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# 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 660VAC
- Rated Operational current: up to 30AAC
- Up to 1800A<sup>2</sup>s for I<sup>2</sup>t
- Control voltages: 4-32 VDC, 20-275 VAC (24-190VDC)
- Design according to IEC/EN60947-4-2, IEC/EN60947-4-3, IEC/EN62314, UL508, CSA22.2 No. 14-13
- Integrated voltage transient protection with varistor
- 100 kA short circuit current rating according to UL508
- Option for DIN mounting (RGS...DIN)



## Product Description

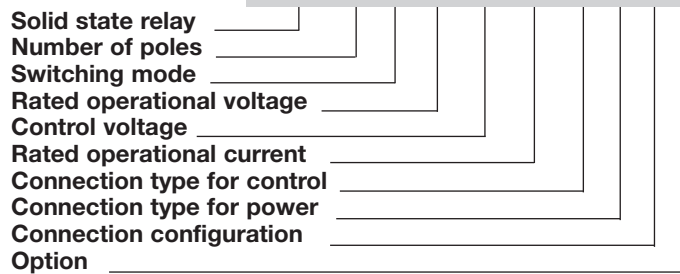
Aim of this solid state switching device is to switch heater loads and motor loads frequently. This range offers solutions up to 30AAC in 17.5mm width. Input connections are via a screw connection, having a captivated washer allowing for safe loop- ing. Output connections are

provided via box clamps. Other options with integrated heatsink are available in RGC ranges.

The **RGS...DIN** provides an option for DIN mounting of the RGS series. AC51 rating @ 40°C is 10AAC.

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

## Ordering Key **RGS 1 A 60 D 30 K G U**



## Ordering Key

1 Phase SSR with no heatsink	Rated voltage	Control voltage	Rated current, Blocking voltage	Connection control	Connection power	Connection configuration	Options <sup>1</sup>
<b>RGS1A: ZC*</b>	60: 600V +10% -15%	D: 4 - 32 VDC	30: 30A, 1200Vp	K: Screw	G: Box clamp	U: SSR	HT: Thermal pad
<b>RGS1B: IO**</b>		A: 20 - 275VAC (24-190 VDC)					H51: Heatsink RHS37A DIN: DIN rail mount X40: Bulk packaging of 40pcs.

1. Add suffix 'HT' to RGS part number for RGS with attached thermal pad. Add suffix 'H51' to RGS part number for factory mounted RGS on heatsink RHS37A. Add suffix 'DIN' to RGS part number for DIN rail mountable RGS.

\* ZC: Zero cross switching  
\*\*IO: Instant-On switching

## Selection Guide - RGS..

Rated voltage, Blocking voltage	Switching mode	Connection control / power	Control voltage	Max. rated operational current (I <sup>2</sup> t value)
600VAC, ZC	1200Vp	Screw/Box clamp	4-32VDC	<b>30 AAC (1800 A<sup>2</sup>s)</b>
		Screw/Box clamp	20-275VAC, 24-190VDC	RGS1A60D30KGU
				RGS1A60A30KGU
600VAC, IO	1200Vp	Screw/Box clamp	4-32VDC	RGS1B60D30KGU

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

Rated voltage, Blocking voltage	Switching mode	Connection control / power	Control voltage	Rated operational current @ 40°C (I <sup>2</sup> t value)
600VAC, ZC	1200Vp	Screw/Box clamp	4-32VDC	<b>10 AAC (525 A<sup>2</sup>s)</b>
				RGS1A60D20KGUDIN



## Output Voltage Specifications

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

## General Specifications

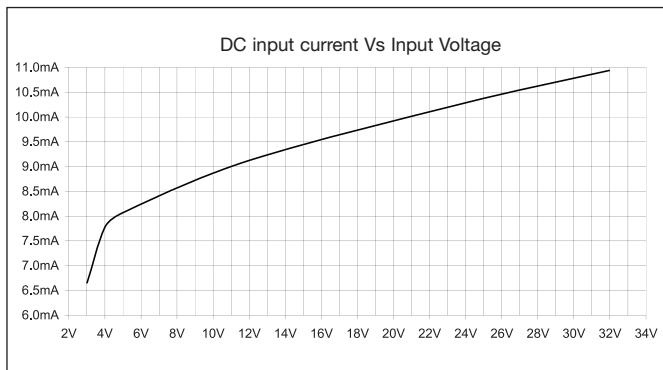
Latching voltage (across L1-T1)	20V	Pollution degree	2 (non-conductive pollution with possibilities of condensation)
Operational frequency range	45 to 65Hz	Rated impulse withstand	6 kV (1.2/50µs) for voltage, Uimp
Power factor	> 0.5 @ Vrated	Over-voltage category	III (fixed installations)
CE marking	Yes	Isolation	
Touch 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

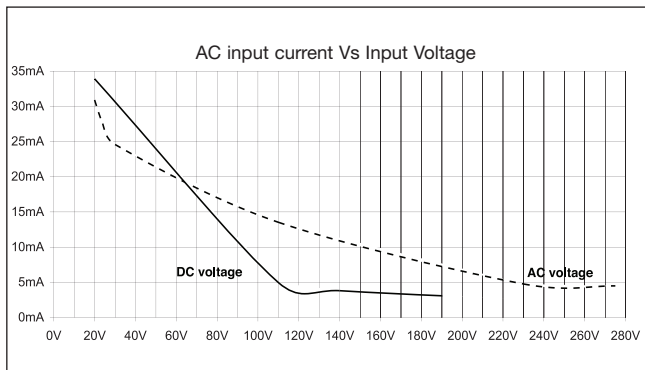
	RGS..D.. <sup>2</sup>	RGS..A..
Control voltage range	4 - 32 VDC	20 - 275 VAC, 24 (-10%) - 190 VDC
Pick-up voltage	3.8 VDC	20 VAC/DC
Drop-out voltage	1 VDC	5 VAC/DC
Maximum Reverse voltage	32 VDC	-
Response time pick-up (RGS1A..)	0.5 cycle + 500µs @ 24VDC	2 cycles @ 230VAC/110VDC
Response time pick-up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

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

### RG..D..



### RG..A..



## Motor Ratings<sup>3</sup>: HP (UL508) / 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

3: Refer to Heatsink Selection table

## Output Specifications

Rated operational current AC-51 rating @ Ta=40°C (IEC60947-4-3/UL508) <sup>3</sup>	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 <sup>3, 4</sup>	30
Min. operational current	250 mAAC
Rep. overload current - (Motor rating) PF = 0.4-0.5 UL508: T <sub>AMB</sub> =40°C, t <sub>ON</sub> =1s, t <sub>OFF</sub> =9s, 50cycles	84 AAC
Maximum transient surge current (I <sub>TSM</sub> ), t = 10ms	600Ap
Maximum Off-state leakage current @ rated voltage	3 mAAC
I <sup>2</sup> t for fusing (t=10ms) Minimum	1800A <sup>2</sup> s
Critical dv/dt (@ T <sub>j</sub> init = 40°C)	1000V/μs

4: Overload profile for AC-53a;

le: AC-53a: x-Tx: F-S, where le = nominal current (AC-53a AAC), x = overload current, 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 with an overload profile of 48A for 6 seconds with a duty cycle of 50%

## Output Specifications for RGS..DIN

	RGS..20..DIN
Rated operational current <sup>5</sup> AC-51 rating @ Ta = 40°C AC-53a rating @ Ta = 40°C	10 AAC 5 AAC
Min. operational current	150 mA
Maximum transient surge current I <sub>TSM</sub> , t=10ms	325Ap
Maximum Off-state leakage current @ rated voltage	3 mAAC
I <sup>2</sup> t for fusing (t=10ms) Minimum	525 A <sup>2</sup> s
Critical dv/dt (@ T <sub>j</sub> init = 40°C)	1000V/μs

5. Refer to Derating Curves

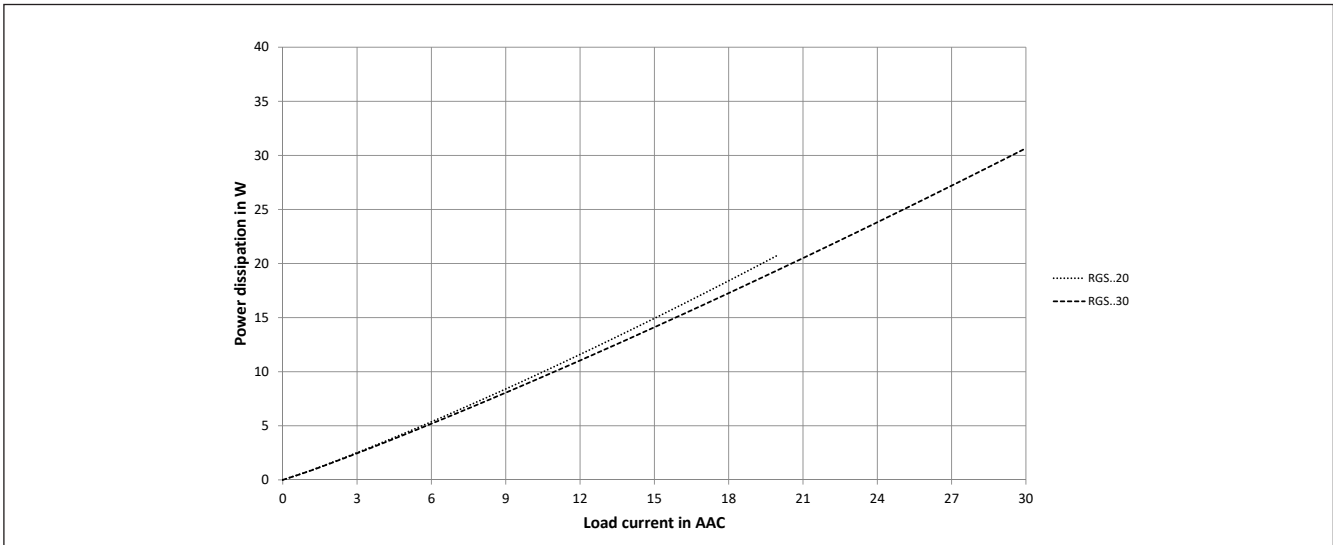
## Agency Approvals and Conformances

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

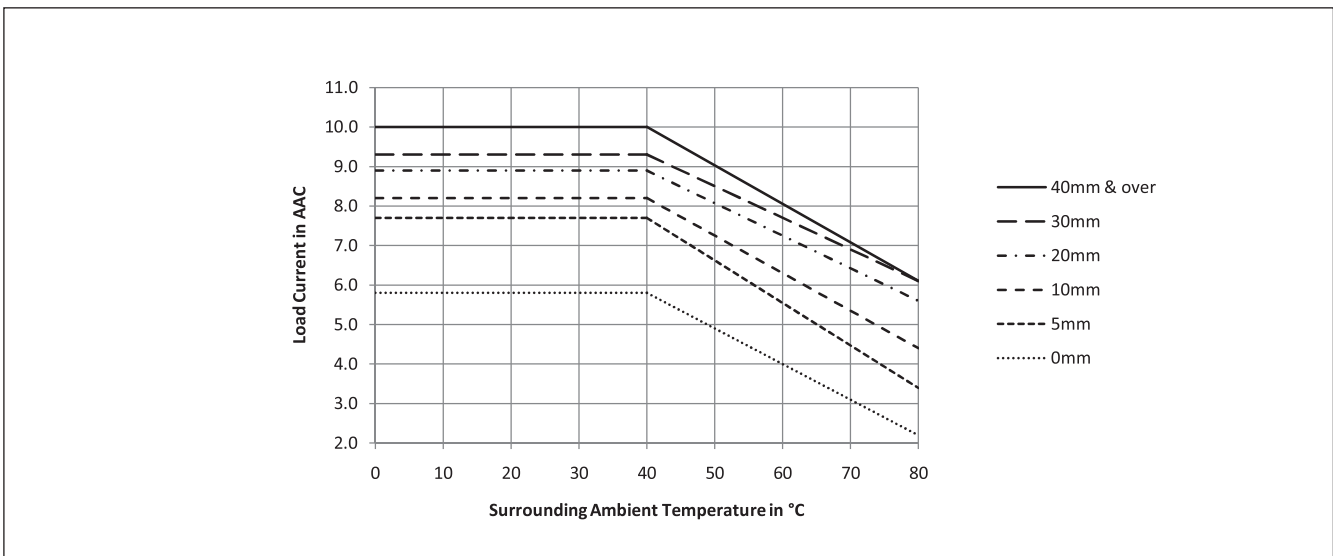




## Output Power Dissipation



## Derating vs. Spacing Curves for RGS...DIN



## Electromagnetic Compatibility

<b>EMC Immunity</b>	EN 60947-4-3	<b>Radiated Radio Frequency Immunity</b>	IEC/EN 61000-4-3
<b>Electrostatic Discharge (ESD) Immunity</b>	IEC/EN 61000-4-2	10V/m, 80 - 1000 Mhz	Performance Criteria 1
Air discharge, 8kV	Performance Criteria 1	10V/m, 1.4 - 2.0GHz	Performance Criteria 1
Contact, 4kV	Performance Criteria 1	3 V/m, 2.0 - 2.7GHz	Performance Criteria 1
<b>Electrical Fast Transient (Burst) Immunity</b>	IEC/EN 61000-4-4	<b>Conducted Radio Frequency Immunity</b>	IEC/EN 61000-4-6
Output: 2kV, 5kHz	Performance Criteria 1	10V/m, 0.15 - 80 MHz	Performance Criteria 1
Input: 1kV, 5kHz	Performance Criteria 1	<b>Voltage Dips Immunity</b>	IEC/EN 61000-4-11
<b>Electrical Surge Immunity</b>	IEC/EN 61000-4-5	0% for 0.5, 1 cycle	Performance Criteria 2
Output, line to line, 1kV	Performance Criteria 1	40% for 10 cycles	Performance Criteria 2
Output, line to earth, 2kV	Performance Criteria 1	70% for 25 cycles	Performance Criteria 2
Input, line to line, 1kV	Performance Criteria 2	80% for 250 cycles	Performance Criteria 2
Input, line to earth, 2kV	Performance Criteria 2	<b>Voltage Interruptions Immunity</b>	IEC/EN 61000-4-11
		0% for 5000ms	Performance Criteria 2
<b>EMC Emission</b>	EN 60947-4-3	<b>Radio Interference Field Emission (Radiated)</b>	IEC/EN 55011
<b>Radio Interference Voltage Emission (Conducted) 0.15 - 30MHz</b>	IEC/EN 55011	<b>30 - 1000MHz</b>	Class A (industrial)
	Class A (industrial) with filters - see filter information		

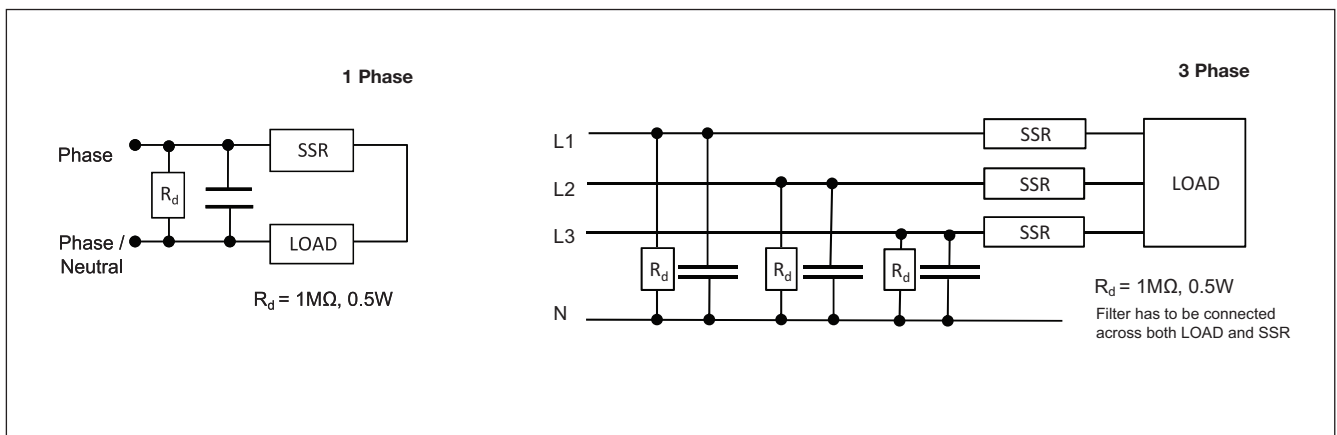
Note:

- 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.

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

Part Number	Suggested filter for compliance	Maximum Heater current
RGS1A60..20	100 nF / 760 V / X1	10 A
RGS1A60..30	330 nF / 760 V / X1	30 A

## Filter Connection Diagram

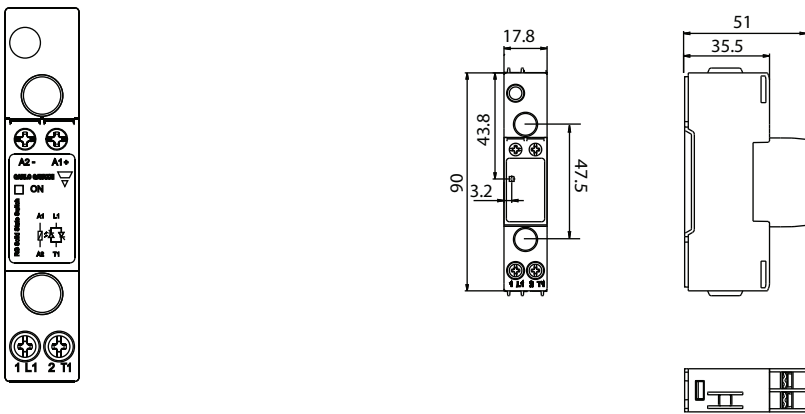


## Environmental Specifications

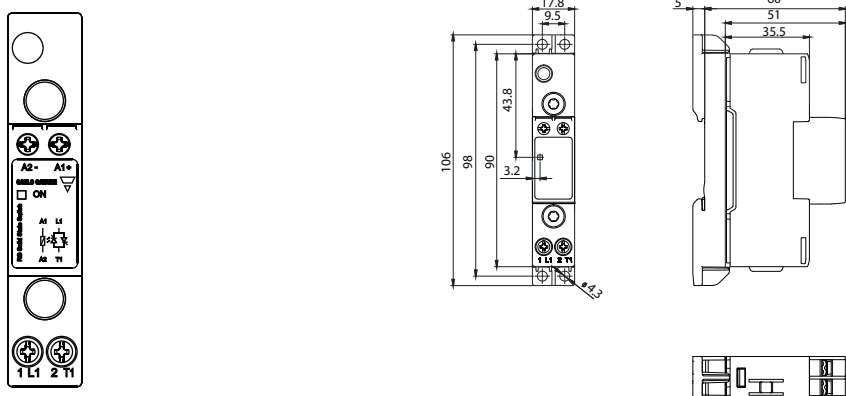
Operating temperature	-40°C to 80°C (-40°F to +176°F)	Relative humidity	95% non-condensing @ 40°C
Storage temperature	-40°C to 100°C (-40°F to +212°F)	UL flammability rating (housing)	UL 94 V0 Glow wire ignition temperature and Glow wire flammability index conform to EN 60335-1 requirements
EU RoHS compliant	Yes	Installation altitude	0-1000m. Above 1000m derate linearly by 1% of FLC per 100m up to a maximum of 2000m
China RoHS compliant	Refer to Environmental Information (page 10)	Weight	approx. 103g approx. 155g
Impact resistance (EN 50155, EN 61373)	15/11 g/ms		
Vibration resistance (2-100Hz, IEC60068-2-6, EN 50155, EN 61373)	5g per axis	RGS...DIN	

## Terminal Layout and Dimensions

**RGS ....KGU**



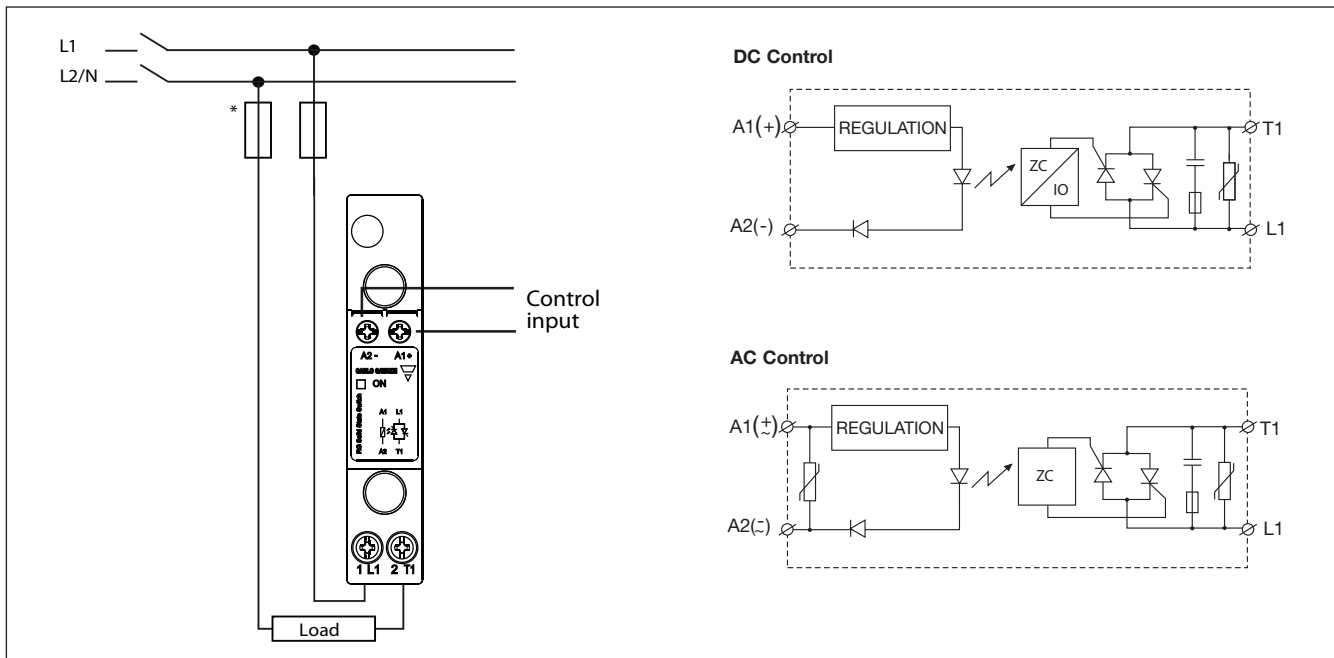
**RGS ....KGUIDIN**



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.

## Connection Diagram



## Connection Specifications

### POWER CONNECTIONS: 1/L1, 2 /T1

#### Torque specifications

Use 60°C copper (Cu) conductors

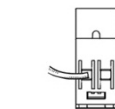
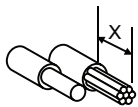


M3.5, Pozidriv 1  
 UL: 1Nm (8.85lb-in)  
 IEC: 0.9 - 1.1Nm (8.0 - 9.7 lb-in)  
 12mm

#### Stripping Length (X)

#### Rigid (Solid & Stranded)

UL/ CSA rated data



1 x 1..6 mm<sup>2</sup>  
 1 x 18..10 AWG

#### Flexible with end sleeve



1 x 0.5..2.5mm<sup>2</sup>  
 1 x 20..14AWG

#### Flexible without end sleeve



1 x 1..4 mm<sup>2</sup>  
 1 x 18..12 AWG

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

#### Torque specifications

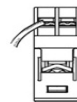
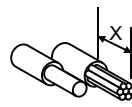
Use 60/75°C copper (Cu) conductors



M3, Pozidriv 1  
 UL: 0.5Nm (4.4lb-in)  
 IEC: 0.5 - 0.6Nm (4.4 - 5.3 lb-in)  
 8mm

#### Stripping Length (X)

#### Rigid (Solid & Stranded)



2 x 0.5..2.5mm<sup>2</sup> 1 x 0.5..2.5mm<sup>2</sup>  
 2 x 18..12 AWG 1 x 18..12 AWG

#### Flexible with end sleeve



2 x 0.5..2.5mm<sup>2</sup> 1 x 0.5..2.5mm<sup>2</sup>  
 2 x 18..12AWG 1 x 18..12AWG



# Heatsink Selection

## RGS1...30

Load current [A]	Thermal resistance [°C/W]						
	20	30	40	50	60	70	80
32.0	2.62	2.29	1.97	1.64	1.31	0.98	0.66
28.8	2.98	2.60	2.23	1.86	1.49	1.12	0.74
25.6	3.43	3.00	2.57	2.14	1.71	1.29	0.86
22.4	4.01	3.51	3.01	2.51	2.01	1.51	1.00
19.2	4.81	4.21	3.61	3.01	2.41	1.80	1.20
16.0	5.94	5.20	4.46	3.71	2.97	2.23	1.49
12.8	7.69	6.73	5.76	4.80	3.84	2.88	1.92
9.6	10.68	9.34	8.01	6.67	5.34	4.00	2.67
6.4	16.89	14.78	12.67	10.56	8.45	6.33	4.22
3.2	---	---	---	---	18.38	13.79	9.19

T<sub>A</sub>  
Ambient temp [°C]

## RGS1...30..HT

Load current [A]	Thermal resistance [°C/W]						
	20	30	40	50	60	70	80
32.0	2.29	1.96	1.64	1.31	0.98	0.65	0.33
28.8	2.76	2.39	2.01	1.64	1.27	0.90	0.52
25.6	3.35	2.92	2.49	2.06	1.63	1.21	0.78
22.4	4.01	3.51	3.01	2.51	2.01	1.51	1.00
19.2	4.81	4.21	3.61	3.01	2.41	1.80	1.20
16.0	5.94	5.20	4.46	3.72	2.97	2.23	1.49
12.8	7.69	6.73	5.77	4.80	3.84	2.88	1.92
9.6	10.68	9.34	8.01	6.67	5.34	4.00	2.67
6.4	16.89	14.78	12.67	10.56	8.45	6.33	4.22
3.2	---	---	---	---	18.38	13.79	9.19

T<sub>A</sub>  
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 <sup>6</sup>	< 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

6: 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.

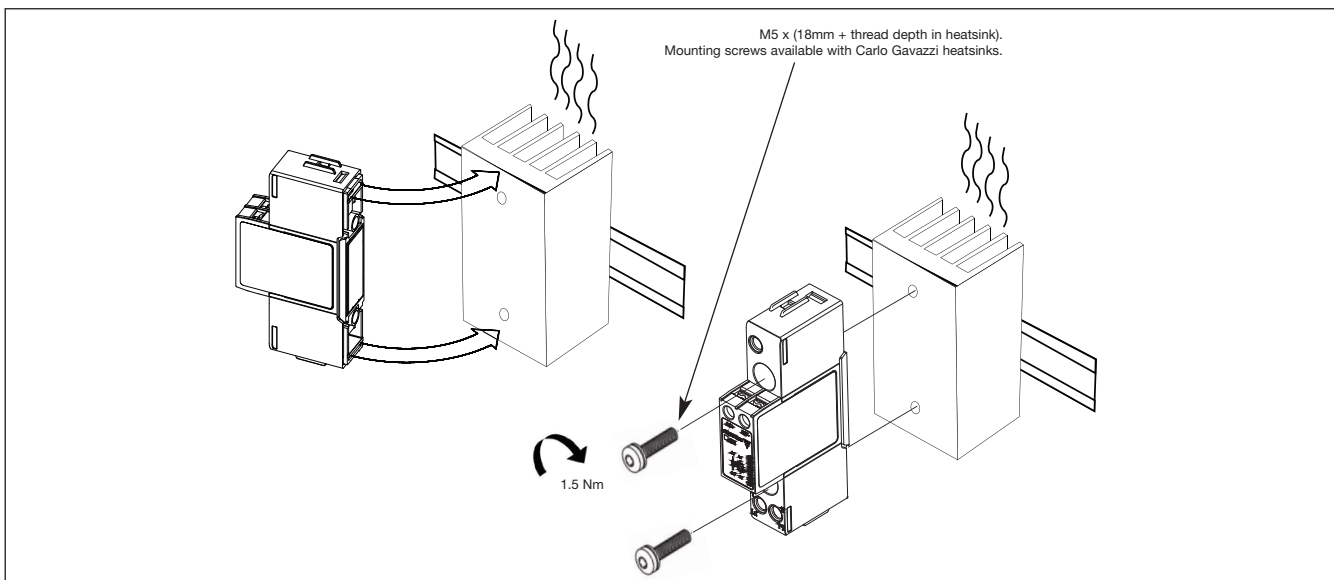
## Mounting Instructions

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. Gradually tighten each screw (alternating between the two)

until both are tightened with a torque of 0.75Nm. Then tighten both screws to their final mounting torque of 1.5Nm.

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



## 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 100,000A rms Symmetrical Amperes, 600 Volts 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. Tests with class J fuses are representative of Class CC fuses.

### Co-ordination type 1 (UL508)

Part no.	Max. fuse size [A]	Class	Current [kA]	Voltage [VAC]
RGS..20	10	J	100	Max. 600
	15	CC	100	Max. 600
RGS..30	30	J or CC	100	Max. 600

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

Part No.	Ferraz Shawmut		Siba		Current [kA]	Voltage [VAC]
	Max fuse size [A]	Part number	Max fuse size [A]	Part number		
RGS..20	32	6.9xx CP URD 22x58/32, (xx = 00 or 21)	32	50 142 06.32	100	Max. 600
RGS..30	40	A70QS40-4	32	50 142 06.32	100	Max. 600

### 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 <sup>2</sup> ]	Minimum length of Cu wire conductor [m] <sup>7</sup>		
RGS..20 (525 A <sup>2</sup> s)	1 pole S201 - Z4 (4A) S201 - Z6 UC (6A)	S201 - B2 (2A) S201 - B2 (2A)	1.0	21.0		
			1.0	21.0		
			1.5	31.5		
RGS..30 (1800 A <sup>2</sup> 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
	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		

7. 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.

## 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	○	○	○	○	○
<p>O: Indicates that said hazardous substance contained in homogeneous materials for this part are below the limit requirement of GB/T 26572.</p> <p>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.</p>						

## 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	○	○	○	○	○
<p>O:此零件所有材料中含有的该有害物低于GB/T 26572的限定。</p> <p>X: 此零件某种材料中含有的该有害物高于GB/T 26572的限定。</p>						



**Accessories**

**RG DIN Clip**



**Ordering Key**

DIN clip mounted to RGS

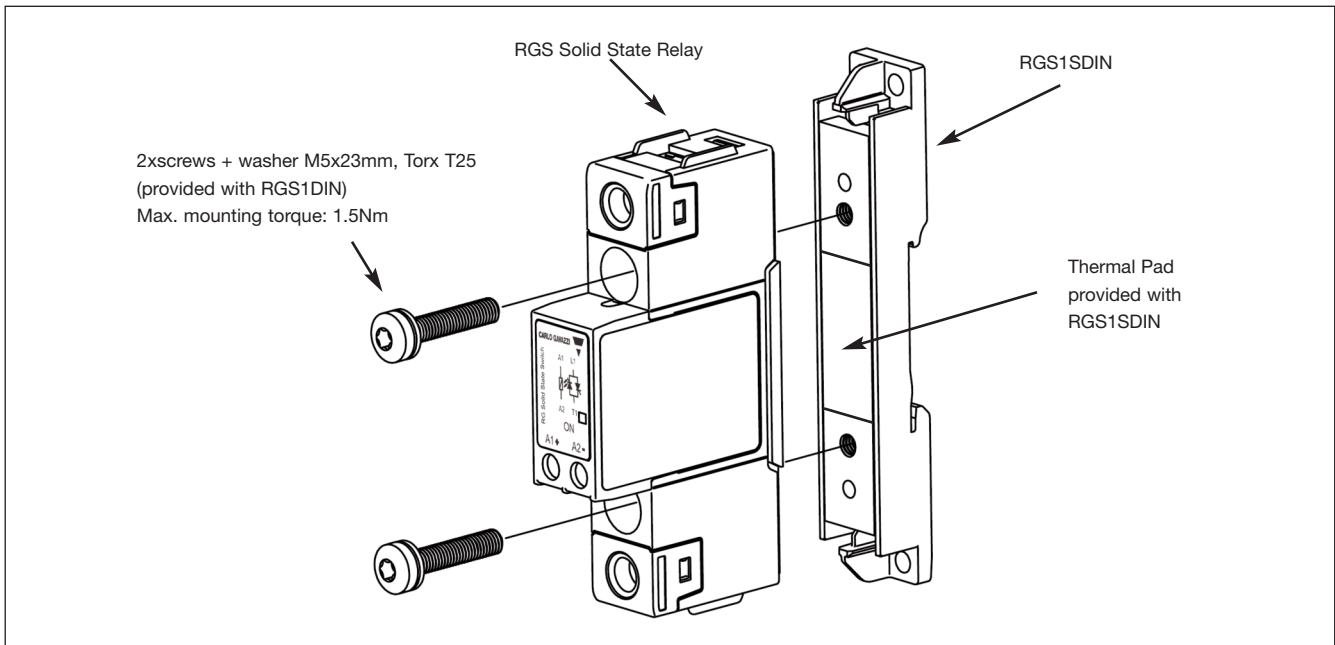
**RGS...DIN**

DIN clip accessory

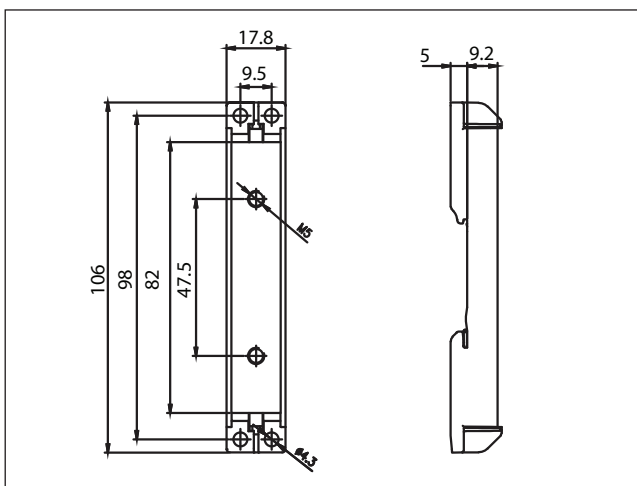
**RGS1DIN**

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

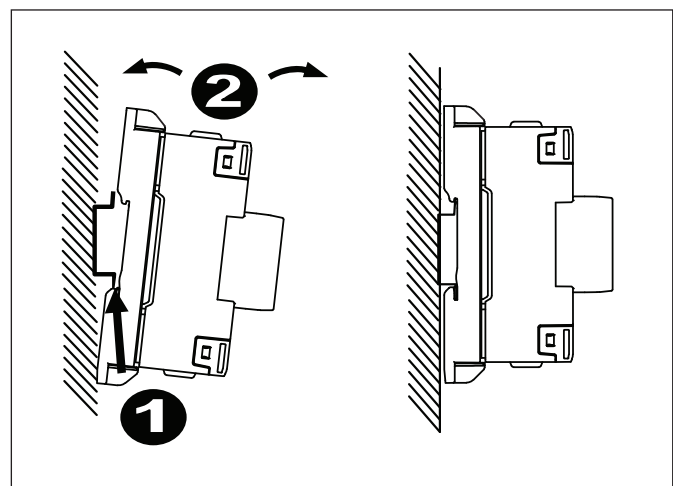
**Mounting Instructions for RGS1DIN to RGS**



**RGS1DIN Dimensions**



**Installation Instructions**



## Accessories

### Heatsinks



#### Ordering Key

**RHS..**

RGS mounted on heatsink

**RGS..H..**

#### Heatsink Range Overview:

[http://www.productselection.net/PDF/UK/ssr\\_accessories.pdf](http://www.productselection.net/PDF/UK/ssr_accessories.pdf)

#### Heatsink Selector Tool:

<http://www.productselection.net/heatsink/heatsinkselector.php?LANG=UK>

### Thermal Pads



#### Ordering Key

**RGS...HT**

Thermal pad mounted on RGS

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...