RG series: 1-phase solid state switching solutions
RG series

A new generation of solid state switches

The RG series is the latest addition to the range of Solid State Relays (SSRs) and Solid State Contactors (SSCs) offered by Carlo Gavazzi. With this series, Carlo Gavazzi continues to distinguish itself as a leader in Solid State Switching by introducing the first SSR and SSC in the smallest DIN dimension of 17.5 mm.

The RG series adopts an innovative thermal efficient design which translates to compact solutions available throughout the RG range. Panel space savings up to 25% is possible with RG solid state relays. The wire bonding technology used for the output chip assembly reduces thermal and mechanical stress providing a longer lifetime for the solid state switch.

Manufacturing of the RG series is done in an ISO9001 facility which is also certified for ISO14001.

Enhanced reliability and panel space optimisation

Solid state relays: RGS1 series

These solutions do not have an integrated heatsink. The size and design of the heatsink, if required, is determined by the end user for the specific application where the SSR is to be used.

Carlo Gavazzi offers a range of heatsinks suitable for DIN, panel or thru wall mounting. Our Heatsink Selector Tool is available on our website: www.gavazziautomation.com and can be used for the selection of the most appropriate Carlo Gavazzi heatsink for the intended application.

Solid state contactors: RGC1, RGH1 series

These are out of the box ready to use solutions that have a factory mounted heatsink. Each product variant has a current derating curve that gives the maximum operational current at a specific working temperature.

Such solutions eliminate the need for the end user to calculate the heatsinking required for the correct operation of the solid state switch.

Additionally, these solutions are not approved as components but bear the UL listed mark instead of the UR mark.
Benefits

Long lifetime, less maintenance costs

Thermal stress on the semiconductor is eliminated with the introduction of wire bonding. SSR lifetime is increased by 2 to 3 times as compared to other SSRs using only die solder technology.

Low downtime

The switching of AC loads in the RG range is done with back-to-back thyristors which are well known for their superior specifications compared to other switching components.

The integrated varistor across the output of the solid state switch provides adequate protection against uncontrolled overvoltages. There is no need to connect this externally for conformance to the surge immunity test according to EN 61000-4-5.

Easy and fast installation

- Integrated heatsink with the RGC series
- Pluggable spring connectors for the input terminals
- Box clamp variants provide robust connections for easy and fast connection of power cables up to 25 mm² / AWG 3

Space saving

The slimmest product in the range has a product width of only 17.5 mm giving 25% space saving per SSR compared to the 22.5 mm solutions.

Short circuit protection with MCBs

The T² specification in the RG range goes up to 18,000 A²s in only 17.5 mm product width. The RG with 18,000 A²s is the ideal solution when protection of the SSR against short circuits with economic, easily accessible, Miniature Circuit Breakers is desired.

High UL fault current rating for panels

Industrial Control Panels designed according to UL508A need to have a short circuit current rating (SCCR) marking based on the lowest SCCR of the components used inside the panel. With 100 kArms SCCR for the RG series, Carlo Gavazzi SSRs are no limitation to panel builders needing a high SCCR marking on their panels.
**RG series**

**A complete product offering**

### Space saving solid state switching solutions for AC loads

**RGS series**
- 17.5mm product width
- Zero cross or Instant on
- Ratings up to 660 VAC, 90 AAC*
- Blocking voltage up to 1600 Vp
- 18,000 A²s for MCB protection
- AC or DC control

**RGC1 series, RGH1 series**
- Integrated heatsink
- Zero cross or Instant on (RGC1)
- Ratings up to 660 VAC, 85 AAC*
- Blocking voltage 1200 Vp, 1600 Vp (RGH1)
- 18,000 A²s for MCB protection
- AC or DC control
- Optional overtemperature protection

### 1000 VDC switching solutions in 17.5 mm product width

**RGS1D series**
- Ratings up to 1000 VDC, 25 ADC
- DC control

**RGC1D series**
- Integrated heatsink
- Ratings up to 1000 VDC, 15 ADC
- DC control

### Fit and forget - Integrated fuse protection and system monitoring

**RGC1FA series**
- Integrated heatsink
- On-board semiconductor fuse
- Zero cross
- Ratings up to 660 VAC, 40 AAC
- DC control

**RGC1FS series**
- Integrated heatsink
- On-board semiconductor fuse
- Monitoring for open fuse, heater loss, SSR malfunction
- Zero cross
- Ratings up to 660 VAC, 40 AAC
- DC control

### Monitor changes in heater characteristics with the RG current sensing

**RGS1S series**
- 1/6 partial load failure
- Load loss, Mains loss, overtemperature and SSR malfunction detection
- Zero cross
- Ratings up to 660 VAC, 90 AAC
- DC control

**RGC1S series**
- Integrated heatsink
- 1/6 partial load failure
- Load loss, Mains loss, overtemperature and SSR malfunction detection
- Zero cross
- Ratings up to 660 VAC, 85 AAC
- DC control

### Power control with analog input solid state switches

**RGS1P..AA, RGS1P..V series**
- Phase angle, full cycle, advanced full cycle or soft start switching
- Ratings up to 660 VAC, 90 AAC
- 4-20mA, 0-10V, 1-5V, 0-5V, pot input

**RGC1P..AA, RGC1P..V series**
- Integrated heatsink
- Phase angle, full cycle, advanced full cycle or soft start switching
- Ratings up to 660 VAC, 63 AAC
- 4-20mA, 0-10V, 1-5V, 0-5V, pot input

### Soft starting solution for SWIR heaters

**RGS1P..K series**
- Soft start switching
- Ratings up to 660 VAC, 90 AAC
- 24 VDC control

**RGC1P..K series**
- Integrated heatsink
- Soft start switching
- Ratings up to 660 VAC, 63 AAC
- 24 VDC control

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* RGS and RGH models are available up to 690 VAC nominal operational voltage. These variants are CE marked only and do not have an integrated varistor.*

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4

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
Applications

Plastic & Rubber
- Extrusion machines
- Blow moulding equipment
- Auxiliary equipment
- Plastic injection machines
- Film blow moulding
- Thermoforming

Benefits
- Trouble free operation over a large number of cycles
- Panel space optimisation with the RG small footprint
- UL listing facilitates equipment certification process
- 100 kAr ms short circuit current rating enables high fault rating for UL 508A panels

Food & Beverage
- Electrical ovens
- Vending machines
- Fryers
- Coffee machines
- Griddles

Benefits
- Reliable operation in humid environments of 95% @ 40 °C (104 °F)
- Conformance to legislation for restricted substances (RoHS)
- Glow wire flammability ratings for plastics conform to EN 60335 requirements

HVAC
- Air duct heaters
- Air handling units
- Dehumidifiers
- Underfloor heating

Benefits
- Long lifetime with a fully solid state solution
- Power control with an analog input fed directly to the RGC
- No annoying clicking sound (unlike with mechanical solutions)
- Energy efficiency with RGC1P phase angle mode for speed control of AC fans

Packaging & Wrapping
- Sealing process
- Sterilisation
- Shrink wrapping

Benefits
- Low downtime, less maintenance costs with integrated overvoltage protection
- Fast to install
- 18,000 A²s facilitates short circuit protection coordination

Semiconductor
- Soldering machines
- Drying

Benefits
- Long operating lifetime
- Space saving with the RG slim solutions
- Fault diagnostics with optional load and system monitoring
- Energy efficiency with power control solutions
In most cases, when utilising a solid state relay, a heatsink is required for heat dissipation. The size and shape of the heatsink is dictated by the specific application and is not always to be fitted in standard sized industrial control panels.

The RGS series does not have integrated heatsink and so allows end users to design and adapt their own heatsinking solutions. Different heatsinks on which the RGS can be fitted are available from Carlo Gavazzi. Our Heatsink Selector Tool is available on our website: www.gavazziautomation.com

All variants in the RGS series are available in a platform with a product width of 17.5 mm.

**RGS series**
- 17.5 mm product width
- Ratings up to 660 VAC, 90 AAC*
- Zero cross or Instant ON (Random) switching
- I²t up to 18,000 A²s
- Control range: 4-32 VDC, 20-275 VAC (24-190 VDC)
- Integrated varistor across output*
- Motor ratings up to 4 kW (400 VAC), 15 HP (600 VAC)
- 100 kArms short circuit current rating acc. to UL 508
- ‘E’ type or ‘U’ type configuration
- Box clamps for 25 mm² / AWG 3 power cables
- Spring loaded control plug option

* Options available for 690 VAC nominal operational voltage with CE marking only and no integrated varistor

**Mounting of RGS**

Identical mounting hole spacing specifications
DIN mounting

RGS1 solid state relay can be DIN mounted by means of the RGS1DIN accessory. RGS1 rating up to 12 AAC @ 40 °C (104 °F) when mounted on RGS1DIN

RGS Power Pack

A pack with maximum 11x RGS1 on heatsink with integrated overheat protection. Rating per SSR goes up to 30 AAC @ 40 °C (104 °F)

Thermal pads

An alternative to thermal paste: the RGHT is a pack of 10 thermal pads. Add suffix ‘HT’, (RGS…HT), for factory mounted thermal pad

Heatsinks

A number of heatsinks are available for mounting the RGS on different type of heatsinks such as thru wall mount heatsinks and panel mount heatsinks.

Selection guide

‘E’ type configurations

<table>
<thead>
<tr>
<th>Rated voltage, Blocking voltage, Switching mode</th>
<th>Connection control/power</th>
<th>Control voltage</th>
<th>30 AAC (1800 A’s) 17.5 mm</th>
<th>50 AAC (3200 A’s) 17.5 mm</th>
<th>75 AAC (6600 A’s) 17.5 mm</th>
<th>90 AAC (18000 A’s) 17.5 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 VAC, 800 Vp ZC</td>
<td>x / Screw</td>
<td>3 - 32 VDC</td>
<td>RGS1A23D25xKE</td>
<td>RGS1A23D50xKE</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 - 275 VAC</td>
<td>RGS1A23D25xKE</td>
<td>RGS1A23A50xKE</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>600 VAC, 1200 Vp ZC</td>
<td>x / Screw</td>
<td>4 - 32 VDC</td>
<td>RGS1A60D25xKE</td>
<td>RGS1A60D50xKE</td>
<td>RGS1A60D75KKE</td>
<td>RGS1A60D90KKE/RGS1A60D92KKE</td>
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<td></td>
<td>20 - 275 VAC</td>
<td>RGS1A60D25xKE</td>
<td>RGS1A60A50xKE</td>
<td>RGS1A60A75KKE</td>
<td>RGS1A60A90KKE/RGS1A60A92KKE</td>
</tr>
<tr>
<td>600 VAC, 1600 Vp ZC</td>
<td>x / Box</td>
<td>4 - 32 VDC</td>
<td>-</td>
<td>RGS1A60D50xGE</td>
<td>-</td>
<td>RGS1A60D92KGE</td>
</tr>
<tr>
<td></td>
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<td>-</td>
<td>RGS1A60A92KGE</td>
</tr>
<tr>
<td>600 VAC, 1200 Vp ZC</td>
<td>Screw / Screw</td>
<td>4 - 32 VDC</td>
<td>RGS1A60D30KKE</td>
<td>-</td>
<td>RGS1A60D91KKE*</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 - 275 VAC</td>
<td>RGS1A60A30KKE</td>
<td>-</td>
<td>RGS1A60A91KKE*</td>
<td>-</td>
</tr>
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</table>

‘U’ type configurations

<table>
<thead>
<tr>
<th>Rated voltage, Blocking voltage, Switching mode</th>
<th>Connection control/power</th>
<th>Control voltage</th>
<th>30 AAC (1800 A’s) 17.5 mm</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 VAC, 1200 Vp ZC</td>
<td>Screw / Box</td>
<td>4 - 32 VDC</td>
<td>RGS1A60D30KGU</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>20 - 275 VAC (24 - 190 VDC)</td>
<td>RGS1A60A30KGU</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>600 VAC, 1200 Vp ZC</td>
<td>Screw / Box</td>
<td>4 - 32 VDC</td>
<td>RGS1B60D30KGU</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

x = control connection type, x = ‘K’ for screw, x = ‘M’ for spring
ZC = Zero Cross Switching, IO = Instant On Switching
* Similar models are available for 690 VAC rated voltage
Further details are available on online datasheets at www.productselection.net

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
RGC and RGH series

Unlike the RGS series, the RGC and RGH have integrated heatsink and hence are referred to as ready to use solutions since end users do not need to calculate and mount the solid state switch on an additional heatsink.

Because of this, each variant in the RGC and RGH series has an associated current rating at a specific working ambient temperature that is determined by the size of the heatsink of that particular model. The physical sizes and hence ratings in the RGC and RGH series are dictated by the size of the heatsink.

The smallest product in the RGC and RGH range is a product with 17.5 mm width and associated rating goes up to 37 AAC @ 40 °C (104 °F). Product width in the RGC, RGH range goes up to 70mm extending the series to a maximum rating of 85 AAC @ 40 °C (104 °F).

AC output solid state contactors

RGC series
- 1200 Vp blocking voltage; I²t up to 18,000 A²s
- Current ratings at 40 °C (104 °F) up to 85 AAC
- Operational voltage up to 660 VAC
- Zero cross or Instant ON (Random) switching
- Control range: 4-32 VDC, 20-275 VAC (24-190 VDC)
- Integrated varistor across output
- Motor ratings up to 4.4 kW (400 VAC), 15 HP (600 VAC)
- 100 kArms short circuit current rating acc. to UL 508
- ‘E’ type or ‘U’ type configuration
- Spring loaded control plug option
- Optional overtemperature protection

RGH series
- 1600 Vp blocking voltage; I²t up to 6,600 A²s
- Current ratings at 40 °C (104 °F) up to 60 AAC
- Operational voltage up to 660 VAC**
- Zero cross switching
- Control range: 4-32 VDC, 20-275 VAC (24-190 VDC)
- Integrated varistor across output**
- Motor ratings up to 4.4 kW (400 VAC), 15 HP (600 VAC)
- 100 kArms short circuit current rating acc. to UL 508
- ‘E’ type or ‘U’ type configuration
- Spring loaded control plug option

* GL applies only to RGC..15, RGC..20, RGC..25, RGC..30
**Options available for 690 VAC rated voltage with CE marking only and no integrated varistor
**Selection guide**

### ‘E’ type configurations

<table>
<thead>
<tr>
<th>Rated voltage, Blocking voltage, Switching mode</th>
<th>Control voltage</th>
<th>Power connection: Screw ‘K’</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 AAC (525 A²s) 17.5 mm - Short</td>
<td>-</td>
<td>RGCIA2D015:KE</td>
</tr>
<tr>
<td>23 AAC (6600 A²s) 17.5 mm - Short</td>
<td>-</td>
<td>RGCIA2D025:KE</td>
</tr>
<tr>
<td>25 AAC (1800 A²s) 22.5 mm</td>
<td>-</td>
<td>RGCIA2D030:KE</td>
</tr>
<tr>
<td>30 AAC (6600 A²s) 22.5 mm</td>
<td>-</td>
<td>RGCIA2D030:KE</td>
</tr>
<tr>
<td>600 VAC, 800 Vp ZC</td>
<td>3 - 32 VDC</td>
<td>RGCIA2D015:KE</td>
</tr>
<tr>
<td>20 - 275 VAC (24 - 190 VDC)</td>
<td>RGCIA2D015:KE</td>
<td>RGCIA2D025:KE</td>
</tr>
<tr>
<td>275 VAC (24 - 190 VDC)</td>
<td>RGCIA2D025:KE</td>
<td>RGCIA2D030:KE</td>
</tr>
<tr>
<td>30 AAC (1800 A²s) 22.5 mm</td>
<td>-</td>
<td>RGCIA2D030:KE</td>
</tr>
<tr>
<td>600 VAC, 1200 Vp ZC</td>
<td>20 - 275 VAC</td>
<td>RGCIA60A015:KE</td>
</tr>
<tr>
<td>(24 - 190 VDC)</td>
<td>RGCIA60A025:KE</td>
<td>RGCIA60A030:KE</td>
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<tr>
<td>30 AAC (1800 A²s) 22.5 mm</td>
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<td>RGCIA60A030:KE</td>
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<tr>
<td>600 VAC, 1600 Vp ZC</td>
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<td>RGHIA60D015:KE</td>
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<tr>
<td>20 - 275 VAC (24 - 190 VDC)</td>
<td>RGHIA60D025:KE</td>
<td>RGHIA60D030:KE</td>
</tr>
<tr>
<td>30 AAC (1800 A²s) 22.5 mm</td>
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<td>RGHIA60D030:KE</td>
</tr>
<tr>
<td>600 VAC, 1200 Vp, IO</td>
<td>4 - 32 VDC</td>
<td>RGC1B60D015XKE</td>
</tr>
<tr>
<td>230 VAC, 800 Vp ZC</td>
<td>3 - 32 VDC</td>
<td>RGC1B60D025XKE</td>
</tr>
<tr>
<td>25 AAC (1800 A²s) 22.5 mm</td>
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<td>RGC1B60D030XKE</td>
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### ‘U’ type configurations

<table>
<thead>
<tr>
<th>Rated voltage, Blocking voltage, Switching mode</th>
<th>Control voltage</th>
<th>Power connection: Box ‘G’</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 AAC (525 A²s) 17.5 mm - Short</td>
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<td>RGCIA232D040KGE</td>
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<tr>
<td>20 AAC (3200 A²s) 35 mm</td>
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<td>RGCIA232D040KGE</td>
</tr>
<tr>
<td>25 AAC (1800 A²s) 22.5 mm</td>
<td>-</td>
<td>RGCIA232D040KGE</td>
</tr>
<tr>
<td>30 AAC (6600 A²s) 22.5 mm</td>
<td>-</td>
<td>RGCIA232D040KGE</td>
</tr>
<tr>
<td>600 VAC, 800 Vp ZC</td>
<td>3 - 32 VDC</td>
<td>RGCIA60D040KGE</td>
</tr>
<tr>
<td>20 - 275 VAC (24 - 190 VDC)</td>
<td>RGCIA60D040KGE</td>
<td>RGCIA60D040KGE</td>
</tr>
<tr>
<td>600 VAC, 1200 Vp ZC</td>
<td>4 - 32 VDC</td>
<td>RGHIA60D040KGE</td>
</tr>
<tr>
<td>30 AAC (6600 A²s) 22.5 mm</td>
<td>-</td>
<td>RGHIA60D040KGE</td>
</tr>
<tr>
<td>600 VAC, 1200 Vp, IO</td>
<td>4 - 32 VDC</td>
<td>RGC1B60D040KGE</td>
</tr>
<tr>
<td>230 VAC, 800 Vp ZC</td>
<td>3 - 32 VDC</td>
<td>RGC1A23D040KGE</td>
</tr>
<tr>
<td>20 - 275 VAC (24 - 190 VDC)</td>
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<td>RGC1A23D040KGE</td>
</tr>
<tr>
<td>30 AAC (6600 A²s) 22.5 mm</td>
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<tr>
<td>600 VAC, 1200 Vp, IO</td>
<td>4 - 32 VDC</td>
<td>RGHIA60D040KGE</td>
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<tr>
<td>20 - 275 VAC (24 - 190 VDC)</td>
<td>RGHIA60D040KGE</td>
<td>RGHIA60D040KGE</td>
</tr>
<tr>
<td>600 VAC, 1600 Vp ZC</td>
<td>4 - 32 VDC</td>
<td>RGHIA60D040KGE</td>
</tr>
<tr>
<td>20 - 275 VAC (24 - 190 VDC)</td>
<td>RGHIA60D040KGE</td>
<td>RGHIA60D040KGE</td>
</tr>
<tr>
<td>Integrated over temperature protection</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Rated voltage, Blocking voltage, Switching mode</th>
<th>Control voltage</th>
<th>Power connection: Box ‘G’</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 AAC (1800 A²s) 22.5 mm</td>
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<td>RGCIA60D040KGE</td>
</tr>
<tr>
<td>30 AAC (1800 A²s) 35 mm</td>
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<tr>
<td>43 AAC (18000 A²s) 70 mm</td>
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<td>RGCIA60D040KGE</td>
</tr>
<tr>
<td>60 AAC (6600 A²s) 70 mm</td>
<td>-</td>
<td>RGCIA60D040KGE</td>
</tr>
<tr>
<td>65 AAC (18000 A²s) 70 mm</td>
<td>-</td>
<td>RGCIA60D040KGE</td>
</tr>
</tbody>
</table>

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

* = control connection type, x = ‘K’ for screw, x = ‘M’ for spring

ZC = Zero Cross Switching, IO = Instant On Switching

* Similar models are available for 690 VAC rated voltage

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
Current sensing

RGC1S and RGS1S series

The RG Current Sensing (CS) series is able to detect variations in the load current thanks to its integrated current measurement. The load current to be used as a reference is set and recorded through a TEACH procedure which can be done either locally or remotely.

During operation, the actual load current is compared to the set point and if a deviation >16.67% (1/6) is observed an alarm is issued to signal a partial load failure. This feature allows 6 loads to be connected to one solid state switch and have a detection of load failure in case only one of the loads fail.

Upon issue of the partial load failure alarm, the output of the solid state switch is not inhibited and so the remaining loads connected to the RGC1S or RGS1S can be switched as dictated by the specific process.

Plug and play

RGC1S series

- Integrated heatsink
- Partial load failure detection 1/6
- Ratings up to 660 VAC, 85 AAC @ 40 °C (104 °F)
- I2t up to 18,000 A²s
- 4-32 VDC control voltage range
- Integrated varistor for overvoltage protection
- 100 kArms short circuit current rating acc. to UL 508

RGS1S series

- Product width 22.5 mm, heatsink not integrated
- Partial load failure detection 1/6
- Ratings up to 660 VAC, 90 AAC, 18,000 A²s
- 4-32 VDC control voltage range
- Integrated varistor for overvoltage protection
- 100 kArms short circuit current rating acc. to UL 508
With the RGC1S, RGS1S it is possible to detect a load failure even when multiple loads are connected to one SSR. A maximum of 6 loads can be connected to the RGC1S or RGS1S. In case of a failure of 1 heater, whereby current will deviate from setpoint by 1/6 (16.67%), a partial load failure alarm is issued. The other 5 heaters will continue to be controlled as required by the specific process in the presence of a partial load failure alarm.

**Partial load failure detection**

**User interface**

- Local TEACH: Press for more than 3 seconds for Current Setpoint
- Green: Half intensity: External Supply ON, Full intensity: Control Input ON
- Yellow: Load ON
- Red: Alarm ON

**Visual alarm indication**

- Locked TEACH: 1 flash
- Open SSR / Open heater: 2 flashes
- SSR Overtemperature: 3 flashes
- SSR short circuit: 4 flashes
- No TEACH setpoint: 50%
- Partial load failure: 100%

**Selection guide**

**RGC1S series (integrated heatsink)**

<table>
<thead>
<tr>
<th>Rated voltage, Blocking voltage, Switching mode</th>
<th>23 AAC (525 A/s) 22.5 mm</th>
<th>25 AAC (1800 A/s) 22.5 mm - Short</th>
<th>25 AAC (18000 A/s) 22.5 mm - Short</th>
<th>30 AAC (1800 A/s) 22.5 mm</th>
<th>30 AAC (6600 A/s) 22.5 mm</th>
<th>43 AAC (18000 A/s) 35 mm</th>
<th>65 AAC (18000 A/s) 70 mm</th>
<th>85 AAC (18000 A/s) 70 mm + fan</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 VAC, 1200 Vp ZC</td>
<td>RGC1S60D22GKEP</td>
<td>RGC1S60D25GKEP</td>
<td>RGC1S60D26GKEP</td>
<td>RGC1S60D30GKEP</td>
<td>RGC1S60D31GKEP</td>
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<td>RGC1S60D41GGEP</td>
<td>RGC1S60D90GKEP</td>
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</tbody>
</table>
| ZC = Zero cross switching                    | GK = box clamps for control terminals, screws for power terminals | GG = box clamps for control terminals, box clamps for power terminals | Further details are available on online datasheets at www.gavazziautomation.com

**RGS1S series (no heatsink)**

<table>
<thead>
<tr>
<th>Rated voltage, Blocking voltage, Switching mode</th>
<th>30 AAC (1800 A/s) 22.5 mm</th>
<th>65 AAC (18000 A/s) 35 mm</th>
<th>90 AAC (18000 A/s) 22.5 mm</th>
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<tbody>
<tr>
<td>600 VAC, 1200 Vp ZC</td>
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<td>-</td>
<td>RGS1S60D92GKEP</td>
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</tbody>
</table>
| ZC = Zero cross switching                    | GK = box clamps for control terminals, screws for power terminals | GG = box clamps for control terminals, box clamps for power terminals | Further details are available on online datasheets at www.gavazziautomation.com

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
The RGC1F is a series of solid state contactors which integrate protection by means of an on-board semiconductor fuse. The fuse is easily accessible through the front panel of the device. The series consists of two versions, the RGC1FA and the RGC1FS.

The RGC1FA is a version including just the solid state switch and the integrated fuse for protection of the SSR in case of short circuit conditions.

The RGC1FS is a more sophisticated version that apart from the integrated fuse provides also additional monitoring for load status, fuse failure, and SSR malfunction. Alarm status is visible by means of an LED and is also available through an alarm output for remote signalling.

**Fit and forget**

**RGC1F series**
- Integrated heatsink
- 35 mm product width
- Zero cross switching
- Ratings up to 660 VAC, 40 AAC @ 40 °C (104 °F)
- 4.5-32 VDC control voltage range
- Integrated varistor for overvoltage protection
- 100 kArms short circuit current rating acc. to UL 508
- Monitoring for load and SSR malfunction (RGC1FS)

**The RGC1FS series: 4 functions at 1 go**

**Switch**
Solid state switch with integrated heatsink

**Protection**
Integrated fuse holder and fast acting semiconductor fuse for protection against short circuit currents up to 100kArms

**Monitoring**
Monitoring and detection of open fuse, load loss, solid state switch malfunction

**Alarm**
Visual indication through a red LED on the front facia and normally closed alarm output

RGC1F..40 not UL approved
Space saving with integrated solutions

Fuse and fuse holder

- 40 AAC Solid State Contactor: RGC1A60D40KGE
- 40 AAC Solid State Contactor with integrated fuse in 35 mm product width: RGC1FA60D40GGE

Easy accessible fuse

1. Preparation 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

Selection guide

<table>
<thead>
<tr>
<th>Options</th>
<th>Rated voltage, Blocking voltage</th>
<th>Control voltage</th>
<th>20 AAC 35 mm</th>
<th>30 AAC 35 mm</th>
<th>40 AAC 35 mm</th>
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</thead>
<tbody>
<tr>
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<td>3 - 32 VDC</td>
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<td>RGC1F23D30GGE</td>
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<td>Fuse</td>
<td>600 VAC, 1200 Vp</td>
<td>4.5 - 32 VDC</td>
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<td>RGC1F60D30GGE</td>
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Further details are available on online datasheets at www.gavazziautomation.com

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
Proportional controllers

RGC1P and RGS1P series

In a number of applications, the output signal from measuring and monitoring devices is an analog signal that needs to be converted to a digital signal to switch a ‘common’ solid state relay. This can be costly, occupies additional space in the panel and takes a longer time to install.

With the RG proportional controllers there is no need for this conversion since they can be controlled directly with an analog signal. Based on the analog input signal, the RG controller calculates the output power needed by the process and controls the load accordingly.

The RG proportional controller is equipped with user selectable switching modes to address different application such as speed control of AC fans, light dimming, very fine temperature control and reduction of visual flickering associated with short wave infrared heaters.

Analog input, power control solutions

Features

- Selectable switching modes
- 4-20 mA, 0-10 V, 0-5 V, 1-5 V or external pot input
- Integrated heatsink (RGC1P)
- Operational voltage up to 660 VAC
- Current rating up to 63 AAC (RGC1P), 90 AAC (RGS1P)
- Integrated output overvoltage protection
- 18,000 A²s for MCB protection coordination
- LED indication for control and load status
- 100 kArms short circuit current rating acc. to UL 508

Benefits

Energy saving
Switching the load for less than a half mains cycle makes it possible to regulate speed of AC fans and to maintain a temperature closer to set point leading to potential savings in consumed energy

Inventory reduction
Multifunction controller that integrates various switching modes in one unit

Easy to use
Switching mode is easily selectable with a selector knob. Tamper proof covers, RGTMP, are available

Less down time, lower maintenance costs
RG controllers adopt integrated output overvoltage protection, high surge current capability and process technology that reduces thermo-mechanical stresses on output chips extending the controller lifetime

CE, cULus for RGC1P
CE, UR, CSA for RGS1P

CARLO GAVAZZI Automation Components. Specifications are subject to change without notice. Illustrations are for example only.
A compact, easy to use solid state solution for power control

Switching modes for the RGC1P, RGS1P

Mode 1: Phase angle switching
- low resolution by firing at any point within a mains half cycle.
- Ideal for: Speed control of AC fans, light dimming, fine heater control (such as infrared heaters)

Mode 2: 1x Full cycle switching
- 1 mains full cycle resolution, less noisy than Mode 1.
- Ideal for: Heater control of standard heater elements, long and medium wave infrared heaters

Mode 3: 4x Full cycle switching

Mode 4: 16x Full cycle switching
- 4 or 16 mains full cycle resolution, heater lifetime expectancy less than Modes 1 and 2, less noisy than Mode 2.
- Ideal for: Control of standard heater elements and heater elements with a low thermal inertia

Mode 5: Advanced full cycle switching
- non firing in mains half cycle, firing in mains full cycle at >50% input to reduce visual flickering of lamps.
- Ideal for: Short and medium wave infrared heaters

Mode 6: Mode 4 with a soft start
- Soft start on power up of Mode 4 and when non firing is >5sec to reduces peak inrush currents.
- Ideal for: Heater elements which change resistance with time and temperature

Mode 7: Mode 5 with a soft start
- Soft start on power up of Mode 5 and when non firing is >5sec to reduces peak inrush currents.
- Ideal for: Short and medium wave infrared heaters

Selection guide

RGC1P..AA, RGC1P..V. (integrated heatsink)

<table>
<thead>
<tr>
<th>Control input</th>
<th>Output voltage</th>
<th>Supply voltage</th>
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<tr>
<td>4-20 mA</td>
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<td>190 - 550 VAC</td>
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<td>410 - 660 VAC</td>
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RGS1P..AA, RGS1P..V. (no heatsink)

<table>
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<tr>
<th>Control input</th>
<th>Output voltage</th>
<th>Supply voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-20 mA</td>
<td>85 - 265 VAC</td>
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<tr>
<td></td>
<td>190 - 550 VAC</td>
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<td></td>
<td>410 - 660 VAC</td>
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</table>
Soft starters

RGC1P..K and RGS1P..K series

Short wave infrared (SWIR) heaters are nowadays used in a wide range of different applications due to their efficiency in reaching high temperatures in a very short time and hence have the advantage of being more energy efficient over other type of heaters.

The main issue with SWIR is that they exhibit a high cold to hot resistance ratio which results in a very high inrush current on start up from a cold condition. Because of this inrush current, solid state relays have to be over-engineered to handle the surge current. Upstream protection may also trip unnecessarily on start up.

The RGC1P, RGS1P..K variants have been designed to tackle these issues. Upon starting from a cold condition a soft start is performed in order to apply the voltage and current to the load smoothly. This reduces the inrush current when SWIR heaters are switched on from a cold state.

Features

• Soft start on power up or when non firing period is >5 seconds
• Soft start time settable to max. 5 seconds
• Integrated heatsink (RGC1P)
• Operational voltage up to 660 VAC
• Max. current rating 63 AAC (RGC1P), 90 AAC (RGS1P)
• Control voltage 24 VDC
• Integrated output overvoltage protection
• 18,000 A²s for MCB protection coordination
• LED indication for control and load status
• 100 kArms short circuit current rating acc. to UL 508

Benefits

Extended heater lifetime
Eliminating the peak inrush current which can be as high as 1.5x In extends the heater lifetime

Trouble free startup
No peak inrush current exhibited with RGC1P..K, RGS1P..K. Upstream protection does not trip unnecessarily on start up. There is no need to overengineer on the protection and the solid state relay

Low downtime, less maintenance costs
Ensured with integrated output overvoltage protection, high surge current capability and process technology that reduces thermal and mechanical stresses on output chips extending the controller lifetime
Enjoy the benefits of SWIR heaters without the problematics of inrush currents

SWIR are used when lower power consumption and faster process cycles are needed.

SWIR resistance is however affected by changes in temperature. This results in a very high inrush current upon starting which can be a nuisance. The RGC1P..K and RGS1P..K are intended to reduce this inrush current by performing a soft start when starting from a cold state.

Extending SWIR heater lifetime

Soft starting only when the SWIR is in a cold state

The cause of the inrush current associated with SWIR is due to the very low resistance of such heaters when in a cold state. When the SWIR is in a hot condition the resistance is stable and no inrush current is exhibited.

For this reason, the RGC1P..K and RGS1P..K do not exhibit a soft start every time a control voltage is applied but only on startup and when control signal has been missing for the previous 5 seconds.

Inrush current of SWIR can be as high as 15x the nominal current

The RGC1P..K, RGS1P..K can reduce the inrush current by > 60%

Soft starting only when the SWIR is in a cold state

The cause of the inrush current associated with SWIR is due to the very low resistance of such heaters when in a cold state. When the SWIR is in a hot condition the resistance is stable and no inrush current is exhibited. For this reason, the RGC1P..K and RGS1P..K do not exhibit a soft start every time a control voltage is applied but only on startup and when control signal has been missing for the previous 5 seconds.

Soft start on power up

Soft start. Time elapsed from last control > 5 seconds

No soft start. Time elapsed from last control < 5 seconds

Selection guide

**RGC1P..K.. (integrated heatsink)**

<table>
<thead>
<tr>
<th>Control voltage</th>
<th>Output voltage</th>
<th>Supply voltage</th>
<th>30 AAC (1800 A²s) 35 mm</th>
<th>43 AAC (18000 A²s) 35 mm</th>
<th>63 AAC (18000 A²s) 70 mm</th>
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<td>85 - 265 VAC</td>
<td>24 VDC/AC</td>
<td>RGC1P23K30ED</td>
<td>RGC1P23K92ED</td>
<td>RGC1P23K62ED</td>
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<tr>
<td></td>
<td>190 - 550 VAC</td>
<td>24 VDC/AC</td>
<td>RGC1P48K30ED</td>
<td>RGC1P48K92ED</td>
<td>RGC1P48K62ED</td>
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<tr>
<td></td>
<td>410 - 660 VAC</td>
<td>24 VDC/AC</td>
<td>RGC1P60K30ED</td>
<td>RGC1P60K92ED</td>
<td>RGC1P60K62ED</td>
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</tbody>
</table>

**RGS1P..K.. (no heatsink)**

<table>
<thead>
<tr>
<th>Control voltage</th>
<th>Output voltage</th>
<th>Supply voltage</th>
<th>50 AAC (1800 A²s) 35 mm</th>
<th>90 AAC (18000 A²s) 35 mm</th>
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</thead>
<tbody>
<tr>
<td>24 VDC</td>
<td>85 - 265 VAC</td>
<td>24 VDC/AC</td>
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<td>190 - 550 VAC</td>
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<td></td>
<td>410 - 660 VAC</td>
<td>24 VDC/AC</td>
<td>RGS1P60K50ED</td>
<td>RGS1P60K92ED</td>
<td>-</td>
</tr>
</tbody>
</table>
RGS1D and RGC1D series

Apart fromswitching of AC loads, the RG series caters also for switching of DC loads with the RGS1D and RGC1D series.

The RGC1D is offered with integrated heatsink whilst the RGS1D is suitable for panel mounting or for mounting on heatsinks which are specific to the particular application in which the solid state relay is to be used.

Switching is done through an IGBT power semiconductor which is protected by an integrated free-wheeling diode. Ratings extend to 1000 VDC, 25 ADC. Maximum operational temperature goes up to +80 °C (+176 °F).

DC output solid state switches

RGS1D series
- Without integrated heatsink
- Product width 17.5 mm
- Ratings up to 1000 VDC, 25 ADC
- 4.5 - 32 VDC control voltage range

RGC1D series
- Integrated heatsink
- Product width 17.5 mm
- Ratings up to 1000 VDC, 15 ADC @ 40 °C (104 °F)
- 4.5 - 32 VDC control voltage range

Repeatable and reliable
The RG solutions are fully solid state. Lifetime is not compromised by contact arcing. The need for frequent replacements is hence eliminated.

Efficient heat dissipation
This series of DC switching solid state switches boasts of high thermal efficiency thanks to the power assembly processes adopted in the RG series.

Space saving
Product width of the RGS1D and RGC1D is only 17.5 mm. This enables compact control panel designs.
Applications

Switching of photovoltaic strings
The 1000 VDC rating makes the RGS1D and the RGC1D the ideal solid state switch for the switching of strings in photovoltaic panels. A photovoltaic installation is a long term investment that can only be sustained by using reliable equipment which ensures minimum downtimes. Unlike electromechanical solutions, the RG series is a fully solid state solution offering a much longer lifetime. Carlo Gavazzi product offering covers also monitoring and smart control systems as well as surge protectors for such applications.

Ambient heating in train cabins
In train applications it is common to have DC voltages which can go well over 600 VDC. The 1000 VDC operational voltage associated with the RGS1D and RGC1D enables this solid state switch to be used to control DC loads used for ambient heating in such applications. Working temperature requirements are covered by the wide operating range of the RGC1D, RGS1D.

Selection guide

<table>
<thead>
<tr>
<th>Model</th>
<th>Output voltage</th>
<th>Control voltage</th>
<th>Connection control / power</th>
<th>15 ADC 17.5 mm</th>
<th>25 ADC 17.5 mm</th>
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<tr>
<td>No heatsink</td>
<td>24 - 1000 VDC</td>
<td>4.5 - 32 VDC</td>
<td>Screw / Screw</td>
<td>RGS1D1000D15KKE</td>
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<td>With integrated heatsink</td>
<td>24 - 1000 VDC</td>
<td>4.5 - 32 VDC</td>
<td>Screw / Screw</td>
<td>RGC1D1000D15KKE</td>
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Further details are available on online datasheets at www.gavazziautomation.com
## OUR SALES NETWORK IN EUROPE

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<tr>
<th>Country</th>
<th>Location</th>
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<tbody>
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<td>AUSTRIA</td>
<td>Carlo Gavazzi GmbH</td>
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<td>Carlo Gavazzi Sarl</td>
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<tr>
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<tr>
<td>NORWAY</td>
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<td>Tel: +47 35 93 08 00 Fax: +47 35 93 08 01 <a href="mailto:post@gavazzi.no">post@gavazzi.no</a></td>
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## OUR SALES NETWORK IN THE AMERICAS

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<tr>
<td>USA</td>
<td>Carlo Gavazzi Inc.</td>
<td>Tel: +1 847 465 6100 Fax: +1 847 465 7373 <a href="mailto:sales@carlogavazzi.com">sales@carlogavazzi.com</a></td>
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<tr>
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<td>Carlo Gavazzi Mexico S.A. de C.V.</td>
<td>Tel: +52 55 5373 7042</td>
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<td>BRAZIL</td>
<td>Carlo Gavazzi Automação Ltd.</td>
<td>Tel: +55 11 3052 0832 Fax: +55 11 3057 1753 <a href="mailto:info@carlogavazzi.com.br">info@carlogavazzi.com.br</a></td>
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<td>SINGAPORE</td>
<td>Carlo Gavazzi Automation</td>
<td>Tel: +65 67 466 990 Fax: +65 67 461 980 <a href="mailto:info@carlogavazzi.com.sg">info@carlogavazzi.com.sg</a></td>
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<tr>
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<td>Carlo Gavazzi Automation (China) Co. Ltd.</td>
<td>Unit 2308, 23/F., News Building, Block 1, 1002 Middle Shannon Zong Road, Shenzhen, China Tel: +86 755 83699500 Fax: +86 755 83699300 <a href="mailto:sales@carlogavazzi.cn">sales@carlogavazzi.cn</a></td>
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<tr>
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<td>Carlo Gavazzi Automation</td>
<td>Tel: +852 23041228 Fax: +852 2344389</td>
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## OUR COMPETENCE CENTRES AND PRODUCTION SITES

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<td>Carlo Gavazzi Industri A/S</td>
<td>Tel: +49 61 51 81 00 40 <a href="mailto:info@gavazzi.de">info@gavazzi.de</a></td>
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<tr>
<td>MALTA</td>
<td>Carlo Gavazzi Ltd</td>
<td>Tel: +35 1 48 63 27 43 <a href="mailto:french.team@carlogavazzi.fr">french.team@carlogavazzi.fr</a></td>
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<tr>
<td>ITALY</td>
<td>Carlo Gavazzi Controls SpA</td>
<td>Tel: +39 02 931 763 01 <a href="mailto:info@gavazziacbu.it">info@gavazziacbu.it</a></td>
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<tr>
<td>LITHUANIA</td>
<td>Uab Carlo Gavazzi Industri Kaunas</td>
<td>Tel: +39 02 931 763 01 <a href="mailto:info@gavazziacbu.it">info@gavazziacbu.it</a></td>
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<tbody>
<tr>
<td>Via Milano, 13</td>
<td>Tel: +39 02 931 763 01 <a href="mailto:info@gavazziacbu.it">info@gavazziacbu.it</a></td>
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