

RG series: 3-phase solid state switching solutions

Switch

RGC2 RGC3 series

3-phase solid state solutions

The 3-phase solid state switching solutions presented hereafter build on the success of the 1-phase version of the RG series whereby the same effective thermal design is adapted. This translates to one of the most compact 3-phase solid state switching solutions available in the market.

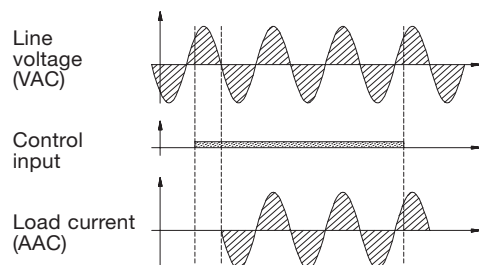
The solutions offered in the RGC2 and RGC3 series have an integrated heatsink making it easy for user to match product rating to application needs. Different switching modes are available catering for digital control signals, for example from PLCs, as well as analog signals, current or voltage, directly from temperature controllers output.

The RGC3 series covers 3-phase, 3-pole switching solutions whilst the RGC2 series is a more economic version consisting of 2 switching poles and a short link.

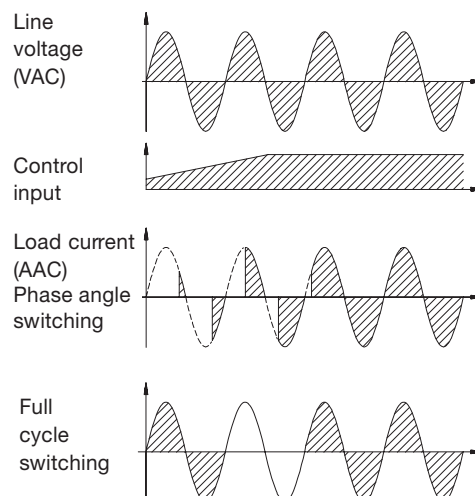


Concentrated power

RGC2A, RGC3A series
RGCM2A, RGCM3A series
 'A': Zero Cross Switching

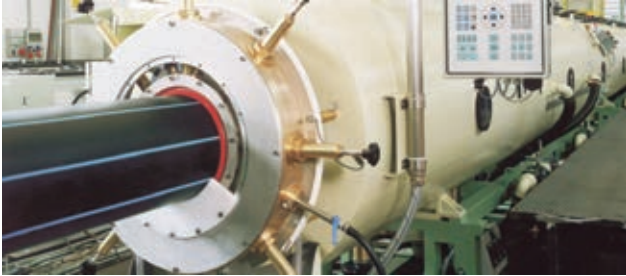


RGC2P, RGC3P series
 'P': Proportional Switching



Applications

Extrusion



Packaging & wrapping



Thermoforming



Plastic dryers



Ambient heating



Ventilation



Food & beverage



Industrial furnaces & ovens



Blow moulding



Semiconductor



RGC2, RGC3 series

3-phase solid state solutions

Benefits

Fast and easy installation

SSR is just placed on DIN rail and secured by pushing downwards without the need of tools. Back panel mounting is also possible



Time saving in wiring up

Robust connections for models rated 30A and over can easily handle power cables up to 25mm² / AWG3



Configuration flexibility

Removable IP20 covers for the versions with screw terminals allow for connection of ring lugs

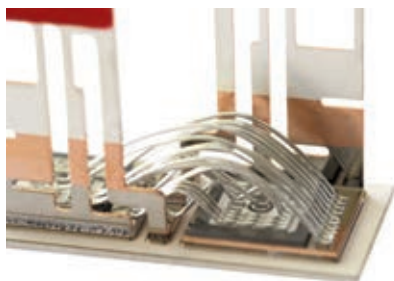


User friendly

Frontal access to the PE screw (if needed) can be done after SSR is mounted on DIN rail. Other components mounted in the panel will not hinder accessibility to this terminal



Reliability



Long lifetime

Elimination of thermal stress on the semiconductors and innovative thermal design improve the SSR lifetime by 2 to 3 times compared to other SSRs using solder process technologies.

Overvoltages

The RGC2 and RGC3 series conform to the Industrial Immunity standards without need of additional external components. Each pole is protected against overvoltages by a varistor.

Integrated heatsinks

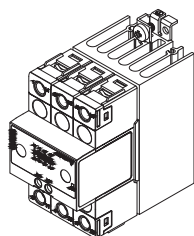
Derating curves guide users to select the product for the needed application. There is no need for users to calculate their own heatsinks and worry of overheating because of wrong heatsink sizing.

Product overview

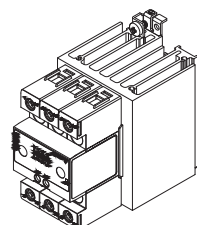
	Model	RGC2A 2 pole switching + 1 pole direct	RGC3A 3 pole switching	RGC2A..M 2 pole switch- ing + 1 pole direct	RGC3A..M 3 pole switching	RGC2P 2 pole switching + 1 pole direct	RGC3P 3 pole switching
Ratings	Operational voltage	42-242 VAC 42-660 VAC	42-242 VAC 42-660 VAC	90-660 VAC	90-660 VAC	180-660 VAC	180-660 VAC
	Size 1	25 AAC	20 AAC			25 AAC*	20 AAC*
	Size 2	40 AAC	25 AAC, 30 AAC			40 AAC*	30 AAC*
	Size 3			25 AAC	20 AAC	25 AAC	20 AAC
	Size 4			40 AAC	25 AAC, 30 AAC	40 AAC	30 AAC
	Size 5		40 AAC				
Size 6	75 AAC	65 AAC	75 AAC	65 AAC	75 AAC	65 AAC	
Load	3-phase star (Y)	■	■	■	■	■	■
	3-phase delta (Δ)	■	■	■	■	■	■
	3-phase + N (4-wire)						■
Control Input	5-32VDC	■	■	■	■		
	20-275VAC (24-190VDC)	■	■	■	■		
	0-20mA, 4-20mA, 12-20mA					■	■
	0-10V, 0-5V, 1-5V					■	■
	Potentiometer control					■	■
Switching Mode	Zero crossing	■	■	■	■		
	Phase angle						■
	Distributed 1 FC					■	■
	Distributed 4 FC					■	■
	Distributed 16 FC						■
	Soft start						■
	Soft start + 16 FC						■
Monitoring	Mains loss			■	■	■	■
	Load loss			■	■	■	■
	Overtemperature protection	■ (75 AAC)	■ (65 AAC)	■	■	■	■
	SSR open circuit			■	■	■	■
	SSR short circuit			■	■	■	■

FC = Full cycles

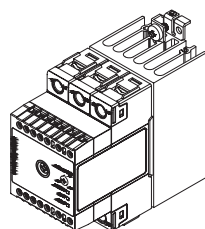
* Applicable only for control input type 'AA'



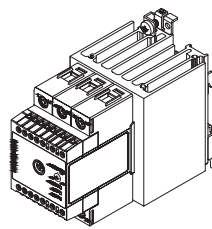
Size 1*
54 x 110 x 103 (mm)



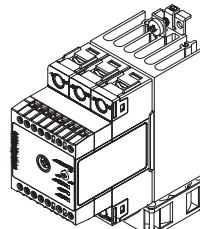
Size 2*
70 x 110 x 126 (mm)



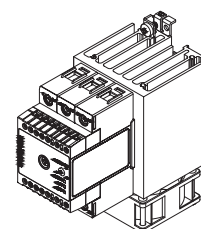
Size 3*
54 x 110 x 118 (mm)



Size 4*
70 x 110 x 141 (mm)



Size 5*
54 x 135 x 118 (mm)



Size 6*
70 x 141 x 141 (mm)

* Dimensions (Width x Height x Depth)

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RGC2A, RGC3A series

3-phase solid state solutions

The RGC2A and RGC3A series offer a one component switching solution dedicated to 3-phase loads. The solutions available are ready to use since they are equipped with an integrated heatsink thus eliminating the possibility of incorrect heatsink sizing.

The high current ratings are achieved with integrated forced ventilation. These versions integrate over temperature protection to protect the solid state contactor against overheating in case of a fan malfunction. The fan operation is controlled and is switched only when necessary to extend its lifetime.

The RGC2A..M and RGC3A..M versions are more sophisticated variants that are able to detect malfunctions in the system. An electromechanical relay output is available for remote indication of such alarm conditions. Alarm LED flash sequence facilitates diagnostics. Additional LEDs indicate presence of control voltage and status of load.



Solid state contactors

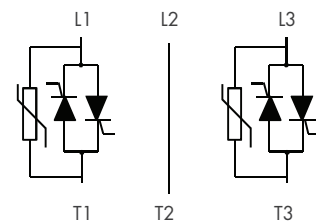
Features

- 3-phase zero cross switching
- Rated operational voltage up to 660VAC
- Rated current up to 75AAC @ 40°C/ pole (RGC2A)
- Rated current up to 65AAC @ 40°C/ pole (RGC3A)
- Motor ratings up to 11kW @ 400VAC/25HP @ 600VAC
- Control voltages: 5-32VDC, 20-275VAC (24-190VDC)
- Integrated output overvoltage protection
- 100kArms short circuit current rating acc. to UL508
- Up to 15,000A²s for I²t
- Controlled fan operation extending fan lifetime
- Overtemperature protection (for versions with fan)
- System monitoring with RGC..M



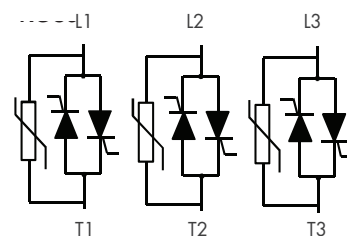
RGC2A series

2 pole switching + 1 pole direct



RGC3A series

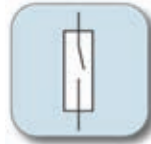
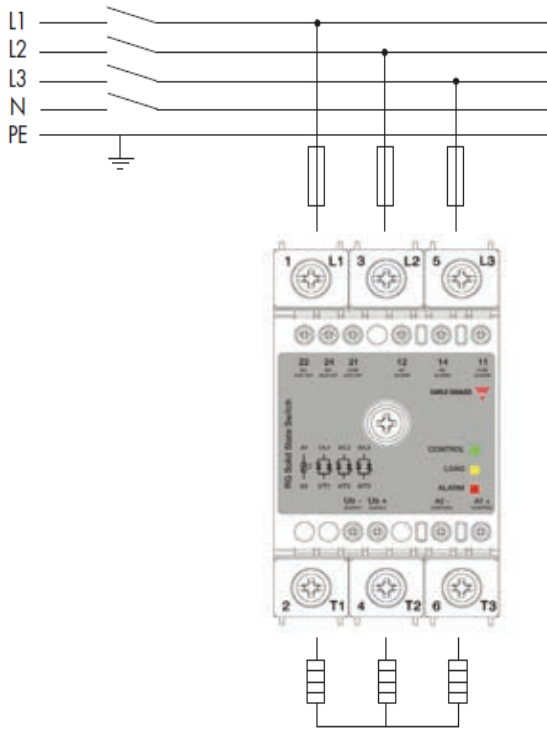
3 pole switching



System monitoring

RGC2A..M and RGC3A..M series

The 'M' suffix versions offer the possibility to have additional features that can detect the status of the Mains and the Load in addition to the status of the SSR, whereby conditions of SSR open circuit, SSR short circuit and SSR overheat can be detected. These features facilitate diagnostics. The alarm output makes remote monitoring possible.



Mains Loss Alarm

Issued in case mains voltage is not present on either L1, L2 or L3



Load Loss Alarm

Issued in case of a heater break or no connection on either T1, T2 or T3
(Applies also to RGC2A i.e. the version with 1 pole direct)



Over Temperature Alarm

Issued in case of an SSR overheat. Output is switched off to protect the SSR. Restart occurs automatically once SSR cools down



SSR Malfunction

Alarm issued when the SSR does not operate as intended such as in the case of an SSR open circuit or an SSR short circuit

suitable for resistive loads only

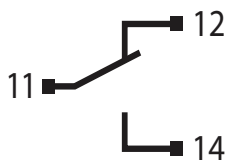
Alarm indications

Signal:

An electromechanical relay output having user selectable NO or NC contacts

Visual:

Flashing red LED

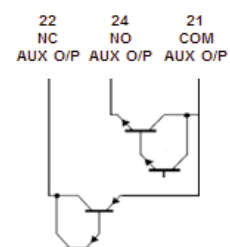


Mains Loss	2 flashes	
Load loss, SSR short circuit	3 flashes	
SSR open circuit	4 flashes	
SSR over temperature	100%	

Auxiliary output

This has a similar function to the auxiliary contacts of mechanical contactors, but is implemented with a solid state solution. Three terminals are provided and the user can select NO terminals or NC terminals

NO = Normally Open
NC = Normally Closed
AUX O/P = Auxiliary Output



RGCM2A, RGCM3A series

3-phase solid state solutions

The RGCM2A and RGCM3A series are a miniature version of the RGC2A and RGC3A series, as product width does not exceed 45mm. This allows for easy replacement of miniature mechanical contactors.

Being fully solid state the RGCM2 and RGCM3 guarantee trouble free operation over a long period of time. Additionally, varistors are integrated across the output of each pole for protection against overvoltages.

The RGCM series is certified as a motor switching device with associated motor ratings up to 3KW @ 400VAC / 5HP @ 600VAC and so can be used for motor switching as well as for resistive loads.



45mm miniature solid state contactors

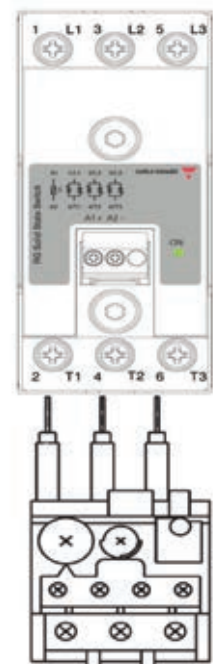
RGCM2A, RGCM3A series

- 45mm product width
- 3-phase zero cross switching
- 2-pole switching + 1 direct (RGCM2A) or 3-pole switching (RGCM3A)
- Rated operational voltage up to 660VAC
- Rated current up to 20AAC @ 40°C/ pole (RGCM2A)
- Rated current up to 15AAC @ 40°C/ pole (RGCM3A)
- Motor ratings up to 3kW (400VAC) / 5HP (600VAC)
- Control voltage: 5-32VDC, 20-275VAC (24-190VDC)
- Integrated output overvoltage protection
- Pluggable control terminal



RGCM

Solid state contactor



Overload relay

Selection guide

2-pole switching + 1 pole direct, zero cross: RGC2A series

Operational voltage	Features	Control voltage	25 AAC (1,800A ² s) 54mm	-	40 AAC (6,600A ² s) 70mm	-	75 AAC (15,000A ² s) 70mm + fan
42-242 VAC	No monitoring	5 - 32 VDC	RGC2A22D25KKE	-	-	-	-
		20 - 275 VAC 24 - 190 VDC	RGC2A22A25KKE	-	-	-	-
42-660 VAC	No monitoring	5 - 32 VDC	RGC2A60D25KKE	-	RGC2A60D40KGE	-	RGC2A60D75GGEDF* RGC2A60D75GGGEAF*
		20 - 275 VAC 24 - 190 VDC	RGC2A60A25KKE	-	RGC2A60A40KGE	-	RGC2A60A75GGGEAF*
90-660 VAC	Integrated monitoring with external supply DM = 24 VDC AM = 90-250 VAC	5 - 32 VDC	RGC2A60D25GKEDM	-	RGC2A60D40GGEDM	-	RGC2A60D75GGEDFM
			RGC2A60D25GKEAM	-	RGC2A60D40GGEAM	-	RGC2A60D75GGGEAFM
		20 - 275 VAC	RGC2A60A25GKEAM	-	RGC2A60A40GGEAM	-	RGC2A60A75GGGEAFM

3-pole switching, zero cross: RGC3A series

Operational voltage	Features	Control voltage	20 AAC (1,800A ² s) 54mm	25 AAC (1,800A ² s) 70mm	30 AAC (6,600A ² s) 70mm	40 AAC (6,600A ² s) 54mm + fan	65 AAC (15,000A ² s) 70mm + fan
42-242 VAC	No monitoring	5 - 32 VDC	RGC3A22D20KKE	-	-	-	-
		20 - 275 VAC 24 - 190 VDC	RGC3A22A20KKE	-	-	-	-
42-660 VAC	No monitoring	5-32 VDC	RGC3A60D20KKE	RGC3A60D25KKE	RGC3A60D30KGE	RGC3A60D40GGEDF*	RGC3A60D65GGEDF* RGC3A60D65GGGEAF*
		20 - 275 VAC 24 - 190 VDC	RGC3A60A20KKE	RGC3A60A25KKE	RGC3A60A30KGE	RGC3A60A40GGGEAF*	RGC3A60A65GGGEAF*
90-660 VAC	Integrated monitoring with external supply DM = 24 VDC AM = 90-250 VAC	5 - 32 VDC	RGC3A60D20GKEDM	RGC3A60D25GKEDM	RGC3A60D30GGEDM	-	RGC3A60D65GGEDFM
			RGC3A60D20GKEAM	RGC3A60D25GKEAM	RGC3A60D30GGEAM	-	RGC3A60D65GGGEAFM
		20 - 275 VAC	RGC3A60A20GKEAM	RGC3A60A25GKEAM	RGC3A60A30GGEAM	-	RGC3A60A65GGGEAFM

* Integrated Overtemperature protection, DF = 24 VDC external supply, AF = 90-250 VAC external supply
Where applicable AC control voltage range is limited to 20-275 VAC only

KKE = screw terminals for control (K), screw terminals for power (K)
GKE = box clamps for control (G), screw terminals for power (K)
KGE = screw terminals for control (K), box clamps for power (G)
GGE = box clamps for control (G), box clamps for power (G)

45mm miniature solution, zero cross: RGCM2A, RGCM3A series

Operational voltage	Features	Control voltage	2-pole switching + 1 direct 20 AAC (1,800A ² s) 45mm	3-pole switching 15 AAC (1,800A ² s) 45mm	-	-	-
42-242 VAC	No monitoring	5 - 32 VDC	-	RGCM3A22D15GKE	-	-	-
		20 - 275 VAC 24 - 190 VDC	-	RGCM3A22A15GKE	-	-	-
42-660 VAC	No monitoring	5 - 32 VDC	RGCM2A60D20GKE	RGCM3A60D15GKE	-	-	-
		20 - 275 VAC 24 - 190 VDC	RGCM2A60A20GKE	RGCM3A60A15GKE	-	-	-

GKE = pluggable box clamps for control (G), screw terminals for power (K)

Further details are available on online datasheets at www.productselection.net

RGC2P, RGC3P series

3-phase solid state solutions

The RGC2P and RGC3P series cover 3-phase solid state switching controllers that deliver output power in proportion to the control input voltage or current. This series of solid state contactors can be controlled directly through the analog output of auxiliary components present in the system without the need for additional modules to convert such analog signals to digital signals.

A wide range of current and voltage inputs is accepted by the RGC2P and RGC3P. Various switching modes are available to cater for the different application needs. System monitoring is integrated in most versions whereby malfunction in the SSR or the load can be detected and signalled accordingly through an electromechanical relay and is visible through a dedicated LED on the front fascia of the device.



Proportional controllers

RGC2P, RGC3P series

- 2-pole + 1 direct (RGC2P) or 3-pole (RGC3P) switching
- Rated operational voltage up to 660VAC
- Rated current up to 75AAC @ 40°C/ pole (RGC2P)
- Rated current up to 65AAC @ 40°C/ pole (RGC3P)
- Current control input: 0-20mA, 4-20mA or 12-20mA
- Voltage control input: 0-10V, 0-5V or 1-5V
- Local setting possible with external potentiometer
- Integrated output overvoltage protection
- Soft start feature with selectable ramp time
- 100kArms short circuit current rating acc. to UL508
- System monitoring for SSR and load malfunction



System monitoring



Mains Loss Alarm

Issued in case mains voltage is not present on either L1, L2 or L3



Monitoring Alarm

Issued in case of load loss, SSR open circuit or SSR short circuit



Internal Error Alarm

Issued in case of an internal malfunction of the SSR

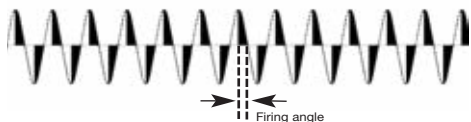


Over Temperature Alarm

Issued in case of SSR overheat. Output is switched off to protect the SSR

Switching modes

Phase Angle 'PA'



The power delivered to the load is controlled by the firing of the thyristors over each half cycle. The lowest resolution is a half cycle and hence response is very fast. Due to the chopping of the waveform, however, electromagnetic disturbance is created with this switching mode. This mode can only be utilised with 3-pole switching and hence the RGC3P.

Applications: dimmers, speed control, temperature control

Distributed Full Cycle 'C1', 'C4', 'C16'

1 Full Cycle 'C1' @ 25% power output



1 Full Cycle 'C1' @ 50% power output



1 Full Cycle 'C1' @ 75% power output



Only full cycles are switched in this case and so noise emission is reduced since switching is done at zero crossing. The lowest resolution is 1 full cycle and hence response is relatively fast. The number of full cycles switched is determined by the control input. This mode can be utilised also with economy switching and hence with the RGC2P as well as the RGC3P.

Applications: temperature control

4 Full Cycles and **16 Full Cycles** switching mode work on the same principle but the lowest resolution is 4 and 16 full cycles respectively. These modes are utilised with heater types which have a low thermal inertia.

Soft Starting + 16 Full Cycles 'S16'



Soft starting is used to limit inrush current of loads which change characteristics with temperature. Soft starting is performed only when the load is switched from a cold state. After the ramp is completed mode C16 comes into affect. This mode is available only on the RGC3P.

Applications: temperature control for loads with a variable resistance (change in resistance from cold to hot state)

Selection guide

2-pole switching + 1 pole direct, proportional control: RGC2P series

Operational voltage	Features	Control input	Switching mode	15 AAC (1,800A ² s) 54mm	25 AAC (1,800A ² s) 54mm	40 AAC (6,600A ² s) 70mm	75 AAC (15,000A ² s) 70mm + fan
180-660 VAC	No external supply	AA: 4-20 mA	1 FC	RGC2P60AA15C1	RGC2P60AA25C1	RGC2P60AA40C1	
180-660 VAC	Integrated monitoring with external supply D = 24 VDC/VAC A = 90-250 VAC	I: Current control	X = C1 for 1 FC X = C4 for 4 FC	-	RGC2P60I25XDM	RGC2P60I40XDM	RGC2P60I75XDFM RGC2P60I75XAFM
		V: Voltage control	1 FC		RGC2P60V25C1DM	RGC2P60V40C1DM	RGC2P60V75C1DFM RGC2P60V75C1AFM

3-pole switching, proportional control: RGC3P series

Operational voltage	Features	Control input	Switching mode	-	20 AAC (1,800A ² s) 54mm	30 AAC (6,600A ² s) 70mm	65 AAC (15,000A ² s) 70mm + fan
180-660 VAC	No external supply	AA: 4-20 mA	X = E for PA X = C1 for 1 FC	-	RGC3P60AA20X	RGC3P60AA30X	
180-660 VAC	Integrated monitoring with external supply D = 24 VDC/VAC A = 90-250 VAC	I: Current control	PA*	-	RGC3P60I20EDP	RGC3P60I30EDP RGC3P60I30EAP	RGC3P60I65EDFP RGC3P60I65EAFP
			X = C1 for 1 FC X = C4 for 4 FC X = C16 for 16 FC	-	RGC3P60I20XDM	RGC3P60I30XDM RGC3P60I30XAM	RGC3P60I65XDFM RGC3P60I65XAFM
		V: Voltage control	PA*	-	RGC3P60V20EDP	RGC3P60V30EDP RGC3P60V30EAP	RGC3P60V65EDFP RGC3P60V65EAFP
			X = C1 for 1 FC X = C4 for 4 FC X = C16 for 16 FC X = S16 for SS + 16 FC	-	RGC3P60V20XDM	RGC3P60V30XDM RGC3P60V30XAM	RGC3P60V65XDFM RGC3P60V65XAFM

* Monitoring in the case of Phase Angle mode consists of Overtemperature protection only

PA = Phase Angle, FC = Full Cycle(s), SS = Soft Start

Current control covers 0-20mA, 4-20mA, 12-20mA ranges

Voltage control covers 0-10V, 0-5V, 1-5V ranges and external potentiometer control

Further details are available on online datasheets at www.productselection.net

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