Solid State Relays
Industrial, 1-Phase, 17.5mm with built-in varistor
'E' type connection
Types RGS..S343, RGS..S343DIN

- Zero cross switching AC solid state relay
- Rated operational voltage: Up to 660 VAC
- Rated operational current: up to 50 AAC
- I^2t up to 1800A^2s
- Control voltages: 4-32 VDC, 20-275 VAC (24-190 VDC)
- Design according to IEC/EN60947-4-3, IEC/EN62314, UL508, CSA22.2 No. 14-13
- Integrated over-voltage protection with varistor
- 100kA short circuit current rating according to UL508
- Option for DIN mounting (RGS...DIN)

Product Description

The RG...S343 is a variant from the RG family that is specially designed for LED switching applications.

The product platform of 17.5mm provides space savings in panels. The robust design of the RG family is adopted on this variant to ensure reliable operation through the product lifetime.

The RGS..DIN version provides solution for DIN mounting.

The RGS..S343.. solutions cater for loads from 0.5 AAC up to 50 AAC and a voltage of up to 660 VAC.

A green LED on the product indicates the presence of the control voltage.

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

Ordering Key

RGS 1 A 60 D 50 K K E _

- 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
- Options

Ordering Key (refer to page 2 for available part numbers)

Series	Rated voltage	Control voltage	Rated current[1], Blocking voltage	Connection control	Connection power	Connection configuration	Special	Options
RGS1A: zero cross switching	60: 600 VAC +10% -15%	D: 4-32 VDC A: 20-275 VAC, 24-190 VDC	50: 50 A, 1200 Vp	K: Screw	K: Screw	E: Contactor	S343: Special design for LED switching	DIN: DIN rail mount

1. Max. rated current with suitable heatsink. Refer to Heatsink Selection tables or derating curves in the case of the RGS..DIN

Note:
LED drivers from different manufacturers have different characteristics. The RG...S343 was tested and adopted to Philips Xitanium LED Drivers. In case of use with other drivers it is suggested that you contact your Carlo Gavazzi representative for recommendations.

Selection Guide - RGS..

Rated voltage, Blocking voltage, Switching mode	Control voltage	Connection control/ power	Max. rated operational current (I^2t value) 50 AAC (1800 A^2s)
600V, 1200Vp ZC	4-32VDC	Screw/Screw	**RGS1A60D50KKES343**
	20-275VAC, 24-190VDC	Screw/Screw	**RGS1A60A50KKES343**

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

Rated voltage, Blocking voltage, Switching mode	Control voltage	Connection control/ power	Rated operational current @ 40°C (I^2t value) 12 AAC (1800 A^2s)
600V, 1200Vp	4-32VDC	Screw/Screw	**RGS1A60D50KKES343DIN**
ZC	20-275VAC, 24-190VDC	Screw/Screw	**RGS1A60A50KKES343DIN**

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	> 0.9 @ Vrated
CE marking	Yes
Touch protection	IP20
Control input status	continuously ON Green LED, when control input is applied

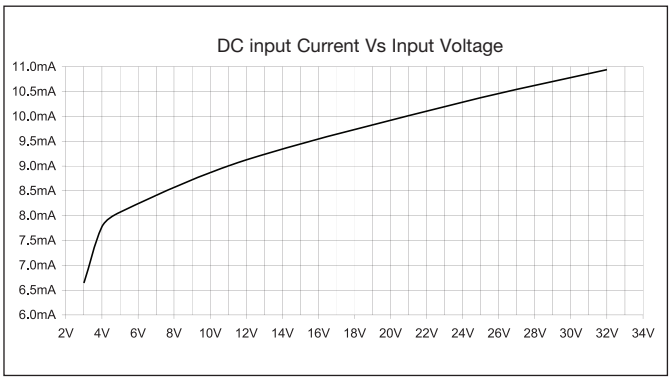
Pollution degree	2 (non-conductive pollution with possibilities of condensation)
Rated impulse withstand voltage, Uimp	6 kV (1.2/50µs) for Overvoltage Category III (fixed installations)
Isolation	
Input to Output	4000Vrms
Input&Output to Case	4000Vrms

Input Specifications

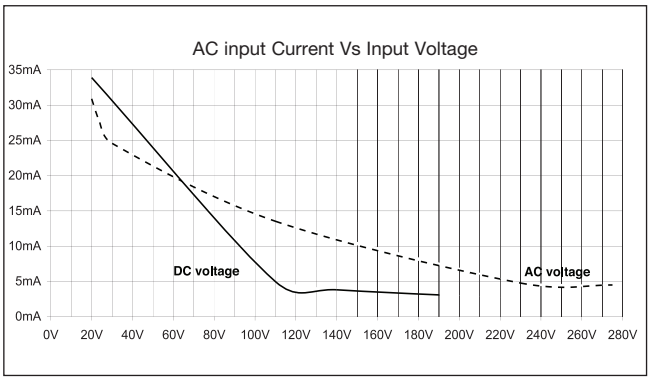
	RGS..D..	RGS..A..
Control voltage range[2]	4 - 32 VDC	20 - 275 VAC, 24 (-10%) - 190 VDC
Pick-up voltage	3.8 VDC	
Drop-out voltage	1 VDC	
Maximum reverse voltage	32 VDC	-
Response time pick-up	0.5 cycle + 500 µs @ 24VDC	2 cycles @ 230 VAC/110 VDC
Response time drop-out	0.5 cycle + 500µs @ 24VDC	0.5 cycle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

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

RG..D..



RG..A..



Output Specifications

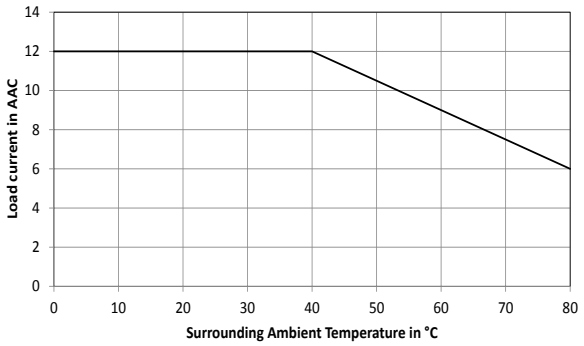
Rated operational current[1] AC-51 rating @ Ta=40°C	50 AAC
Min. operational current	500 mAAC
Rep. overload current - PF = 0.9 UL508: $_{TMB}$=40°C, t_{ON}=1s, t_{OFF}=9s, 50 cycles	107 AAC
Maximum trasient surge current (I_{TSM}), t=10ms	600 Ap
Maximum off-state leakage current @ rated voltage	3 mAAC
I^2t for fusing (t=10ms), Minimum	1800A^2s
Crititcal dv/dt (@ Tj init = 40°C)	1000 V/us

Output Specifications for RGS..DIN

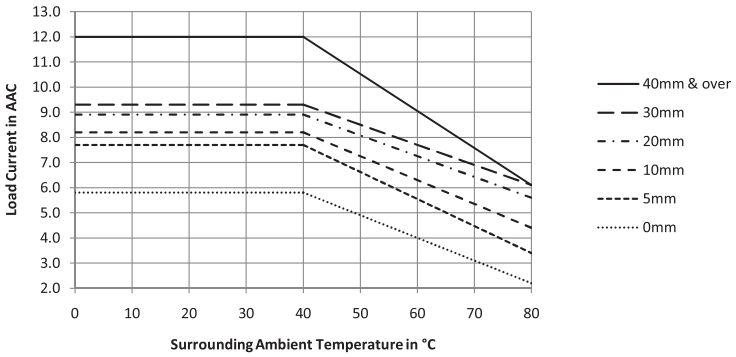
Rated operational current [3] AC-51 rating @ Ta = 40°C	12 AAC
Min. operational current	500 mAAC
Maximum transient surge current I_{TSM}, t=10ms	600 Ap
Maximum off-state leakage current @ rated voltage	3 mAAC
I^2t for fusing (t=10ms), Minimum	1800 A^2s
Crititcal dv/dt (@ Tj init = 40°C)	1000 V/us

3: Refer to Derating Curves

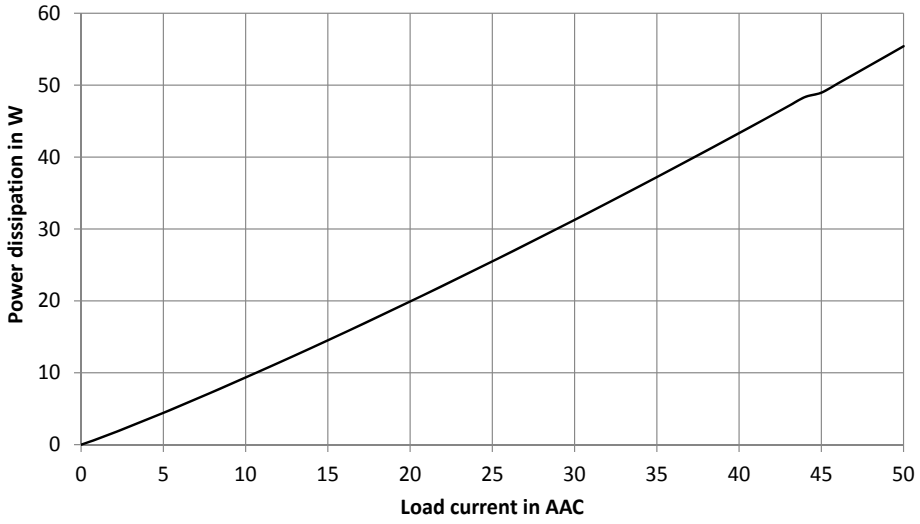
Derating Curves for RGS...DIN



Derating vs. Spacing Curves for RGS...DIN



Output Power Dissipation



Electromagnetic Compatibility

EMC Immunity	EN 60947-4-3
Electrostatic Discharge (ESD) Immunity	IEC/EN 61000-4-2
Air discharge, 8kV	Performance Criteria 1
Contact, 4kV	Performance Criteria 1
Electrical Fast Transient (Burst) Immunity	IEC/EN 61000-4-4
Output: 2kV, 5kHz	Performance Criteria 1
Input: 1kV, 5kHz	Performance Criteria 1
Electrical Surge Immunity	IEC/EN 61000-4-5
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

Radiated Radio Frequency Immunity	IEC/EN 61000-4-3
10V/m, 80 - 1000 MHz	Performance Criteria 1
10V/m, 1.4 - 2.0GHz	Performance Criteria 1
3 V/m, 2.0 - 2.7GHz	Performance Criteria 1
Conducted Radio Frequency Immunity	IEC/EN 61000-4-6
10V/m, 0.15 - 80 MHz	Performance Criteria 1
Voltage Dips Immunity	IEC/EN 61000-4-11
0% for 0.5 , 1 cycle	Performance Criteria 2
40% for 10 cycles	Performance Criteria 2
70% for 25 cycles	Performance Criteria 2
Voltage Interruptions Immunity	IEC/EN 61000-4-11
0% for 5000ms	Performance Criteria 2

EMC Emission	EN 60947-4-3
Radio Interference Voltage Emission (Conducted) 0.15 - 30MHz	EN 60947-4-3 Class A (no filtering needed) IEC/EN 55011 Class A (industrial) with filters - see filter information

Radio Interference Field Emission (Radiated) 30 - 1000MHz	IEC/EN 55011 Class A (industrial)

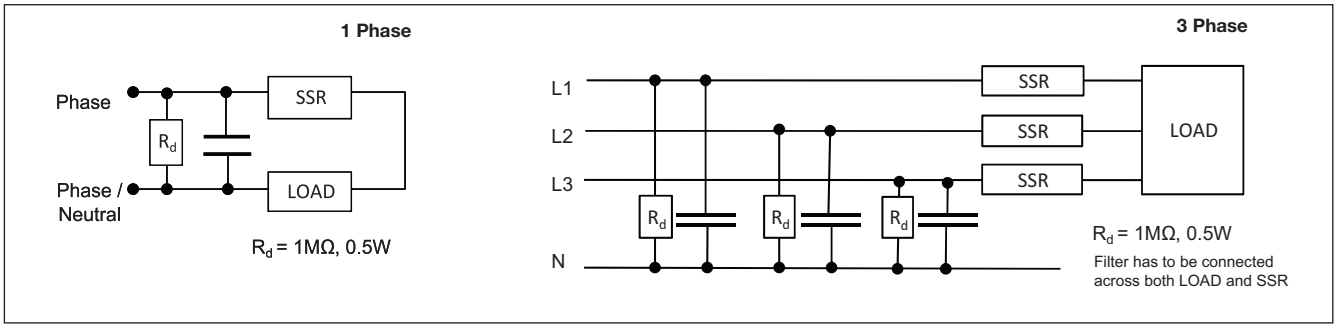
Filtering - IEC/EN 55011 Class A compliance (for class B compliance contact us)

Suggested filter for compliance	Maximum Heater current
330 nF / 760 V / X1	30 A

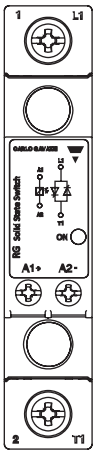
Note:

- 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 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 Diagram

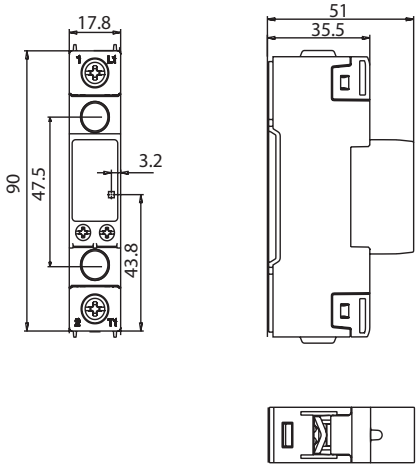


Terminal Layout and Dimensions

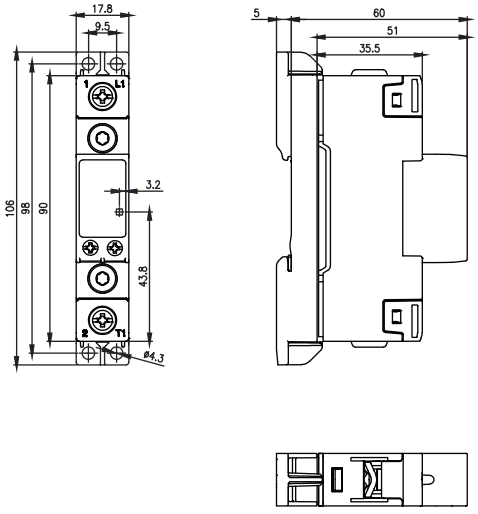


1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
A2 (-): Control ground

RGS....KKE



RGS....KKE..DIN



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

Connection Specifications

POWER CONNECTIONS: 1/L1, 2 /T1

Use 75°C copper (Cu) conductors

Stripping Length (X)	12mm	
Connection type	M4 screw with captivated washer	
Rigid (Solid & Stranded) UL/ CSA rated data	2 x 2.5..6 mm² 2 x 14.. 10 AWG	1 x 2.5..6 mm² 1 x 14.. 10 AWG
Flexible with end sleeve	2 x 1.0 ... 2.5mm² 2 x 2.5..4mm² 2 x 18.. 14 AWG 2 x 14.. 12 AWG	1 x 1.0..4mm² 1 x 18.. 12 AWG
Flexible without end sleeve	2 x 1.0 ... 2.5mm² 2 x 2.5.. 6mm² 2 x 18.. 14 AWG 2 x 14.. 10 AWG	1 x 1.0.. 6mm² 1 x 18.. 10 AWG
Torque specifications	Pozidrive 2 UL: 2Nm (17.7lb-in) IEC: 1.5 - 2.0Nm (13.3 - 17.7lb-in)	
Aperture for termination lug	12.3mm	

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

Use 60/75°C copper (Cu) conductors

Torque specifications	M3, Pozidrive 1 UL: 0.5Nm (4.4lb-in) IEC: 0.5 - 0.6Nm (4.4 - 5.3lb-in)	
Stripping Length (X)	8mm	
Rigid (Solid & Stranded) UL/ CSA rated data	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	1 x 0.5..2.5mm² 1 x 18..12AWG

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 (2011/65/EU)	Compliant
Impact resistance (EN 50155, EN 61373)	15/11 g/ms
Vibration resistance (2-100Hz, IEC60068-2-6, EN 50155, EN 61373)	5g per axis
GWIT & GWFI	conforms to EN 60335-1 requirements

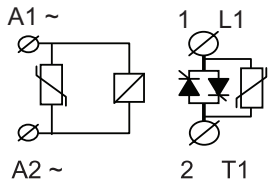
Relative humidity	95% non-condensing @ 40°C
UL flammability rating (housing)	UL 94 V0
Installation altitude	0-1000m. Above 1000m derate linearly by 1% of FLC per 100m up to a maximum of 2000m
Weight RGS...DIN	approx. 103g approx. 155g

Agency Approvals and Conformance

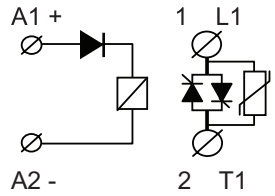
Conformance	IEC/EN 62314 IEC/EN 60947-4-3

Agency Approvals	UL508 Recognised (E172877) CSA 22.2 No.14-13 (204075)
Short circuit current rating	100kA, UL508

Functional Diagram

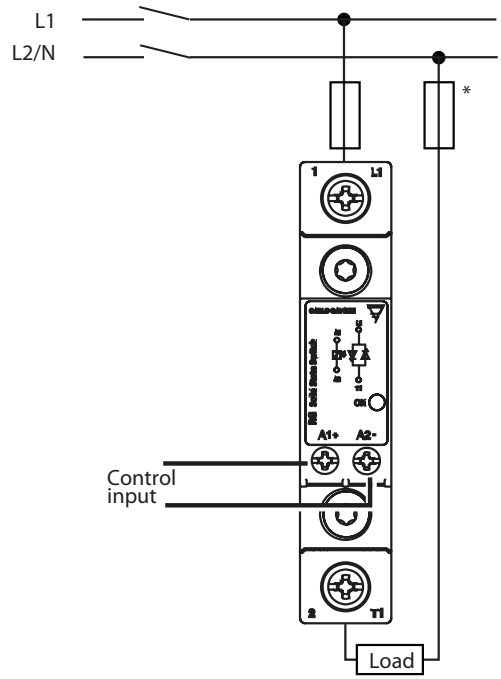


In AC controlled types only (RG..A..) a varistor is placed across A1/A2 terminals.



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

Connection Diagram



* depends on system requirements

Heatsink Selection

Load current [A] \ Thermal resistance [°C/W]							
50.0	1.45	1.28	1.06	0.87	0.68	0.49	0.30
45.0	1.72	1.50	1.29	1.07	0.85	0.64	0.42
40.0	2.00	1.75	1.50	1.25	1.00	0.75	0.50
35.0	2.35	2.06	1.76	1.47	1.18	0.88	0.59
30.0	2.83	2.48	2.13	1.77	1.42	1.06	0.71
25.0	3.52	3.08	2.64	2.20	1.76	1.32	0.88
20.0	4.58	4.01	3.44	2.86	2.29	1.72	1.15
15.0	6.40	5.60	4.80	4.00	3.20	2.40	1.60
10.0	10.19	8.92	7.64	6.37	5.10	3.82	2.55
5.0	---	19.51	16.72	13.94	11.15	8.36	5.57
	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[5]	< 0.25 °C/W

5: Thermal resistance case to heatsink values 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 (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 (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 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.

Class CC fuses are represented by tests performed on Class J fuses.

Co-ordination type 1 (UL 508)

Part No.	Prospective short circuit current [kArms]	Max. fuse size [A]	Class	Voltage [VAC]
RGS..50..	100	30	J or CC	max. 600

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

Part No.	Prospective short circuit current [kArms]	Ferraz Shawmut		Siba		Voltage [VAC]
		Max fuse size [A]	Part number	Max fuse size [A]	Part number	
RGS..50..	10	80	6.621 CP URQ 27x60 /80	50	50 142 06.50	max. 660
	10	70	A70QS70-4	50	50 142 06.50	max. 660
	100	80	6.621 CP URQ 27x60 /80	50	50 142 06.50	max. 660
	100	70	A70QS70-4	50	50 142 06.50	max. 660

CARLO GAVAZZI

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][6]
RGS..50..	**1-pole**			
(1800 A^2s)	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

6: 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.

Accessories

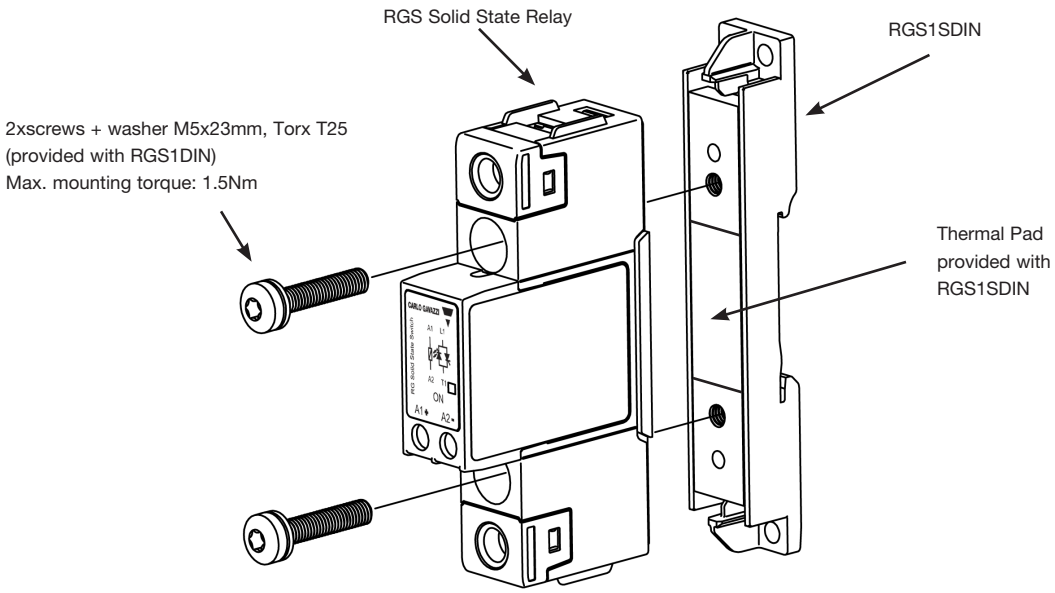
RG DIN Clip

Ordering Key

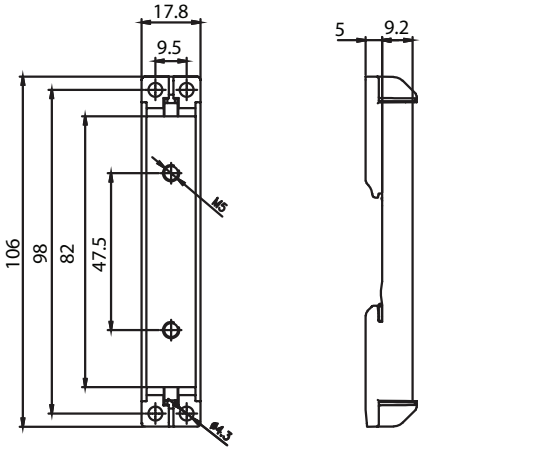
DIN clip mounted to RGS	**RGS....DIN**
DIN clip accessory	**RGS1DIN**

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.

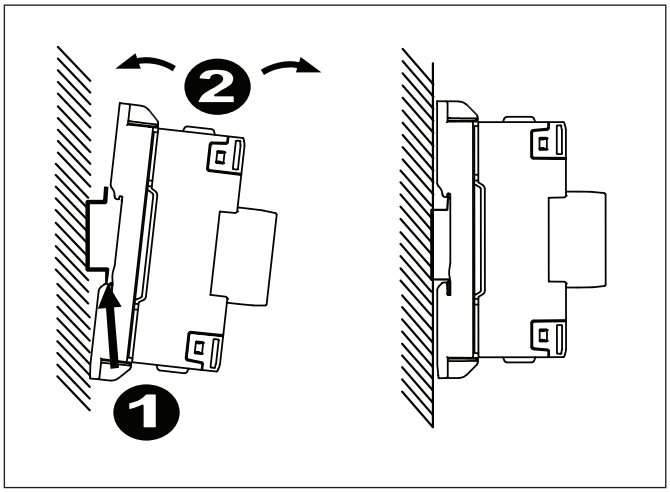
Mounting Instructions for RGS1DIN to RGS



RGS1DIN Dimensions



Installation Instructions



Accessories (cont.)

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...