

# Solid State Relays 1-Phase with Heatsink and Integrated Fuse Type RGC1F

CARLO GAVAZZI



- 35 mm product width
- Solid state contactor with integrated fuse
- AC zero cross switching
- Operational voltage: up to 600 VAC
- Rated load currents of 20 AAC, 30 AAC and 40 AAC
- Control voltage: 4.5 - 32 VDC
- Integrated voltage transient protection with varistor
- Detection of SSR and load malfunction (RGC1FS)
- Alarm output signal (RGC1FS)
- 100 kA short circuit current rating



## Product Description

This solid state contactor includes three functions in one housing: power switching, short circuit protection by semiconductor fuse and system monitoring. RGC1FA is the version including the powerswitch and the fuse version with a fuse while the RGC1FS includes also the monitoring function which detects load, fuse and SSR faults.

The front panel can be opened for easy access of the fuse and the fuse holder accepts fuses from a wide range of manufacturers. Alarms (in RGC1FS) are indicated by a red LED on the front and a signal which is normally closed. Product width is 35 mm for the whole range and covers up to 600 VAC and 40 AAC. Specifications stated at 25°C unless specified.

## Ordering Key **RGC 1 F A 60 D 30 GG E**

Solid state relay	
Number of poles	
Integrated fuse	
Switching mode	
Rated operational voltage	
Control voltage	
Rated operational current	
Connection type for control and power	
Output connection configuration	

## Ordering Key

Type	Integrated fuse	Mode	Rated voltage	Control voltage	Rated current	Connection control/ power	Connection configuration
RGC1	F	A: Zero cross switching + fuse + fuse holder  S: Zero cross switching + fuse + fuse holder + system monitoring	60: 600 VAC	D: 4.5 - 32 VDC	20: 20 AAC 30: 30 AAC 40: 40 AAC	G: Box Clamp	E: Contactor

### Warning

- Risk of electric shock
- Do not open fuse panel when the product is in operation
- Switch off the panel before doing any maintenance on the product. Panel should be closed before restarting operation
- Failure to follow these instructions may result in serious injury (or worse) and/or equipment damage



## Selection Guide

Rated output voltage	Options	Control voltage	Rated operational current at 40°C		
			20 AAC	30 AAC	40 AAC
600 VAC	Fuse Only	4.5 -32 VDC	RGC1FA60D20GGE	RGC1FA60D30GGE	RGC1FA60D40GGE
600 VAC	Fuse + Sensing	4.5 -32 VDC	RGC1FS60D20GGE	RGC1FS60D30GGE	RGC1FS60D40GGE

## Output Voltage Specifications

Operational Voltage Range (+10%, -15% on max)	42-600 VAC
Blocking Voltage	1200 Vp
Internal Varistor	625 V

## General Specifications

Latching voltage (across L1-T1)	≤20 V
Operational frequency range	45 to 65 Hz
Power factor	0.5 at rated voltage
Touch Protection	IP20
LEDs	Control ON: Green, full intensity Supply ON: Green, half intensity Fault: RED
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

## Supply Specifications (A1+, A2- for RGC1F5)

Rated supply voltage, $U_s$ <sup>1</sup>	24 VDC -15%, +20% according to EN61131-2:2003
Max input current	80 mA during normal conditions 20 mA during alarm conditions

## Alarm Output Specifications (OUT for RGC1F5)

Type	PNP open Collector Normally closed
Rating (@ 40°C)	50 mADC, 35 VDC

## Output Specifications

	RGC1F..20	RGC1F..30	RGC1F..40
Rated operational current			
AC-51 rating @ Ta=40°C (IEC60947-4-3 / UL508) <sup>2</sup>	20 AAC	30 AAC	40 AAC
AC-53a rating @ Ta=40°C (IEC60947-4-2 / UL508)	4.7 AAC	6 AAC	8 AAC
Number of motor starts (x:6, Tx:6s, F:50%) at 40°C <sup>2,3</sup>	30	30	30
Min. operational current	0.2 A	0.2 A	0.2 A
I <sup>2</sup> t of integrated fuse @ 690V (size: 14 x 51mm)	740 A <sup>2</sup> s	1400 A <sup>2</sup> s	3100 A <sup>2</sup> s
Critical dv/dt (@ Tj init = 40°C)	1000 V/μs	1000 V/μs	1000 V/μs

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

	115 VAC	230 VAC	400 VAC	480 VAC	600 VAC
RGC1F..20	1/6 HP / 0.18 kW	1/3 HP / 0.37 kW	3/4 HP / 0.75 kW	1 HP / 1.1 kW	1-1/2 HP / 1.1 kW
RGC1F..30	1/4 HP / 0.25 kW	1/2 HP / 0.56 kW	1 HP / 1.1 kW	2 HP / 1.5 kW	2 HP / 1.5 kW
RGC1F..40	0.37 kW	0.75 kW	1.5 kW	1.5 kW	2.2 kW

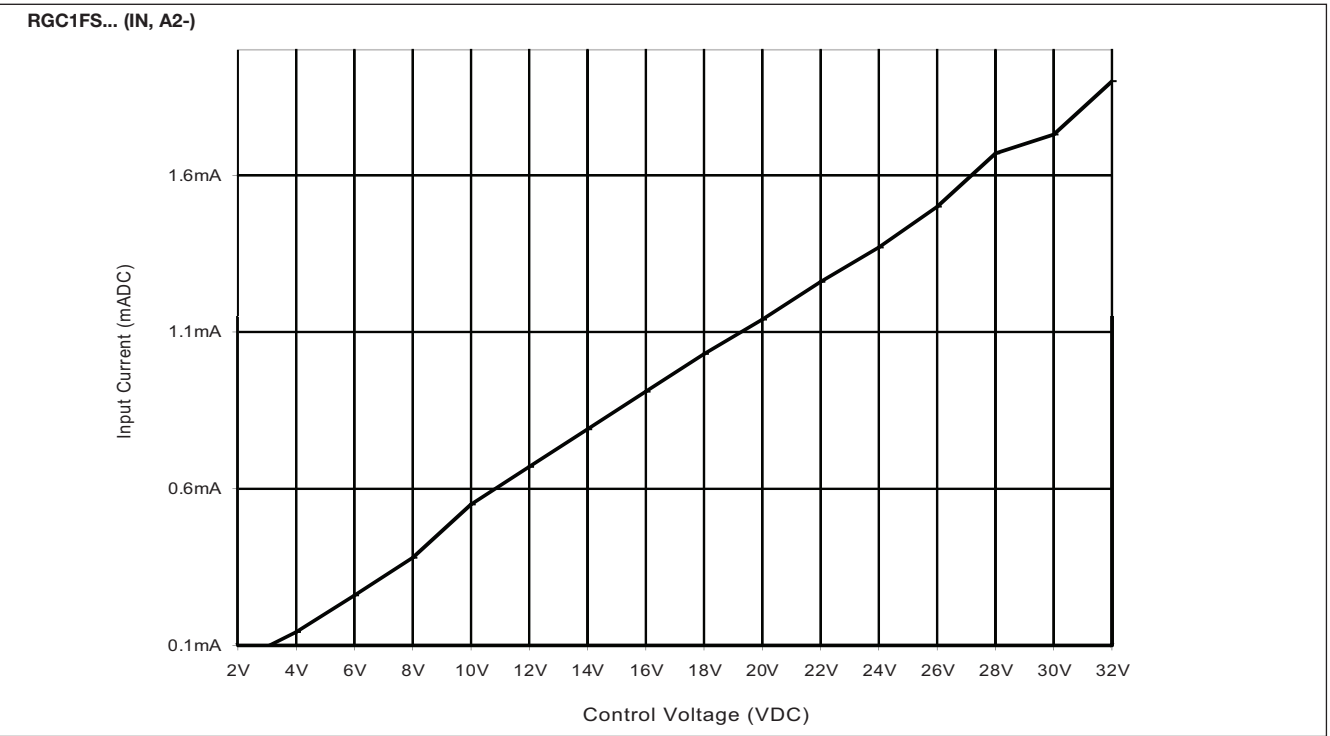
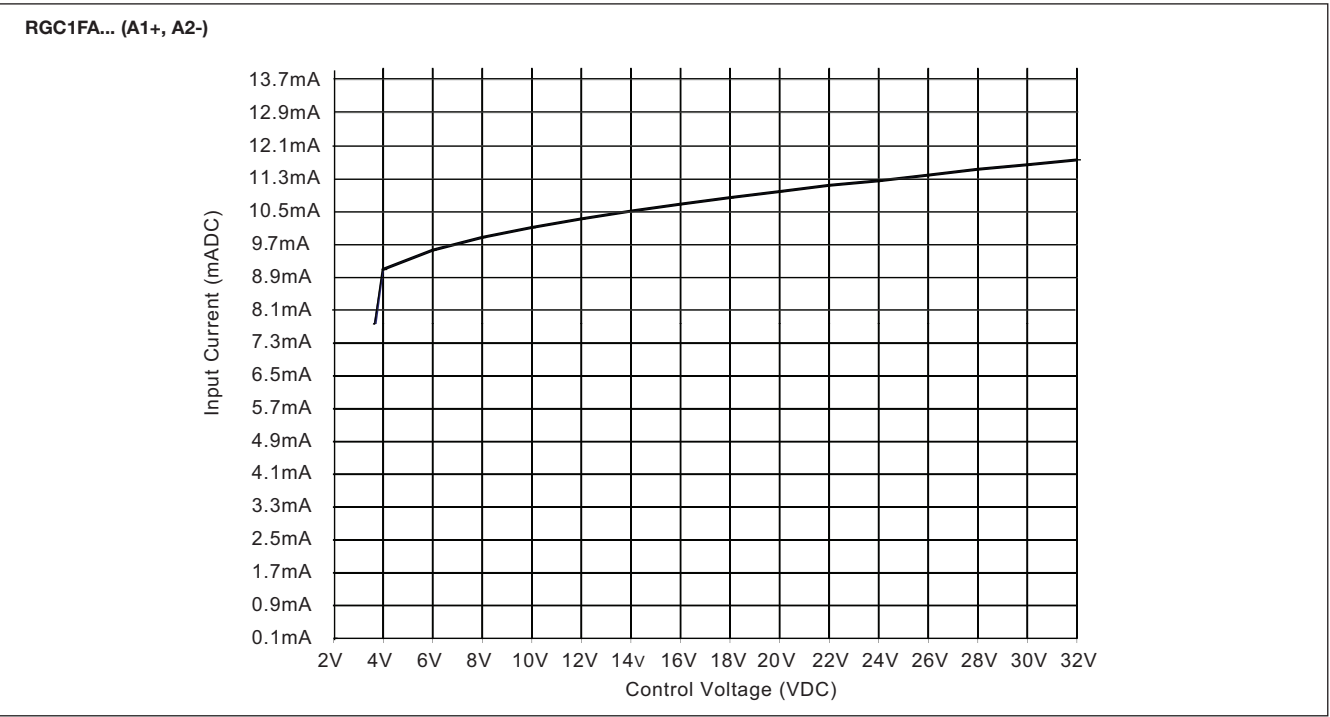
1: DC voltage to be supplied by a Class 2 power source

2: Refer to Derating curves

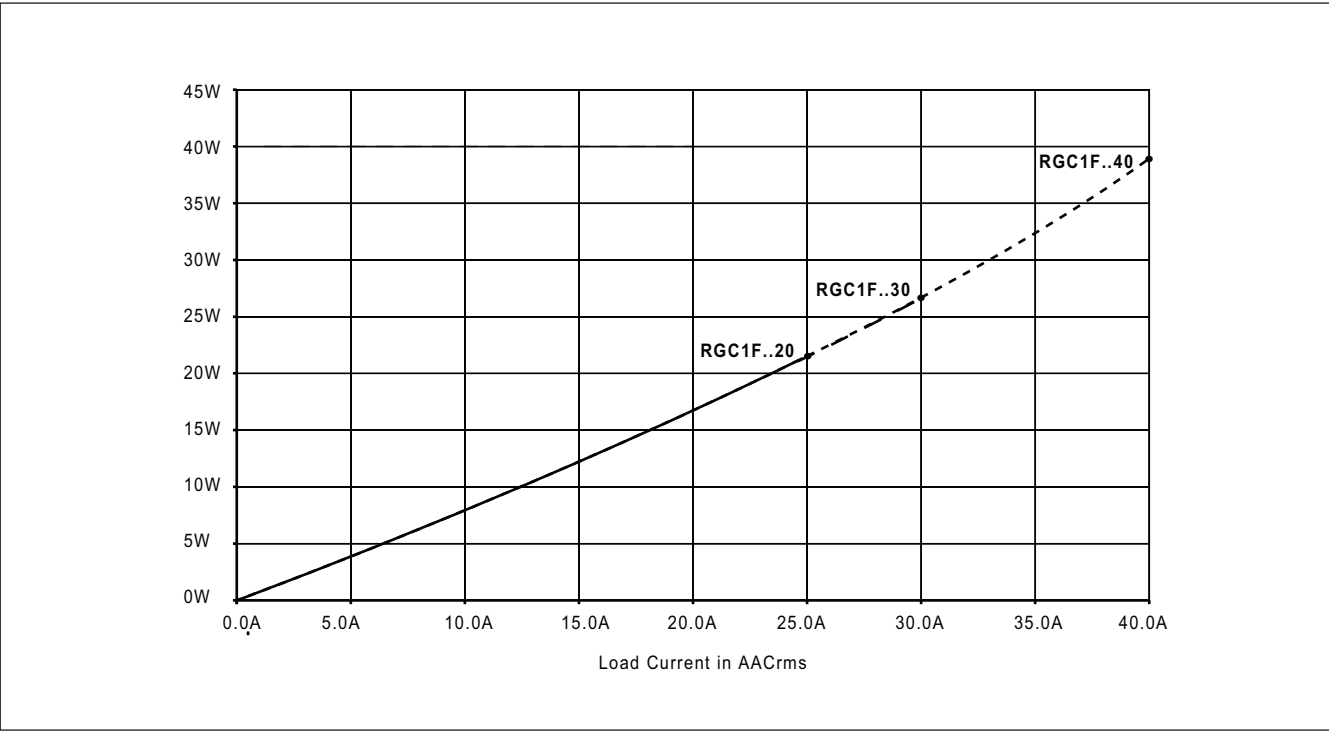
3: x: multiple of AC-53a current rating, Tx: duration of current surge, F: duty cycle

Control Input Specifications

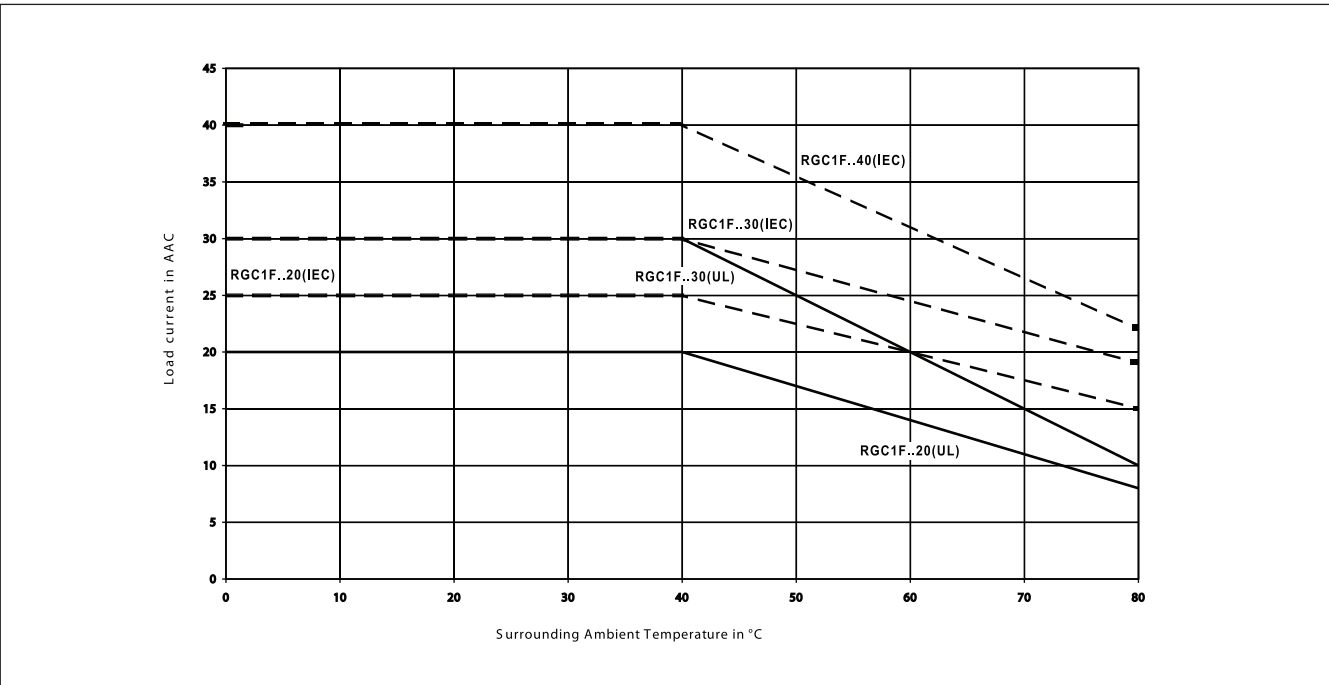
Control voltage range, U <sub>c</sub>		Drop-out voltage	1.0 VDC
<b>RGC1FA</b>		Response time pick-up	0.5 cycle
A1+, A2	4.5 - 32 VDC	Response time drop-out	0.5 cycle
<b>RGC1FS</b>		Max reverse voltage	32 VDC
IN, A2	4.5 - 32 VDC	Input current	See diagram below
Pick-up voltage	4 VDC		



Output Power Dissipation

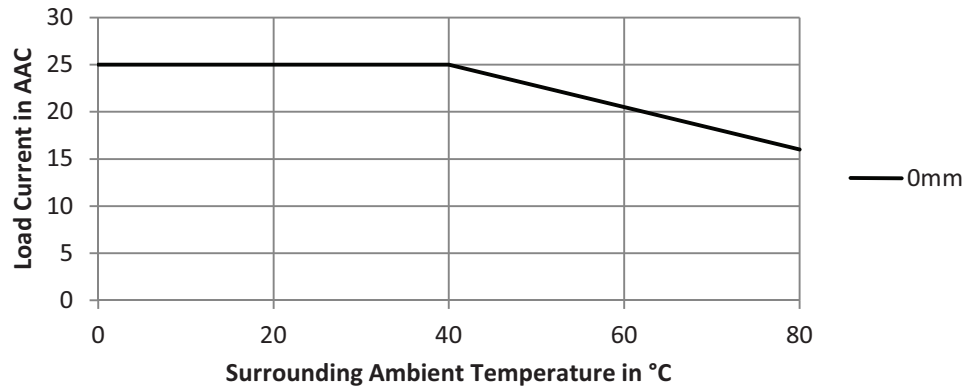


Current Derating (UL 508/ EN/IEC 60947-4-2/-3)

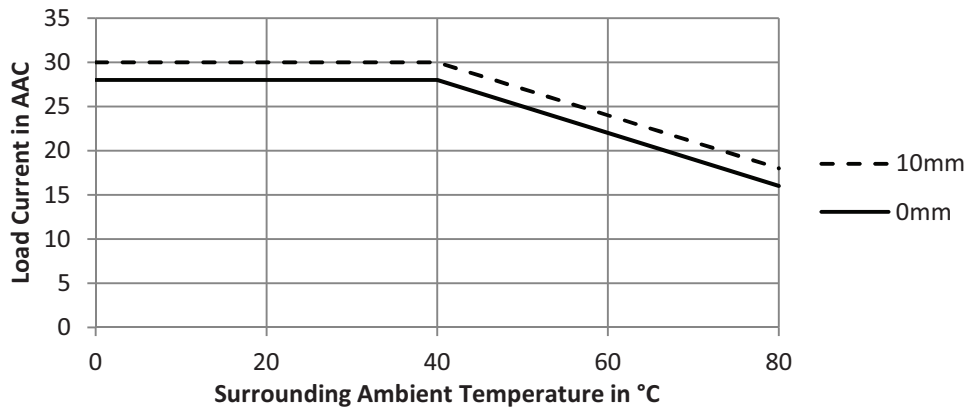


**Derating vs. Spacing Curves**

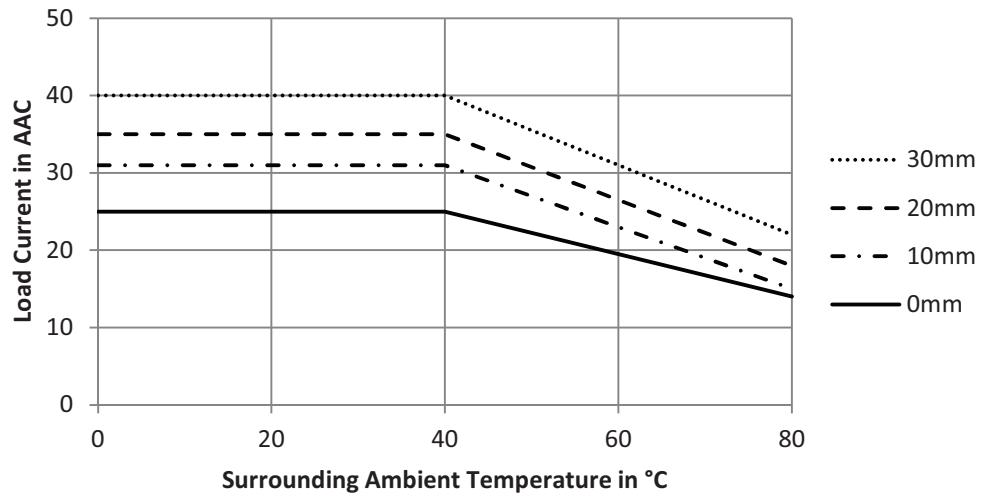
RGC1F..20



RGC1F..30



RGC1F..40



## Agency Approvals and Conformances

Conformance	IEC/EN 62314 IEC/EN 60947-4-2 IEC/EN 60947-4-3	Agency Approvals RGC1F..20, 30 Short circuit current rating	cULus listed (UL 508), E172877 100 kA (UL508)
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## Electromagnetic Compatibility

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

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.
- 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.

## Environmental Specifications

Operating Temperature	-30°C to 80°C (-22°F to 176°F)	Vibration resistance (2-100Hz, EN50155, EN61373)	2 g per axis
Storage Temperature	-40°C to 100°C (-40°F to 212°F)	Relative humidity	95% non-condensing @ 40°C
EU RoHS compliant	Yes	UL flammability rating (housing)	UL 94 V0
China RoHS compliant	Refer to Environmental Information (page 11)		
Impact resistance (EN50155, EN61373)	15/11 g/ms		

Connection Specifications

POWER CONNECTIONS:

Use 75°C copper (Cu) conductors

2/T1



11 mm

1/L1



8 mm

Stripping Length (X)

Torque specifications

UL: 2.5Nm (22 lb-in)



Rigid (Solid& Stranded)  
UL/CSA rated data

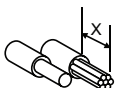


M5, Pozidriv2  
IEC: 2.5 - 3.0Nm  
(22 - 26.6lb-in)

1 x 2.5..25 mm<sup>2</sup>  
1 x 14..3 AWG

M4, Pozidriv2  
IEC: 2.0 - 2.5Nm  
(17.7 - 22lb-in)

1 x 2.5..10 mm<sup>2</sup>  
1 x 14..8 AWG



Flexible with end sleeve

1 x 2.5..16 mm<sup>2</sup>  
1 x 14..6 AWG

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



Flexible without end sleeve

1 x 4..25 mm<sup>2</sup>  
1 x 12..3 AWG

1 x 4..10 mm<sup>2</sup>  
1 x 12..8AWG



CONTROL & AUXILIARY CONNECTIONS: A1(+), A2(-), IN, OUT

Use 60/75°C copper (Cu) conductors

Stripping Length (X)

6 mm

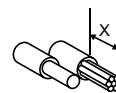
Torque specifications

UL: 0.5 Nm (4.4lb-in)  
IEC: 0.4- 0.5 Nm (3.5 - 4.4lb-in)



Rigid (Solid& Stranded)  
UL/CSA rated data

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



Flexible without end sleeve

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



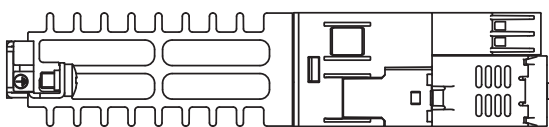
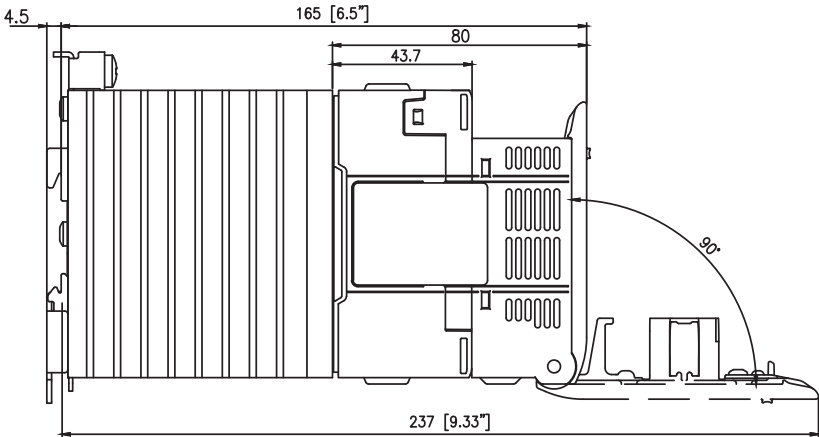
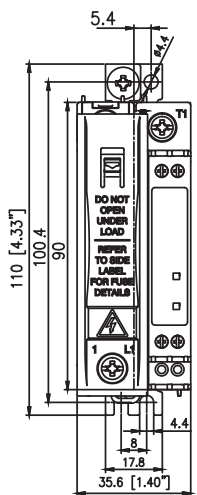
Protective Earth Connection

M5, 1.5 Nm (13.3 in-lb)



Note: M5 PE screw not provided with SSR. PE connection required when product is intended to be used in Class 1 applications according to EN/IEC 61140.

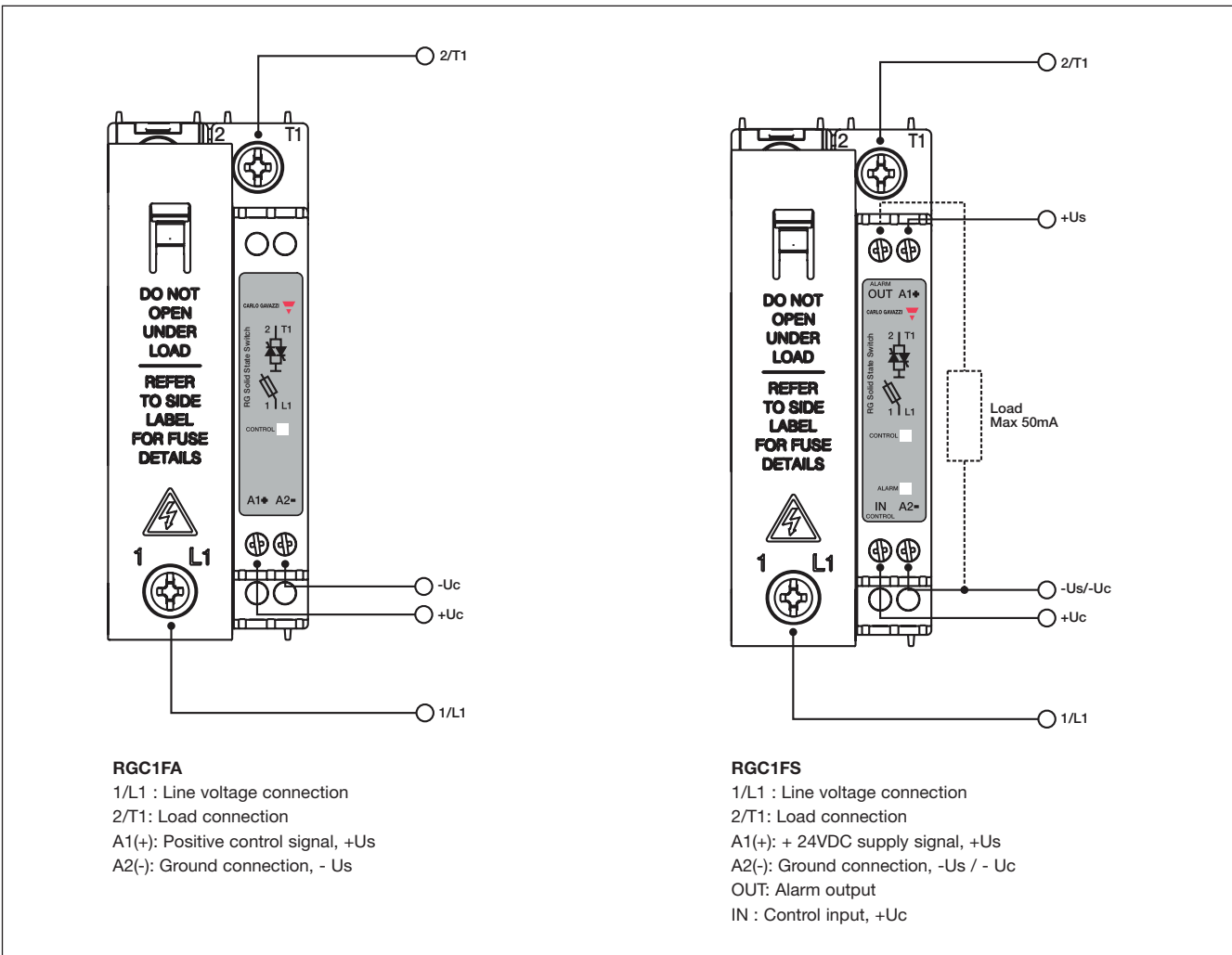
Dimensions



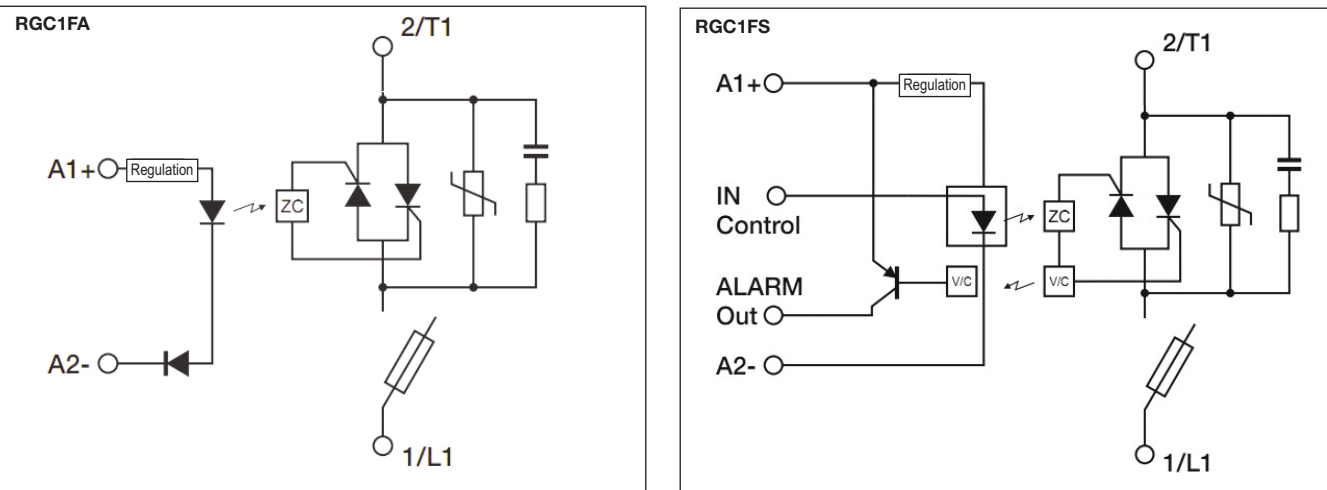
Note: fuse is included in product

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

## Terminal Markings and Connection Diagrams



## Schematic Diagrams





## Function Diagram: RGC1FS

Indication LED	Control OFF	Control ON	Line Voltage Loss	Line Voltage Loss	Heater Break	Power Supply Loss	Power Supply Loss	SSR open circuit	SSR short circuit	SSR short circuit	Open Fuse
Line voltage (1 L1)											
Load current (2 T1)											
Control voltage, Uc (IN)											
Control/ Supply LED (Green)	Full Intensity										
	Half Intensity										
Power Supply, Us (A1, A2)											
Fault LED (Red)											
Alarm signal (Normally closed) (OUT)											
	Normal operation. SSR off	Normal operation. SSR on	Line voltage loss detected without control voltage, i.e. when SSR output is switched off	Line voltage loss detected with control voltage applied, i.e. when SSR output is switched on	Heater break is detected when the control is applied.	All function stops due to loss of power supply.	All function stops due to loss of power supply, even when a control voltage is applied.	If SSR output does not switch ON when control voltage is applied an alarm condition results.	Shorted output is detected even when the control voltage is applied.	Shorted output is detected when the control is not applied. Output would be conducting when it should be in the OFF-state	If fuse blows alarm signal is emitted from OUT terminal and the OPEN FUSE LED will also light up.

Note:

- Half light intensity Green LED to indicate application of power supply. Full brightness to indicate presence of control input.
- Faults indicated by a continuous lighting RED LED.
- Auto-reset function. The alarm signal turns OFF and SSR proceeds normal operation when alarm condition is no longer present.

## Co-ordination type 1 (UL508)

Part No.	Max. fuse size [A]	Class	Current [kA]	Voltage [VAC]
RGC1F.20	30	J or CC	100	Max. 600 VAC
RGC1F.30	30	J or CC	100	Max. 600 VAC

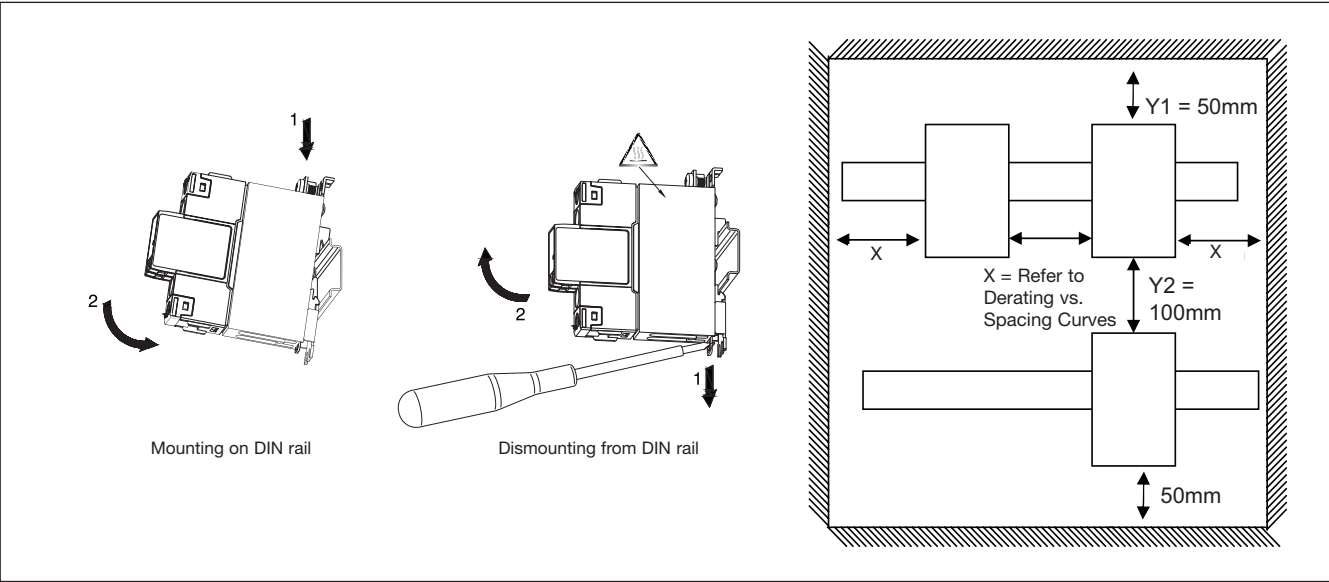
For UL applications an external Class J fuse shall be installed. Tests with Class J fuses are representative of Class CC fuses.

Suitable for use on a circuit capable of delivering not more than 100,000 Arms symmetrical Amperes, 600 volts maximum when protected by fuses. Tests at 100,000 A were performed with class J fuses, fast acting: please refer to the table above for maximum allowed ampere rating of the fuse. Use fuses only.

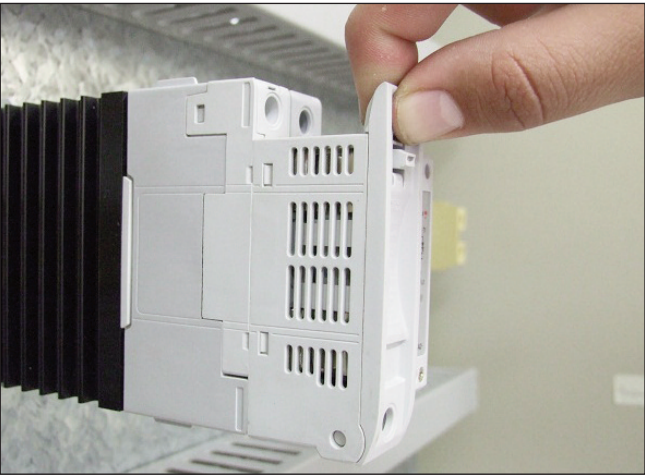
## Co-ordination type 2 - Semiconductor fuses (integrated)

Part No.	Max. fuse size [A]	Type (Siba)	Type (Cooper Bussman)	Current [kA]	Voltage [VAC]
RGC1F.20	25	50 124 34. 25	FWP-25A14F	100	Max. 600
RGC1F.30	30	50 124 34. 30	FWP-30A14F	100	Max. 600
RGC1F.40	40	50 124 34. 40	FWP-40A14F	100	Max. 600

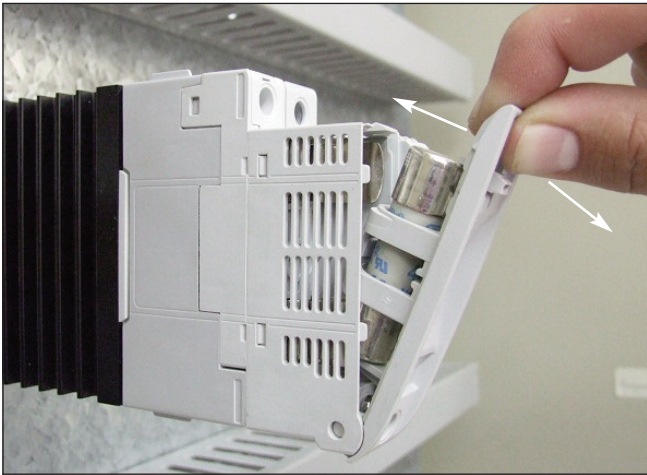
Installation Instructions



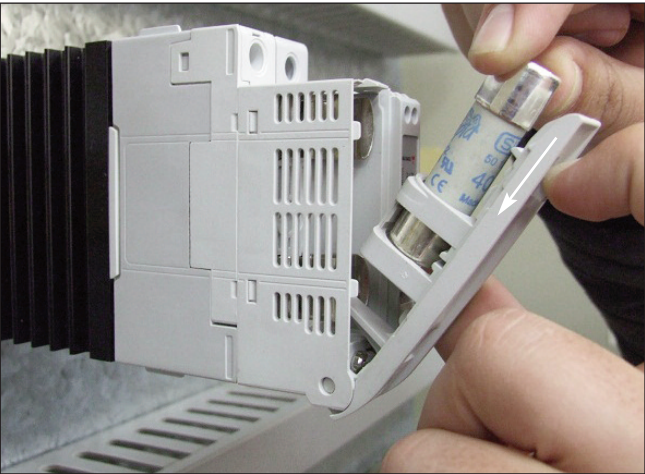
Fuse Changing Instructions



1. Preperation for opening fuse holder.



2. Opening or closing the fuse holder.



3. Removal or Insertion of fuse.



4. Pressing downwards the fuse-holding clip to insert or remove the fuse



Environmental Information

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

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

环境特性

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

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



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