

# Solid State Relays Zero Switching Types RGS Solid State Relay 'E' connection

CARLO GAVAZZI



- 17.5mm width
- Rated Operational voltage: Up to 600Vrms
- Rated Operational current: Up to 90Arms
- Up to 6600A<sup>2</sup>s for I<sup>2</sup>t
- Control voltages: 3-32 VDC, 20-275 VAC (24-190VDC)
- Input connection: Screw terminal or pluggable spring
- Output connection: Screw clamp/screw terminal
- Design according to IEC/EN60947-4-2, IEC/EN60947-4-3, IEC/EN62314, UL508, CSA22.2 No. 14-10
- Integrated voltage transient protection with varistor
- RoHS compliant
- Short circuit rating: 100 kA
- VDE approval (pending)

## 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. Output connections are via a screw connection, having a captivated washer allowing for safe looping. Input connection is provided either via a screw

connection having a captivated washer or via a pluggable spring loaded input. 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

|                             |       |
|-----------------------------|-------|
| 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

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

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

| Rated Output<br>Voltage | Blocking<br>Voltage | Connection<br>Control/ Power | Control<br>Voltage   | Rated operational current @ 40°C |               |               |               |
|-------------------------|---------------------|------------------------------|----------------------|----------------------------------|---------------|---------------|---------------|
|                         |                     |                              |                      | 25 AAC                           | 50 AAC        | 75 AAC        | 90 AAC        |
| 230VAC, ZC              | 800Vp               | Screw/Screw                  | 3-32VDC              | RGS1A23D25KKE                    | RGS1A23D50KKE | RGS1A23D75KKE | -             |
|                         |                     | Spring/Screw                 | 3-32VDC              | RGS1A23D25MKE                    | RGS1A23D50MKE | -             | -             |
|                         |                     | Screw/Screw                  | 20-275VAC, 24-190VDC | RGS1A23A25KKE                    | RGS1A23A50KKE | RGS1A23A75KKE | -             |
|                         |                     | Spring/Screw                 | 20-275VAC, 24-190VDC | RGS1A23A25MKE                    | RGS1A23A50MKE | -             | -             |
| 600VAC, ZC              | 1200Vp              | Screw/Screw                  | 4-32VDC              | RGS1A60D25KKE                    | RGS1A60D50KKE | RGS1A60D75KKE | RGS1A60D90KKE |
|                         |                     | Spring/Screw                 | 4-32VDC              | RGS1A60D25MKE                    | RGS1A60D50MKE | RGS1A60D75MKE | RGS1A60D90MKE |
|                         |                     | Screw/Screw                  | 20-275VAC, 24-190VDC | RGS1A60A25KKE                    | RGS1A60A50KKE | RGS1A60A75KKE | RGS1A60A90KKE |
|                         |                     | Spring/Screw                 | 20-275VAC, 24-190VDC | RGS1A60A25MKE                    | RGS1A60A50MKE | RGS1A60A75MKE | RGS1A60A90MKE |
|                         | 1600Vp              | Screw/Screw                  | 4-32VDC              | -                                | RGS1A60D51KKE | RGS1A60D71KKE | RGS1A60D91KKE |
|                         |                     | Screw/Screw                  | 20-275VAC, 24-190VDC | -                                | RGS1A60A51KKE | RGS1A60A71KKE | RGS1A60A91KKE |
|                         |                     |                              |                      |                                  |               |               |               |
|                         |                     |                              |                      |                                  |               |               |               |
| 600VAC, IO              | 1200Vp              | Screw/Screw                  | 4-32VDC              | RGS1B60D25KKE                    | RGS1B60D50KKE | RGS1B60D75KKE | RGS1B60D90KKE |

## Output Voltage Specifications

|                           |                                   | RGS..23..                        | RGS..60..                       |
|---------------------------|-----------------------------------|----------------------------------|---------------------------------|
| Operational Voltage Range |                                   | 24-240 VAC,<br>+10%, -15% on max | 42-600 VAC,<br>+10% -15% on max |
| Blocking Voltage          | RGS..25/50/75/90<br>RGS..51/71/91 | 800Vp<br>-                       | 1200 Vp<br>1600 Vp              |
| Internal Varistor         | RGS..25/50/75/90<br>RGS..51/71/91 | 275V<br>-                        | 625V<br>680 V                   |

## General Specifications

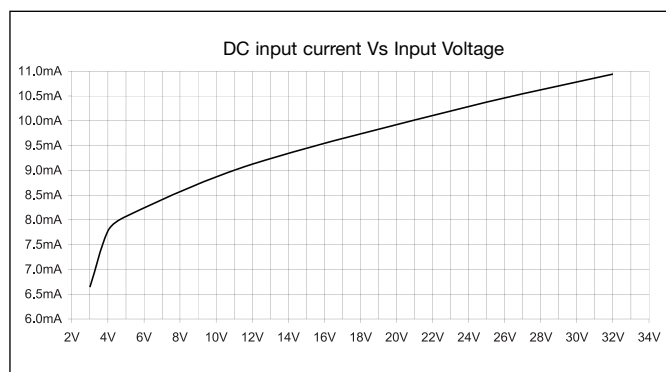
|                                    |                                                             |                       |                                                                    |
|------------------------------------|-------------------------------------------------------------|-----------------------|----------------------------------------------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

## Input specifications (@ 25°C unless otherwise specified)

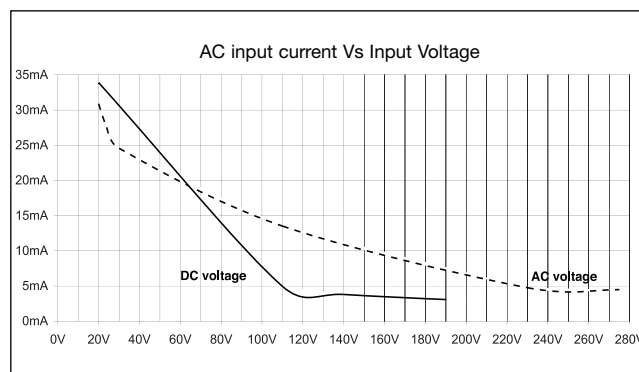
|                                    |                        | RGS..D.. <sup>1</sup>     | RGS..A..                               |
|------------------------------------|------------------------|---------------------------|----------------------------------------|
| Control voltage range              | RGS..23..              | 3 - 32 VDC                | 20 - 275 VAC,<br>24 (-10%) - 190 VDC   |
|                                    | RGS..60..              | 4 - 32 VDC                | 20 - 275 VAC,<br>24 (-10%) - 190 VDC   |
| Pick-up voltage                    | RGS..23..<br>RGS..60.. | 3.0 VDC<br>3.8 VDC        | 20 VAC/DC                              |
| Drop-out voltage                   | RGS..23..<br>RGS..60.. | 1 VDC<br>1 VDC            | 5 VAC/DC                               |
| Maximum Reverse voltage            |                        | 32 VDC                    | -                                      |
| Response time pick-up ZC (RGS1A..) |                        | 0.5 cycle + 500µs @ 24VDC | 2 cycles<br>@ 230VAC/110VDC            |
| Response time pick-up IO (RGS1B..) |                        | 350µs @ 24 VDC            | N/A                                    |
| Response time drop-out             |                        | 0.5 cycle + 500µs @ 24VDC | 0.5 cycle + 40ms<br>@ 230 VAC/ 110 VDC |
| 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 Ratings<sup>2</sup>: HP (UL508) / kW (IEC60947-4-2) @ 40°C

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

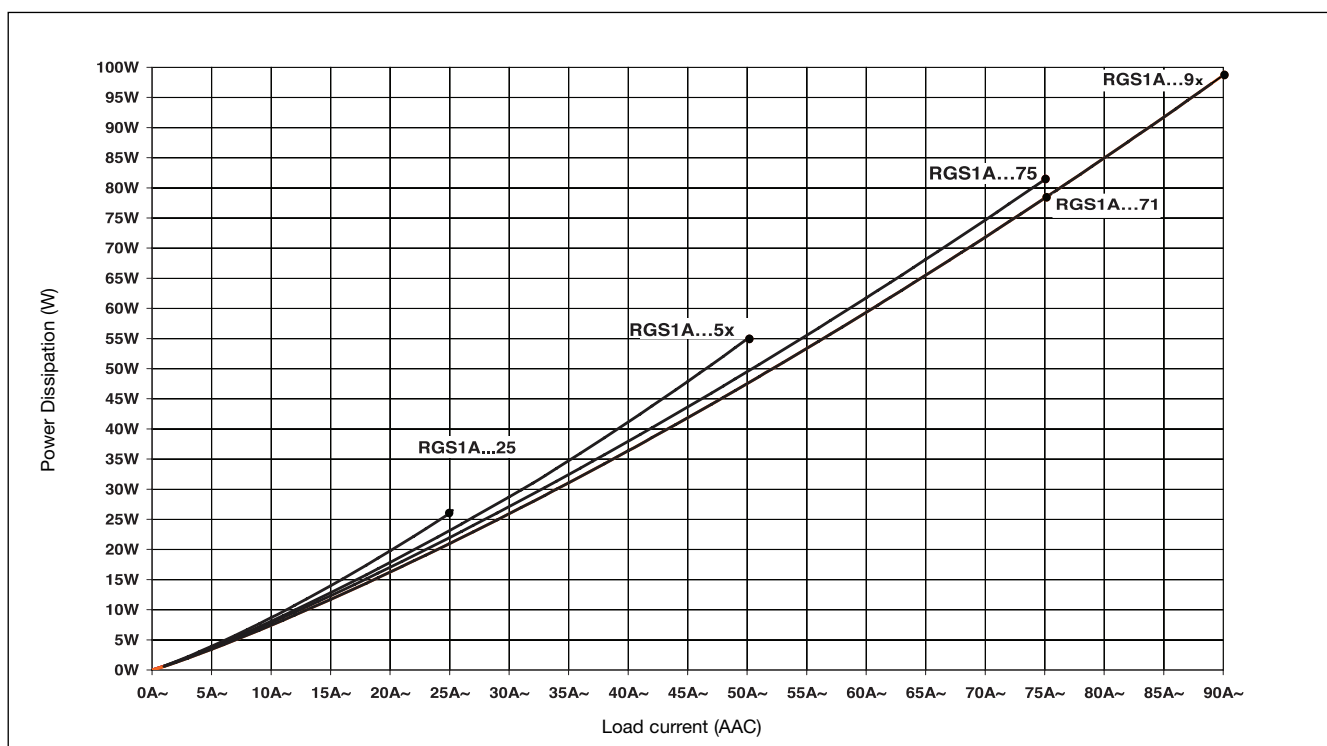
2: Refer to heatsink selection table

## Output specifications

|                                                                                                               | RGS..25..            | RGS..50/51..         | RGS..75/71..                                                 | RGS..90/91..         |
|---------------------------------------------------------------------------------------------------------------|----------------------|----------------------|--------------------------------------------------------------|----------------------|
| Rated operational current<br>AC51 @ Ta=40°C (IEC60947-4-3/UL508) <sup>2</sup>                                 | 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%)<br>at 40°C <sup>2, 3</sup>                                         | 30                   | 30                   | 30                                                           | 30                   |
| Min. operational current                                                                                      | 150 mAAC             | 250 mAAC             | 400 mAAC                                                     | 400 mAAC             |
| Rep. overload current - UL508:<br>T <sub>AMB</sub> =40°C, t <sub>ON</sub> =1s, t <sub>OFF</sub> =9s, 50cycles | 67 AAC               | 107 AAC              | 126 AAC                                                      | 168 AAC              |
| Maximum Transient Surge Current (I <sub>TSM</sub> )                                                           | 325Ap                | 600Ap                | 800Ap                                                        | 1150Ap               |
| Maximum Off-state leakage current                                                                             | 3 mAAC               | 3 mAAC               | 3 mAAC                                                       | 3 mAAC               |
| I <sup>2</sup> t (10ms) Typical                                                                               | 525 A <sup>2</sup> s | 1800A <sup>2</sup> s | RG..75: 3200A <sup>2</sup> s<br>RG..71: 6600A <sup>2</sup> s | 6600A <sup>2</sup> s |
| Critical dv/dt (@ T <sub>j</sub> init = 40°C)                                                                 | 1000V/us             | 1000V/us             | 1000V/us                                                     | 1000V/us             |

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

## Output Power Dissipation



## Electromagnetic Compatibility

|                                                   |                                                                                                                               |                                           |                        |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|------------------------|
| <b>EMC Immunity</b>                               | IEC/EN 61000-6-2                                                                                                              | <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 10ms/20ms                          | Performance Criteria 2 |
| Output, line to line, 1kV                         | Performance Criteria 1                                                                                                        | 40% for 200ms                             | Performance Criteria 2 |
| Output, line to earth, 2kV                        | Performance Criteria 1                                                                                                        | 70% for 500ms                             | Performance Criteria 2 |
| Input, line to line, 1kV                          | Performance Criteria 2                                                                                                        | <b>Voltage Interruptions Immunity</b>     | IEC/EN 61000-4-11      |
| Input, line to earth, 2kV                         | Performance Criteria 2                                                                                                        | 0% for 5000ms                             | Performance Criteria 2 |
| <b>EMC Emission</b>                               | EN/IEC 61000-6-4                                                                                                              | <b>Radio Interference</b>                 |                        |
| <b>Radio Interference</b>                         |                                                                                                                               | <b>Field Emission (Radiated)</b>          | IEC/EN 55011           |
| <b>Voltage Emission (Conducted)</b>               | IEC/EN 55011                                                                                                                  | <b>30 - 1000MHz</b>                       | Class A (industrial)   |
| <b>0.15 - 30MHz</b>                               | Class A (industrial) with filters<br>- see filter information<br>IEC/EN 60947-4-2, 60947-4-3<br>Class A (no filtering needed) |                                           |                        |

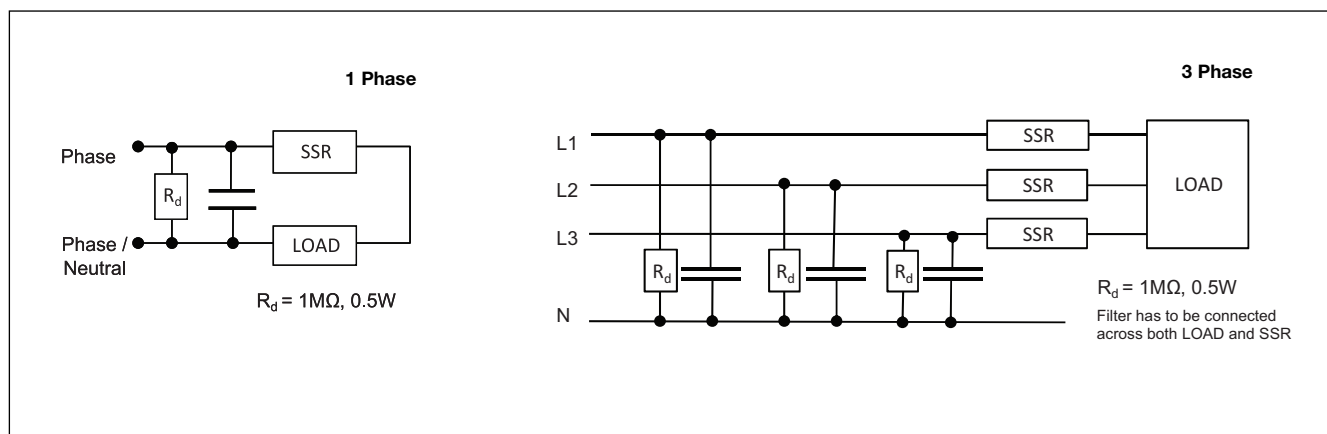
## Filtering - EN / IEC 55011 Class A compliance (for class B compliance contact us)

| Part Number       | Suggested filter for compliance | Maximum Heater current |
|-------------------|---------------------------------|------------------------|
| RGS1A23..25       | 100 nF / 275 V / X1             | 25 A                   |
| RGS1A23..50       | 220 nF / 275 V / X1             | 30 A                   |
|                   | 330 nF / 275 V / X1             | 35 A                   |
| RGS1A23..51       | 150 nF / 275 V / X1             | 20 A                   |
|                   | 220 nF / 275 V / X1             | 35 A                   |
| RGS1A23..75       | 330 nF / 275 V / X1             | 35 A                   |
| RGS1A23..71/90/91 | 330 nF / 275 V / X1             | 35 A                   |
| RGS1A60..25       | 150 nF / 760 V / X1             | 25 A                   |
|                   | 220 nF / 760 V / X1             | 30 A                   |
| RGS1A60..50       | 330 nF / 760 V / X1             | 30 A                   |
| RGS1A60..51       | 220 nF / 760 V / X1             | 30 A                   |
| RGS1A60..75       | 220 nF / 760 V / X1             | 30 A                   |
| RGS1A60..71/90/91 | 220 nF / 760 V / X1             | 30 A                   |

**Note:**

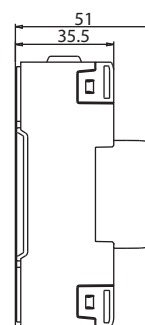
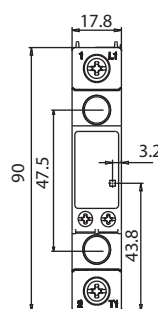
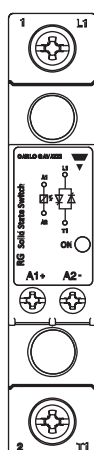
- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference. Use of AC solid state relays may, according to the application and the load current, cause conducted radio interferences. Use of mains filters may be necessary for cases where the user 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

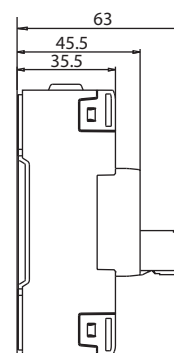
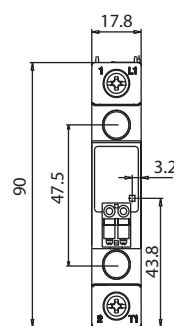
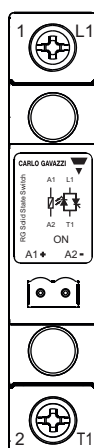


## Terminal Layout and Dimensions

### RGS....KKE



### RGS ....MKE



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 dimensions in mm

## Connection Specifications

### POWER CONNECTIONS: 1/L1, 2 /T2

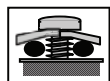
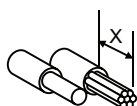
#### Torque specifications



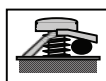
2 Nm (17.7 in-lb)  
M4, Pozidriv 2  
Use 75°C copper (Cu)  
conductors  
Stripping Length (X) = 12mm

#### Rigid (Solid & Stranded)

UL/ CSA rated data



2 x 2.5..6 mm<sup>2</sup>  
2 x 14..10 AWG



1 x 2.5..6 mm<sup>2</sup>  
1 x 14..10 AWG

#### Flexible with end sleeve



2 x 2.5..4mm<sup>2</sup>  
2 x 14..12AWG

1 x 2.5..4mm<sup>2</sup>  
1 x 14..12AWG

#### Flexible without end sleeve



2 x 2.5..6 mm<sup>2</sup>  
2 x 14..10 AWG

1 x 2.5..6 mm<sup>2</sup>  
1 x 14..10 AWG

#### Aperture for termination lug

12.3mm

### CONTROL CONNECTIONS: A1(+), A2(-) for RGS...KKE

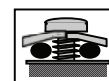
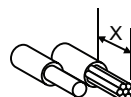
#### Torque specifications



0.5 Nm (4.4 in-lb)  
M3, Pozidriv 1  
Use 60/75°C copper (Cu)  
conductors  
Stripping Length (X) = 8mm

#### Rigid (Solid & Stranded)

UL/ CSA rated data



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



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

#### Flexible with end sleeve



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

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

### CONTROL CONNECTIONS: A1(+), A2(-) for RGS...MKE

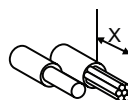
Use 60/75°C copper (Cu) conductors

#### Stripping Length (X)

12 - 13mm

#### Rigid (Stranded)

UL/ cUL rated data



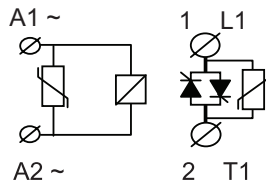
1 x 0.2...2.5mm<sup>2</sup>  
1 x 24 ... 12 AWG

## Environmental Specifications

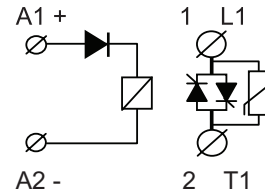
|                                      |                                     |
|--------------------------------------|-------------------------------------|
| Operating Temperature                | -40°C to 80°C<br>(-40°F to +176°F)  |
| Storage Temperature                  | -40°C to 100°C<br>(-40°F to +212°F) |
| RoHS (2002/95/EC)                    | Compliant                           |
| Impact resistance<br>(IEC60068-2-27) | 15/11 g/ms                          |

|                                                  |                           |
|--------------------------------------------------|---------------------------|
| Vibration resistance<br>(2-100Hz, IEC60068-2-26) | 5g                        |
| Relative humidity                                | 95% non-condensing @ 40°C |
| UL flammability rating<br>(housing)              | UL 94 V0                  |

## Connection 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.

## Heatsink Selection

In suggesting the below values for the heatsink thermal resistance, junction temperature was taken as maximum 125°C and heatsink temperature as maximum 100°C.

### RGS1A..25

| Load current [A] | Thermal resistance [K/W] |       |       |       |       |       |      | Power dissipation [W] |
|------------------|--------------------------|-------|-------|-------|-------|-------|------|-----------------------|
|                  | 20                       | 30    | 40    | 50    | 60    | 70    | 80   | T <sub>A</sub>        |
| 25.0             | 3.11                     | 2.72  | 2.33  | 1.94  | 1.55  | 1.17  | 0.78 | 25.7                  |
| 22.5             | 3.55                     | 3.10  | 2.66  | 2.22  | 1.77  | 1.33  | 0.89 | 22.6                  |
| 20.0             | 4.104                    | 3.59  | 3.08  | 2.57  | 2.05  | 1.54  | 1.03 | 19.5                  |
| 17.5             | 4.83                     | 4.23  | 3.63  | 3.02  | 2.42  | 1.81  | 1.21 | 16.6                  |
| 15.0             | 5.83                     | 5.10  | 4.37  | 3.64  | 2.91  | 2.19  | 1.46 | 13.7                  |
| 12.5             | 7.224                    | 6.34  | 5.43  | 4.53  | 3.62  | 2.72  | 1.81 | 11.0                  |
| 10.0             | 9.43                     | 8.25  | 7.07  | 5.89  | 4.71  | 3.54  | 2.36 | 8.5                   |
| 7.5              | 13.17                    | 11.53 | 9.88  | 8.23  | 6.59  | 4.94  | 3.29 | 6.                    |
| 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                   |

Ambient temp [°C]

### RGS1A..5x

| Load current [A] | Thermal resistance [K/W] |       |       |       |       |      |      | Power dissipation [W] |
|------------------|--------------------------|-------|-------|-------|-------|------|------|-----------------------|
|                  | 20                       | 30    | 40    | 50    | 60    | 70   | 80   | T <sub>A</sub>        |
| 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                   |

Ambient temp [°C]

### RGS1A..71

| Load current [A] | Thermal resistance [K/W] |       |       |      |      |      |      | Power dissipation [W] |
|------------------|--------------------------|-------|-------|------|------|------|------|-----------------------|
|                  | 20                       | 30    | 40    | 50   | 60   | 70   | 80   | T <sub>A</sub>        |
| 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                     | 1.19  | 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                   |

Ambient temp [°C]

### RGS1A..75

| Load current [A] | Thermal resistance [K/W] |       |       |      |      |      |      | Power dissipation [W] |
|------------------|--------------------------|-------|-------|------|------|------|------|-----------------------|
|                  | 20                       | 30    | 40    | 50   | 60   | 70   | 80   | T <sub>A</sub>        |
| 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                   |

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<sub>A</sub>  
Ambient temp [°C]

## 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 small amount of thermally conductive silicone paste must be applied to the back of the SSR. 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 paste to be pressed out and then tighten both screws to their final mounting 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, 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 (UL508)

| Part no.     | Max. size [A] | Class | Current [kA] | Voltage [VAC] |
|--------------|---------------|-------|--------------|---------------|
| RGS..25      | 30            | J     | 100          | Max. 600      |
| RGS..50 / 51 | 30            | J     | 100          | Max. 600      |
| RGS..75 / 71 | 30            | J     | 100          | Max. 600      |
| RGS..90 / 91 | 30            | J     | 100          | Max. 600      |

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.

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

| Part No.      | Ferraz Shawmut |                                         | Siba         |               | Current [kA] | Voltage [VAC] |
|---------------|----------------|-----------------------------------------|--------------|---------------|--------------|---------------|
|               | Max size [A]   | Part number                             | Max size [A] | Part number   |              |               |
| RGS..25       | 32             | 6.9xx CP URD 22x58/32,<br>(xx=00 or 21) | -            | -             | 100          | Max. 600      |
| RGS..50       | 50             | A70QS50-4                               | 50           | 50 142 06.50  | 100          | Max. 600      |
| RGS..51       | 50             | A70QS50-4                               | -            | -             | 100          | Max. 600      |
| RGS..75       | 80             | A70QS80-4                               | -            | -             | 100          | Max. 600      |
| RGS..71/90/91 | 100            | A70QS100-4                              | 100          | 50 194 20.100 | 100          | Max. 600      |

## Thermal Specifications

|                                                        | RGS..25    | RGS..50    | RGS..51    | RGS..75    | RGS..71,90,91 |
|--------------------------------------------------------|------------|------------|------------|------------|---------------|
| Max. junction temperature                              | 125°C      | 125°C      | 125°C      | 125°C      | 125°C         |
| Thermal resistance junction to case, R <sub>thjc</sub> | < 0.47 K/W | < 0.32 K/W | < 0.32 K/W | < 0.23 K/W | < 0.22 K/W    |
| Thermal resistance case to heatsink, R <sub>thcs</sub> | < 0.25 K/W | < 0.17 K/W | < 0.17 K/W | < 0.17 K/W | < 0.14 K/W    |

Note: 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.

## Protection with Miniature Circuit Breakers

| Solid State Relay type                        | Model no. for Z - type M. C. B. (rated current) | Model no. for B - type M. C. B. (rated current) | Wire cross sectional area [mm²] | Minimum length of Cu wire conductor [m] <sup>4</sup> |
|-----------------------------------------------|-------------------------------------------------|-------------------------------------------------|---------------------------------|------------------------------------------------------|
| <b>RGS...25</b>                               | S201 - Z4 (4A)<br>S201 - Z6 UC (6A)             | S201 - B2 (2A)<br>S201 - B2 (2A)                | 1.0                             | 21.0                                                 |
|                                               |                                                 |                                                 | 1.0                             | 21.0                                                 |
|                                               |                                                 |                                                 | 1.5                             | 31.5                                                 |
| <b>RGS...50</b><br><b>RGS...51</b>            | 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                                                 |
|                                               | S202 - Z25 (25A)                                | S202-B13 (13A)                                  | 2.5                             | 19.0                                                 |
|                                               |                                                 |                                                 | 4.0                             | 30.4                                                 |
| <b>RGS...75</b>                               | S201 - Z25 (25A)                                | S201-B13 (13A)                                  | 2.5                             | 7.0                                                  |
|                                               |                                                 |                                                 | 4.0                             | 11.2                                                 |
|                                               |                                                 |                                                 | 6.0                             | 16.8                                                 |
| <b>RGS...71, RGS...90,</b><br><b>RGS...91</b> | S201 - Z20 (20A)                                | S201-B10 (10A)                                  | 1.5                             | 4.2                                                  |
|                                               |                                                 |                                                 | 2.5                             | 7.0                                                  |
|                                               |                                                 |                                                 | 4.0                             | 11.2                                                 |
|                                               | S202 - Z20 (20A)                                | S202-B10 (10A)                                  | 1.5                             | 1.8                                                  |
|                                               |                                                 |                                                 | 2.5                             | 3.0                                                  |
|                                               |                                                 |                                                 | 4.0                             | 4.8                                                  |
|                                               | S201 - Z32 (32A)                                | S201-B16 (16A)                                  | 2.5                             | 13.0                                                 |
|                                               |                                                 |                                                 | 4.0                             | 20.8                                                 |
|                                               |                                                 |                                                 | 6.0                             | 31.2                                                 |
|                                               | S202 - Z32 (32A)                                | S202-B16 (16A)                                  | 2.5                             | 5.0                                                  |
|                                               |                                                 |                                                 | 4.0                             | 8.0                                                  |
|                                               |                                                 |                                                 | 6.0                             | 12.0                                                 |
|                                               |                                                 |                                                 | 10.0                            | 20.0                                                 |
|                                               | S202 - Z50 (50A)                                | S202-B25 (25A)                                  | 4.0                             | 14.8                                                 |
|                                               |                                                 |                                                 | 6.0                             | 22.2                                                 |
|                                               |                                                 |                                                 | 10.0                            | 37.0                                                 |

4. between MCB and SSR Relay (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.