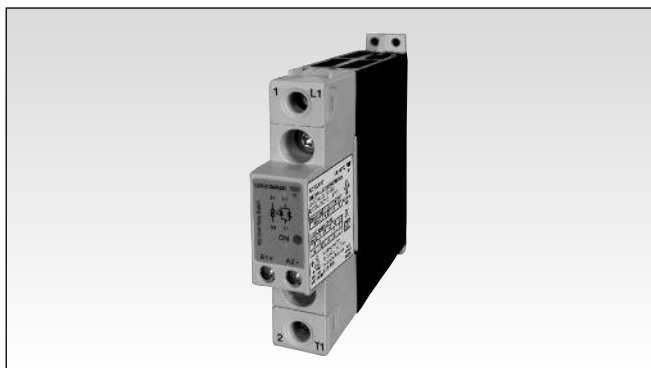


# Solid State Relays Zero Switching Types RGC Solid State Contactor 'E' (Contactor) Connection

CARLO GAVAZZI



- Zero Crossing or Instant-On (Random) Switching
- Product Width 17.5mm, 22.5mm
- Rated Operational voltage: Up to 600Vrms
- Rated Operational Current: Up to 30Arms
- Up to 1800A<sup>2</sup>s for I<sup>2</sup>t and 1200Vp for blocking voltage
- Control voltages: 3-32 VDC, 20-275 VAC (24-190 VDC)
- IP20 protection
- Design according to IEC60947-4-2, IEC60947-4-3, IEC62314, UL508, CSA 22-2 No. 14-05
- Integrated voltage transient protection with varistor
- RoHS compliant

## Product Description

This new range of solid state contactors presents a unique opportunity to maximize efficiency in panel space and is an evolution of solid state switches for which Carlo Gavazzi is very well known.

The latest technologies in electronic and power semiconductor design allows a slim design

incorporating product ratings at a surrounding temperature of 40°C. The smallest width is 17.5mm and is rated at 20 AAC. Power and control terminals allow for safe looping of cables. Voltage transient protection is standard across the output with a varistor. Specifications are stated at 25°C unless otherwise noted.

## Ordering Key

**RGC 1 A 60 A 30 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 with heatsink	Rated Voltage	Control Voltage	Rated Current	Connection Control	Connection Output	Connection configuration
<b>RGC1A: ZC</b>	23: 230V +10% - 15%, 800Vp	D: 3 or 4-32VDC	20: 20AAC	K: Screw	K: Screw	E: Contactor
<b>RGC1B: IO</b>	60: 600V +10% -15%, 1200Vp	A: 20 - 275VAC, 24-190 VDC	30: 30AAC			

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

Rated Output Voltage	Blocking Voltage	Connection Control/ Power	Control Voltage	Rated Operational Current	
				20 AAC	30 AAC
230 VAC, ZC	800Vp	Screw/Screw	3 - 32 VDC	RGC1A23D20KKE	RGC1A23D30KKE
			20 - 275 VAC, 24-190 VDC	RGC1A23A20KKE	RGC1A23A30KKE
600 VAC, ZC	1200Vp	Screw/Screw	4 - 32 VDC	RGC1A60D20KKE	RGC1A60D30KKE
			20 - 275VAC, 24-190 VDC	RGC1A60A20KKE	RGC1A60A30KKE
600 VAC, IO	1200Vp	Screw/Screw	4 - 32 VDC	RGC1B60D20KKE	RGC1B60D30KKE

## Output Voltage Specifications

	RGC..23..	RGC..60..
Operational Voltage Range	24-240 VAC, +10%, -15% on max	42-600 VAC, +10% -15% on max
Blocking Voltage	800Vp	1200 Vp
Internal Varistor	275V	680V

## General Specifications

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

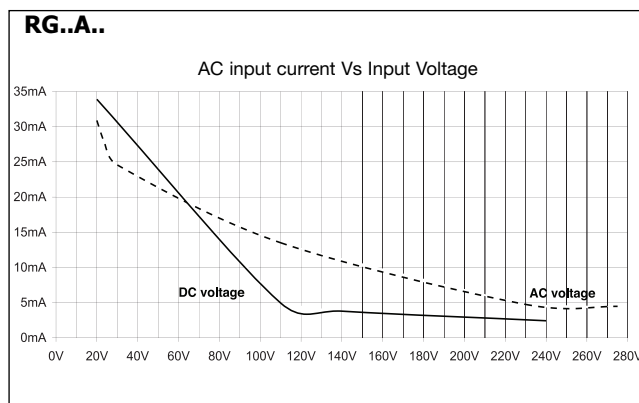
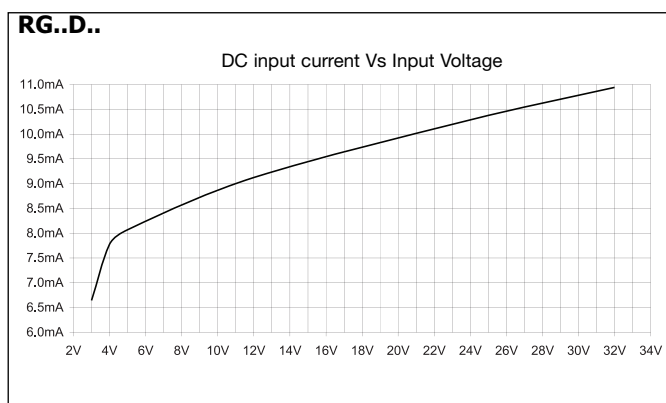
## Isolation

Input to Output	4000Vrms
Input & Output to Case	4000Vrms

## Input specifications

		RGS..D.. <sup>1</sup>	RGS..A..
Control voltage range	RGC..23..	3 - 32 VDC	20 - 275 VAC, 24 (-10%) - 190 VDC
	RGC..60..	4 - 32 VDC	20-280 VAC, 24 (-10%) - 190 VDC
Pick-up voltage	RGC..23..	3.0 VDC	20 VAC/DC
	RGC..60..	3.8 VDC	
Drop-out voltage	RGC..23..	1.2 VDC	5 VAC/DC
	RGC..60..	1.2 VDC	
Maximum Reverse voltage		32 VDC	-
Response time pick-up ZC (RGS1A..)		0.5 cycle + 500μs @ 24VDC	0.5 cycle + 40μs @ 230VAC/110VDC
Response time pick-up IO (RGS1B..)		350μs @ 24 VDC	N/A
Response time drop-out		0.5 cycle + 500μs @ 24VDC	2 cycles
Input current @ 40°C		See diagrams below	See diagrams below

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



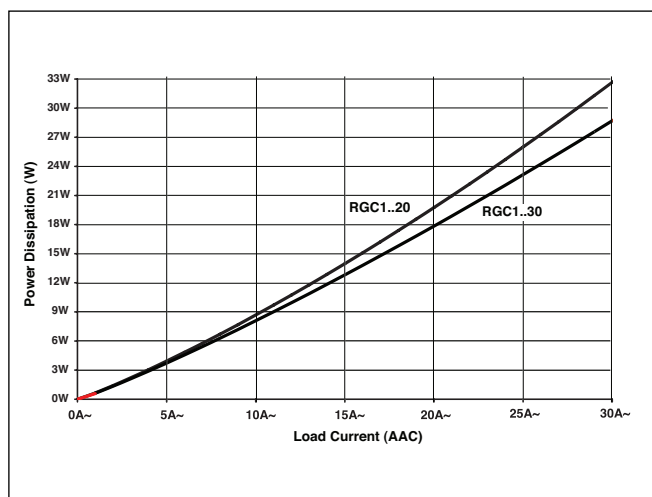
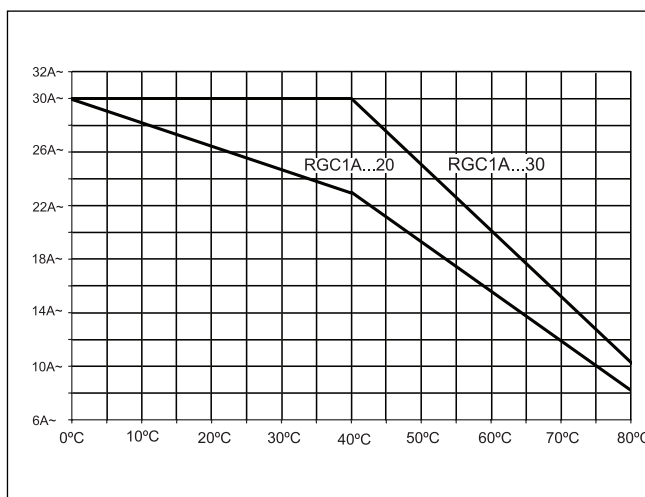
**Motor Ratings: HP (UL508) / kW (IEC60947-4-2) @ 40°C**

	115 VAC	230 VAC	400 VAC	480 VAC	600 VAC
RGC..20	½HP / 0.18kW	1-½HP / 0.37kW	2HP / 0.75kW	3HP / 1.1kW	3HP / 1.5kW
RGC..30	¾HP / 0.37kW	2HP / 1.1kW	3HP / 1.5kW	5HP / 2.2kW	5HP / 3.7kW

**Output specifications**

	RGC..20..	RGC..30..
Rated operational current AC-51 rating @ Ta=40°C	20 AAC	30 AAC
AC-53a rating @ Ta=40°C	5 AAC	10 AAC
Number of starts (x:6, Tx:6s, F:50%) at 40°C <sup>2</sup>	30	30
Min. operational current	150 mAAC	250 mAAC
Rep. overload current - UL508: T <sub>AMB</sub> =40°C, t <sub>ON</sub> =1s, t <sub>OFF</sub> =9s, 50cycles	60 AAC	84 AAC
Maximum transient surge current (I <sub>TSM</sub> )	325 Ap	600 Ap
Maximum off-state leakage current	3 mA	3 mA
I <sup>2</sup> t (10ms) Typical	525 A <sup>2</sup> s	1800 A <sup>2</sup> s
Critical dv/dt (@ Tj = 40°C)	1000 V/us	1000 V/us

<sup>2</sup> x: multiple of AC53a rating, Tx: duration of current surge, F: duty cycle.

**Output Power Dissipation**

**Current Derating**


## Agency Approvals and Electromagnetic Compatibility

<b>Conformance</b>	IEC/EN 62314 IEC/EN 60947-4-2 IEC/EN 60947-4-3	<b>Agency Approvals</b>	UL508 LISTED (E172877), VDE (pending), CUL
<b>EMC Immunity</b>	IEC/EN 61000-6-4	<b>Radiated Radio Frequency Immunity</b>	IEC/EN 61000-4-3 Performance Criteria 1 Performance Criteria 1 Performance Criteria 1
<b>EMC Emission</b>	IEC/EN 61000-6-2	10V/m, 80 - 1000 Mhz 10V/m, 1.4 - 2.0GHz 1V/m, 2.0 - 2.7GHz	
<b>Electrostatic Discharge (ESD) Immunity</b>	IEC/EN 61000-4-2 Air discharge 8kV, Performance Criteria 2 Contact 4kV, Performance Criteria 2	<b>Conducted Radio Frequency Immunity</b>	IEC/EN 61000-4-6 Performance criteria 1
<b>Electrical Fast Transient Burst Immunity</b>	IEC/EN 61000-4-4 Output 2kV, Performance Criteria 1 Input 1kV, Performance Criteria 1	<b>Voltage Dips Immunity</b>	IEC/EN 61000-4-11 0% for 10ms/20ms, 70% for 500ms 40% for 200ms
<b>Electrical Surge Immunity</b>	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	<b>Voltage Interruptions Immunity</b>	IEC/EN 61000-4-11 0% for 5000ms
<b>Radio Interference voltage emission (conducted) 0.15 - 30MHz</b>	IEC/EN 55011 Class A (industrial) - see filter information IEC/EN 60747-4-X Class A (no filtering needed)	<b>Radio Interference voltage emission (conducted) 0.15 - 30MHz</b>	IEC/EN 55011 Class A (industrial) - see filter information

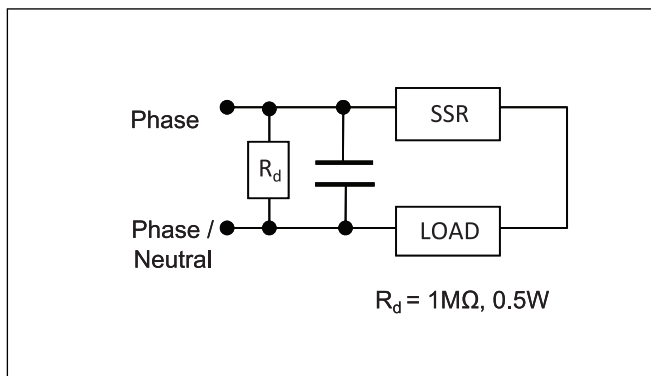
## Filtering - EN / IEC 55011 Class A compliance (for class B compliance contact us)

Part Number	Suggested filter for compliance	Maximum Heater current
RGC1A23D20KKE	68 nF / 275 V / X1	20A
RGC1A23A20KKE	220 nF / 275 V / X1	30A
RGC1A60D20KKE	100 nF / 1000 V / X1	20A
RGC1A60A20KKE	330 nF / 1000 V / X1	30A

### 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.

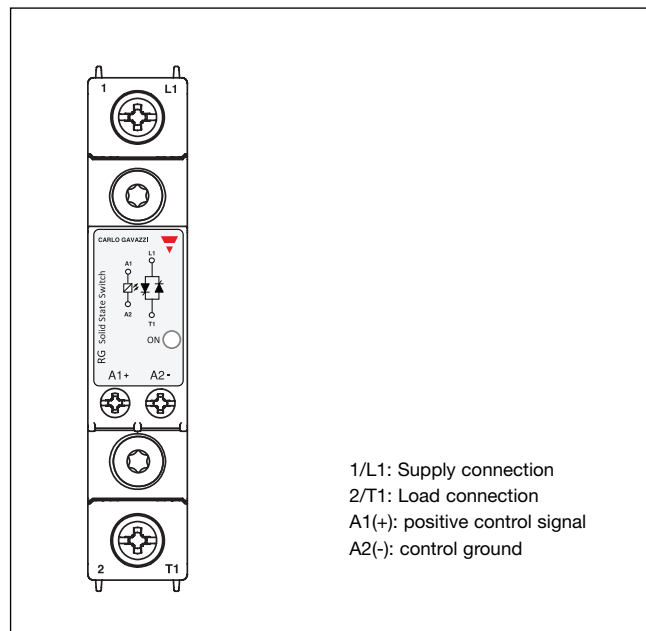
## Filter Connection diagram



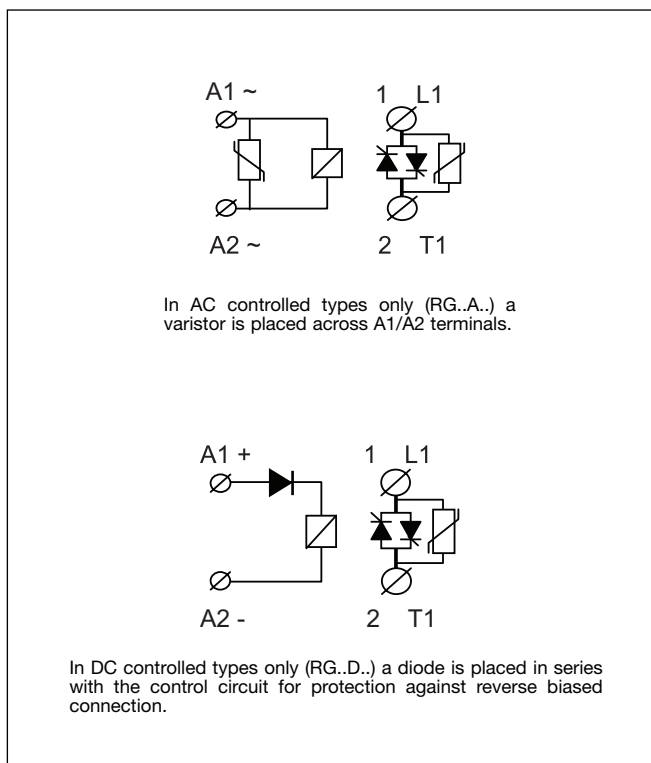
## Environmental Specifications

Operating Temperature	-40°C to 80°C (-40°F to +176°F)
Storage Temperature	-40°C to 100°C (-40°F to +212°F)
RoHS (2002/95/EC)	Compliant
Impact resistance (IEC60068-2-27)	15/11 g/ms
Vibration resistance (2-100Hz, IEC60068-2-26)	5g
Relative humidity	95% non-condensing @ 40°C
UL flammability rating (housing)	UL 94 V0

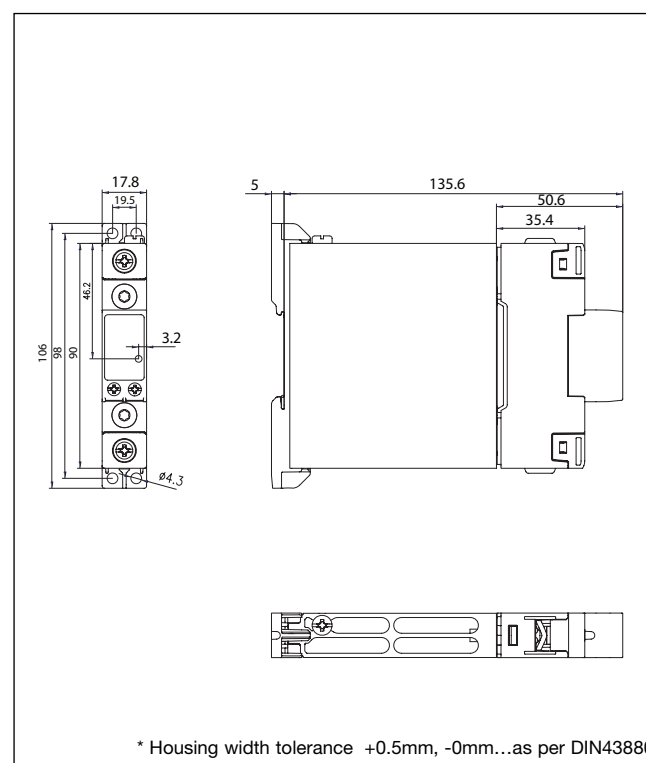
## Terminal Layout



## Connection Diagram



## Dimensions

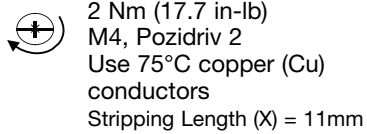


All dimensions in mm

## Connection Specifications

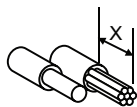
### POWER CONNECTIONS: 1/L1, 2 /T2

#### Torque specifications

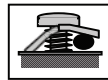


#### Rigid (Solid & Stranded)

UL/ CSA rated data



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



2 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

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

#### Flexible without end sleeve



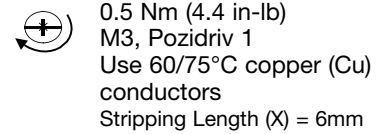
2 x 2.5..6 mm<sup>2</sup>  
2 x 14..10 AWG

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

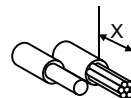
Aperture for termination lug 12.3mm

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

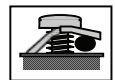
#### Torque specifications



#### Rigid (Solid & Stranded)



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

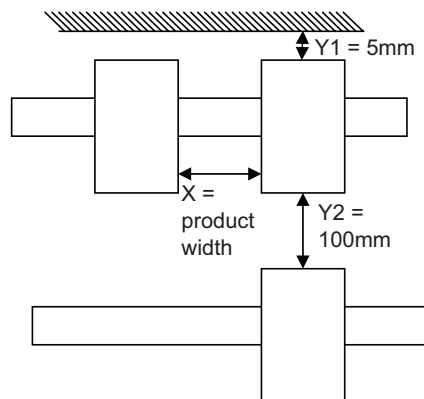
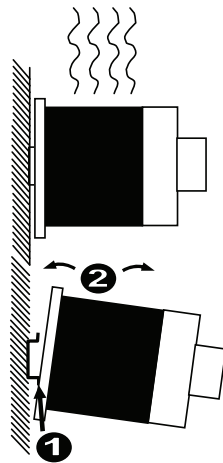
#### Protective Earth Connection



RGC..20: M4; RGC..30: M5  
1.5Nm (13.3 in-lb)

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

## Installation Instructions



## Short Circuit Protection

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### Protection Co-ordination, Type 1 vs Type 2:

Type 1 protection implies that after a short circuit, the device under test will no longer be in a functioning state. In type 2 co-ordination the device under test will still be functional after the short circuit. In both cases, however the short circuit has to be interrupted. The fuse between enclosure and supply shall not open. The door or cover of the enclosure shall not be blown open. There shall be no damage to conductors or terminals and the conductors shall not separate from terminals. There shall be no breakage or cracking of insulating bases to the extent that the integrity of the mounting of live parts is impaired. Discharge of parts or any risk of fire shall not occur.

The product variants listed in the table hereunder are suitable for use on a circuit capable of delivering not more than 5,000 A rms Symmetrical Amperes, 600 Volts maximum when protected by fuses. Tests at 5,000 A were performed with RK5 fuses, time delay; please refer to the table below for maximum allowed ampere rating of the fuse. Use fuses only.

### Co-ordination type 1 (UL508)

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Part No.	Max. size [A]	Class	Current [kA]	Voltage [VAC]
RGC..20	30	RK5	5	Max. 600
RGC..30	30	RK5	5	Max. 600