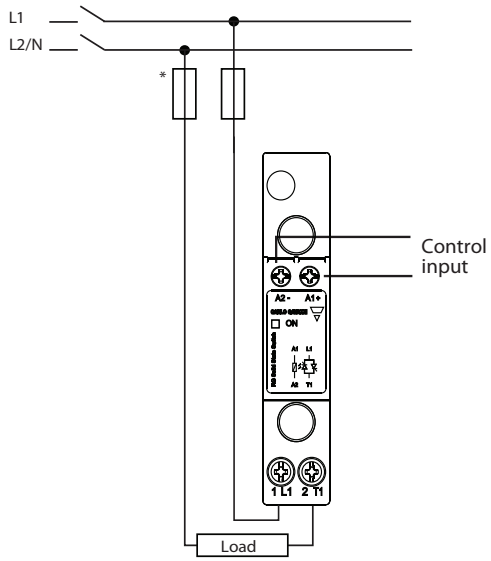
DC control



AC control

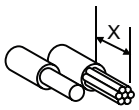


Connection Diagram



* depends on system requirements

Connection Specifications

		POWER: 1/L1, 2 /T1 Use 75°C copper (Cu) conductors	CONTROL: A1(+), A2(-) Use 60/75°C copper (Cu) conductors	
Stripping Length (X)		12mm	8mm	
Connection type		M3.5 with box clamp	M3 with captivated washer	
Rigid (Solid & Stranded) UL/ CSA rated data		 1x 1..6 mm² 1x 18..10 AWG	 2x 0.5..2.5mm² 2x 18..12 AWG	 1x 0.5..2.5mm² 1x 18..12 AWG
Flexible with end sleeve		1x 0.5..2.5 mm² 1x 20..14 AWG	2x 0.5..2.5mm² 2x 18..12 AWG	1x 0.5..2.5mm² 1x 18..12 AWG
Flexible without end sleeve		1x 1..4 mm² 1x 18..12 AWG		
Torque specifications		Pozidriv 1 UL: 1 Nm (8.85 lb-in) IEC: 0.9 - 1.1 Nm (8.0 - 9.7 lb-in)	Pozidriv 1 UL: 0.5 Nm (4.4 lb-in) IEC: 0.5 - 0.6 Nm (4.4 - 5.3 lb-in)	

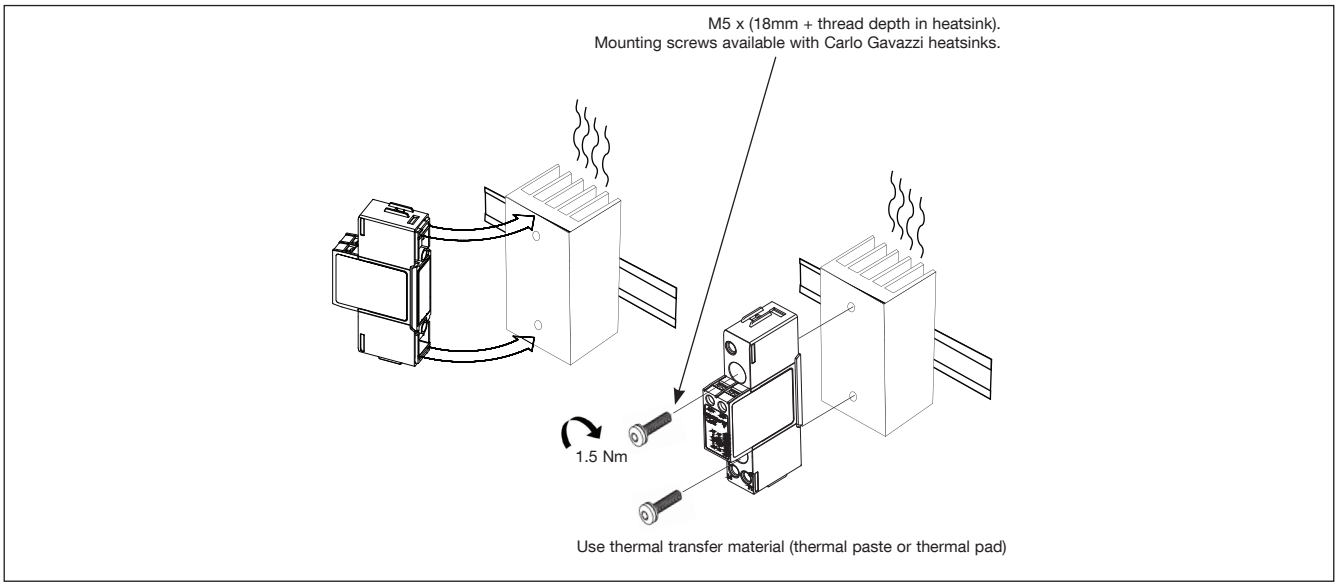
Mounting Instructions

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 fine layer of thermally conductive silicone paste must be evenly applied to the back of the SSR. RGS should be mounted on the heatsink with two M5 x 30mm screws (**SRWKITM5X30MM**).

Gradually tighten each screw (alternating between the two) until both are tightened with a torque of 0.75 Nm. Then tighten both screws to their final mounting torque of 1.5 Nm.

In case of a thermal pad attached to the back of the SSR, no thermal paste is required. The RGS is gradually tightened (alternating between the 2 screws) to a maximum torque of 1.5Nm.



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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 condcutors ot terminals and the condcutors 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 100,000A rms Symmetrical Amperes, 600Volts maximum when protected by fuses. Tests at 100,000A were performed with Class J, fast acting; please refer to the table below for maximum allowed ampere rating of the fuse. Use fuses only.

Co-ordination type 1 (UL 508)

Part No.	Prospective short circuit current [kArms]	Max. fuse size [A]	Class	Voltage [VAC]
RGS..20	100	10	J	max. 600
	100	15	CC	max. 600
RGS..30	100	30	J or CC	max. 600

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

Part No.	Prospective short circuit current [kArms]	Ferraz Shawmut (Mersen)		Siba		Voltage [VAC]
		Max fuse size [A]	Part number	Max fuse size [A]	Part number	
RGS..20	100	32	6.9xx CP URD 22x58 /32	32	50 142 06.32	max. 660
RGS..30	100	40	A70QS40-4	32	50 142 06.32	max. 660

xx = 00 for fuse without trip indication, = 21 for fuse with fuse trip indication

Type 2 Protection with Miniature Circuit Breakers (M. C. B.s)

Solid State Relay type	ABB Model no. for Z - type M. C. B. (rated current)	ABB Model no. for B - type M. C. B. (rated current)	Wire cross sectional area [mm^2]	Minimum length of Cu wire conductor [m][10]
RGS..20 (525 A^{2}s)	**1-pole**			
	S201 - Z4 (4A)	S201 - B2 (2A)	1.0	21.0
	S201 - Z6 UC (6A)	S201 - B2 (2A)	1.0	21.0
			1.5	31.5
RGS..30 (1800 A^{2}s)	**1-pole**			
	S201 - Z10 (10A)	S201-B4 (4A)	1.0	7.6
			1.5	11.4
			2.5	19.0
	S201 - Z16 (16A)	S201-B6 (6A)	1.0	5.2
			1.5	7.8
			2.5	13.0
			4.0	20.8
	S201 - Z20 (20A)	S201-B10 (10A)	1.5	12.6
			2.5	21.0
	S201 - Z25 (25A)	S201-B13 (13A)	2.5	25.0
			4.0	40.0
	2-pole			
	S202 - Z25 (25A)	S202-B13 (13A)	2.5	19.0
			4.0	30.4

10. Between MCB and Load (including return path which goes back to the mains).

Note: A prospective current of 6kA and a 230/400V power supply system is assumed for the above suggested specifications. For cables with different cross section than those mentioned above please consult Carlo Gavazzi's Technical Support Group.

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Environmental Information

The declaration in this section is prepared in compliance with People's Republic of China Electronic Industry Standard SJ/T11364-2014: Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products.

Part Name	Toxic or Harardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Power Unit Assembly	x	O	O	O	O	O
O: Indicates that said hazardous substance contained in homogeneous materials fot this part are below the limit requirement of GB/T 26572. X: Indicates that said hazardous substance contained in one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.						

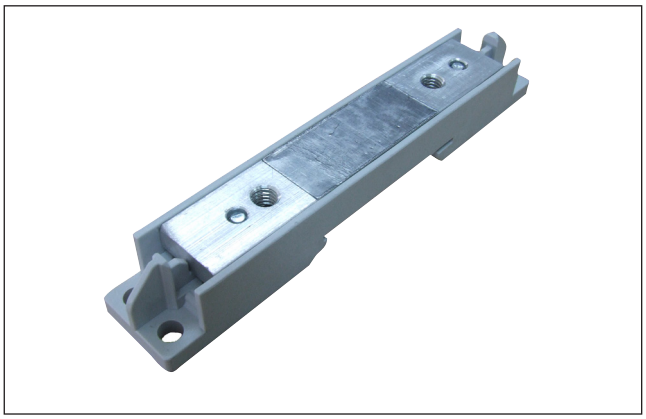
环境特性

这份申明根据中华人民共和国电子工业标准
SJ/T11364-2014：标注在电子电气产品中限定使用的有害物质

零件名称	有毒或有害物质与元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴化联苯 (PBB)	多溴联苯醚 (PBDE)
功率单元	x	O	O	O	O	O
O:此零件所有材料中含有的该有害物低于GB/T 26572的限定。 X: 此零件某种材料中含有的该有害物高于GB/T 26572的限定。						

Accessories

RG DIN Clip

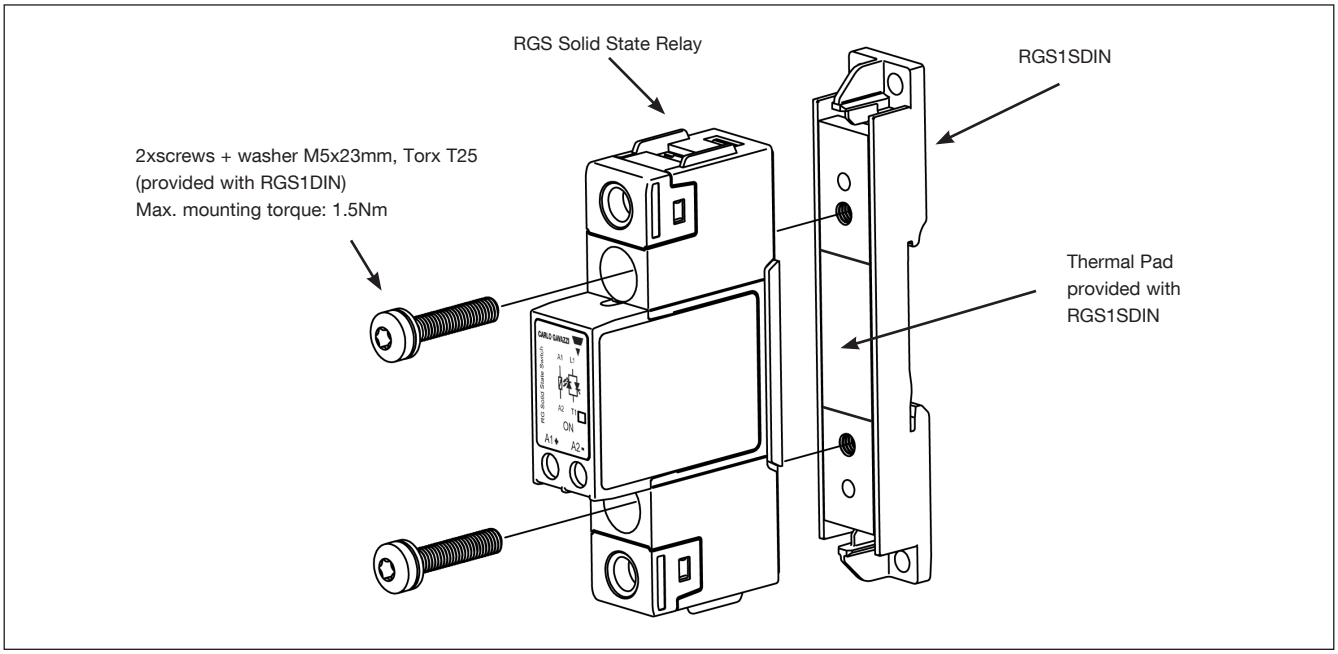


Ordering Key

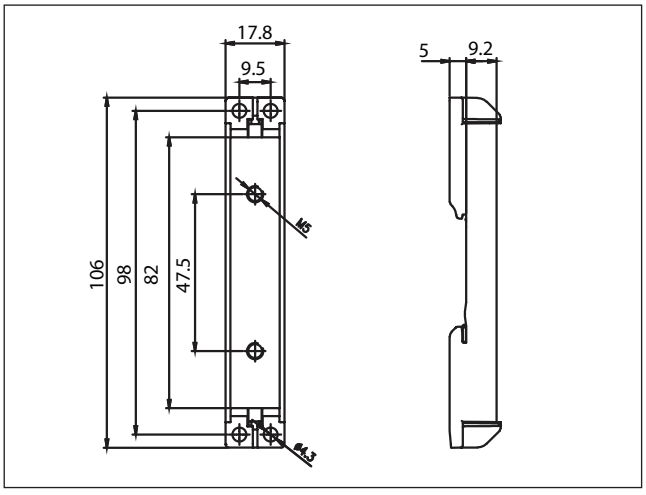
DIN clip mounted to RGS	**RGS....DIN**
DIN clip accessory	**RGS1DIN**

This DIN Clip accessory can be mounted to any RGS model and will enable the RGS to be DIN rail mount. Minimum current rating @ 40°C is 10 AAC. Refer to 'Current Derating' section. Gradually tighten the SSR, alternating between the 2 screws, to a maximum torque of 1.5Nm.

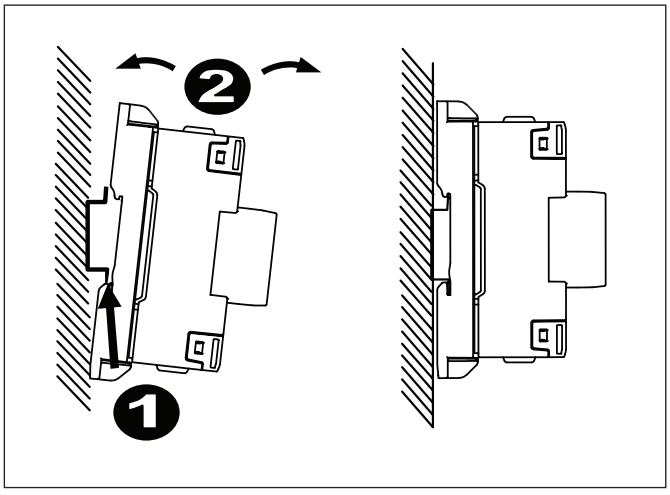
Mounting Instructions for RGS1DIN to RGS



RGS1DIN Dimensions

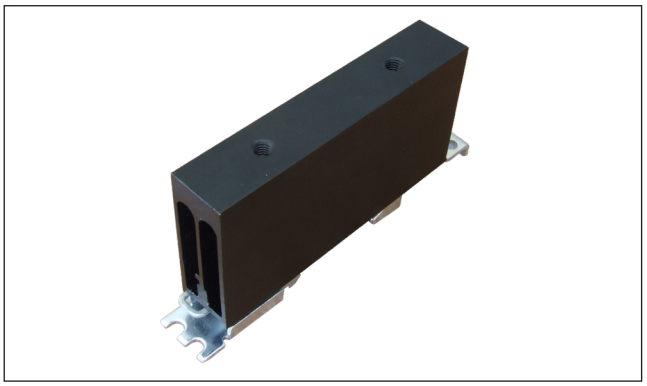


Installation Instructions



Accessories (cont.)

Heatsinks



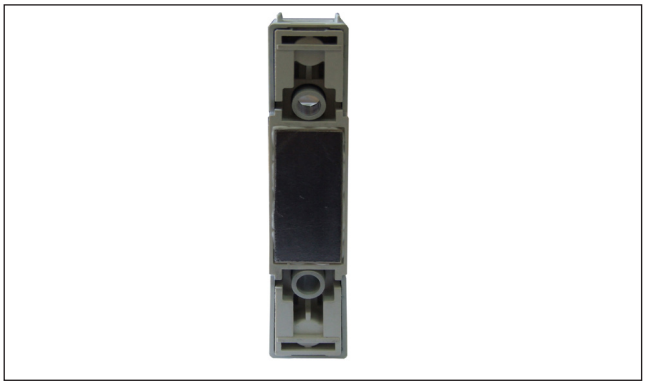
Ordering Key

	RHS..
RGS mounted on heatsink	**RGS..H..**

Heatsink Range Overview:
https://gavazziautomation.com/images/PIM/DATASHEET/ENG/SSR_Accessories.pdf

Heatsink Selector Tool:
https://gavazziautomation.com/nsc/hq/en/solid_state_relays

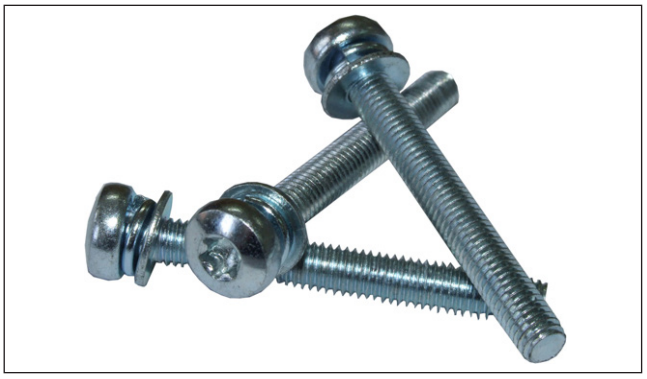
Thermal Pads



Ordering Key

Thermal pad mounted on RGS	**RGS...HT**
Pack of 10 thermal pads size 34.6 x 14mm	**RGHT**

Screw Kits



Ordering Key

SRWKITM5X30MM

- RGS Screw kit for mounting to heatsink
- Torx T20, size M5 x 30 mm
- Packing qty: 20 pcs

Packaging

Ordering Key

RGS...X40

Bulk packaging of 40 pcs. RGS...