# RLC

## 1-phase solid state contactors for resistive loads



## Description

The RL Lite slimline series is the ideal solution when multiple solid state relays need to fit in a constrained space. The RL is intended for use with resistive loads.

The **RLC** variants are equipped with an integrated heatsink. The slimmest product, with a 17.8 mm wide footprint, has a rating of 22 AAC @ 40°C. The **RLC** range extends to 30 AAC, which occupies a 22.5 mm wide footprint.

Power terminals are touch protected and allow for easy and safe looping of cables. The removable IP20 covers allow wiring of ring lug terminated cables. The control is provided through a spring pluggable terminal.

The **RLC** output consists of a TRIAC that is protected against overvoltages by means of integrated protection. Control ON indication is provided through a green LED.

Specifications are at a surrounding temperature of 25°C unless otherwise specified.

## Benefits

- **Panel space savings.** The RL solid state contactor with a width of only 17.8 mm for ratings up to 22 AAC and 22.5 mm for ratings up to 30 AAC occupies a very small footprint in panels.
- **Trouble free operation over millions of cycles.** Wire bonding technology reduces thermal and mechanical stresses on the output chips resulting in a larger number of fault free operational cycles compared to other assembly technologies.
- **Low machine downtime.** Integrated overvoltage protection prevents the output of the solid state relay from breaking down in case of uncontrolled transients that may occur on the lines.
- **Ready to use.** The RLC is provided with an integrated heatsink, eliminating the need for users to calculate the size of the heatsink required for thermal dissipation and to maintain stock of heatsinks.
- **Touch safe.** The RL output terminals are touch protected. The touch protection cover is removable to allow connection of ring lug terminated cables.
- **Fast wiring**. Spring control terminals help to reduce installation time. The pluggable control terminals allow for fast and easy replacement.
- **Certifications ready.** The RLC conforms to applicable EU directives, UK regulations and is certified by Underwriters Laboratory as a listed product.

## Applications

Plastic injection machines, extrusion machines, blow moulding machines, thermoformers, dryers, electrical ovens, fryers, shrink tunnels, climatic chambers, ovens and furnaces, reflow ovens.

## Main features

- Voltage ratings up to 530 VAC
- Current ratings up to 22 AAC @ $T_A$ 40°C in a 17.8 mm wide footprint, 30 AAC @ $T_A$ 40°C in a 22.5 mm wide footprint
- DC or AC control voltage
- Integrated overvoltage protection



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## Order code

**RLC1A □□□□**

Enter the code option instead of □. Refer to the selection guide section for valid part numbers.

| Code | Option | Description | Comments |
|---|---|---|---|
| RL | - | Solid State Relay - RL series | |
| C | - | With integrated heatsink | |
| 1 | - | 1-pole switching | |
| A | - | Zero Cross switching (ZC) | |
| □ | 40 | Rated voltage: 24-440 VAC, 600 Vp | |
| | 48 | Rated voltage: 42-530 VAC, 1200 Vp | |
| □ | D | Control voltage: 4-32 VDC | |
| | A | Control voltage: 80-250 VAC | |
| □ | 15 | Rated current: 15 AAC | 17.8 mm wide |
| | 22 | Rated current: 22 AAC | 17.8 mm wide |
| | 30 | Rated current: 30 AAC | 22.5 mm wide |
| □ | - | | Single packaging |
| | X20 | Bulk packaging of 20 pcs. | Applicable only to: RLC..15, 22 |

## Selection guide

| Rated voltage, Switching mode | Control voltage | Rated operational current @ 40°C | | |
|---|---|---|---|---|
| | | 15 AAC | 22 AAC | 30 AAC |
| 400 VAC, ZC | 4 - 32 VDC | RLC1A40D15 | RLC1A40D22 | RLC1A40D30 |
| 480 VAC, ZC | 4 - 32 VDC | RLC1A48D15 | RLC1A48D22 | RLC1A48D30 |
| | 80 - 250 VAC | RLC1A48A15 | RLC1A48A22 | RLC1A48A30 |

## Selection guide - Bulk packaging by 20 pcs.

| Rated voltage, Switching mode | Control voltage | Rated operational current @ 40°C | | |
|---|---|---|---|---|
| | | 15 AAC | 22 AAC | - |
| 400 VAC, ZC | 4 - 32 VDC | RLC1A40D15X20 | RLC1A40D22X20 | - |

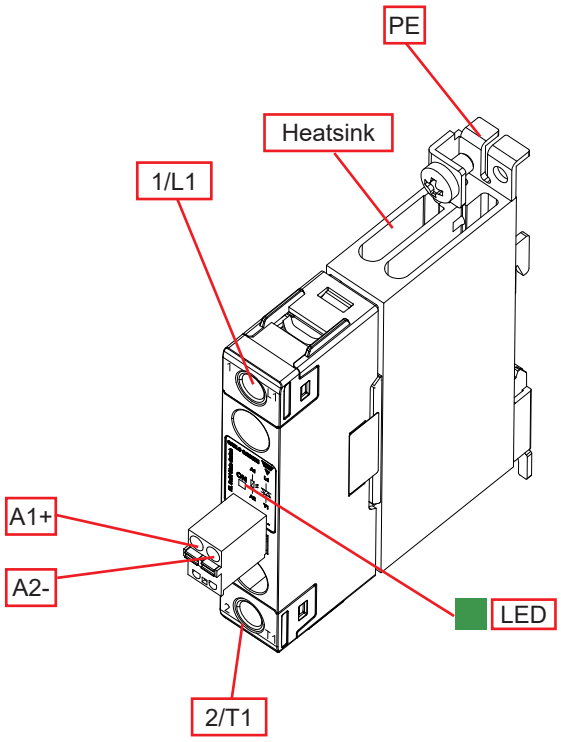
## Carlo Gavazzi compatible components

| Description | Component code | Notes |
|---|---|---|
| Control plugs | RGM25 | Pack of 10 spring loaded control plugs. 1x control plug is provided with the RL. |



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# Structure




| Element | Component | Function |
|---|---|---|
| **1/L1** | Power connection | Mains connection |
| **2/T1** | Power connection | Load connection |
| **A1+, A2-** | Control connection | Terminals for control voltage |
| **LED** | ON indicator | Indicates presence of control voltage |
| **Heatsink** | Integrated heatsink | DIN rail mounting (panel mounting also possible) |
| **PE** | Protective Earth | Connection for Protective Earth, PE screw not provided with RLC |



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# Features

## General data

| | |
|---|---|
| **Material** | PA66 or PA6 (UL94 V0), RAL7035<br>Glow wire ignition temperature and Glow wire flammability index conforming to EN 60335-1 requirements. |
| **Mounting** | DIN rail (panel mount also possible) |
| **Touch protection** | IP20 |
| **Overvoltage category** | III, 6 kV (1.2/50 µs) rated impulse withstand voltage |
| **Isolation** | Input and Output to Case: 4000 Vrms<br>Input to Output: 4000 Vrms |
| **Weight (including packaging)** | RLC..15, RLC..22: approx. 267 g<br>RLC..30: approx. 373 g |

# Performance

## Output specifications

| | RLC..15 | RLC..22 | RLC..30 |
|---|---|---|---|
| **Max. operational current[1]: AC-51 @ Ta=25°C** | 15 AAC | 22 AAC | 30 AAC |
| **Max. operational current[1]: AC-51 @ Ta=40°C** | 15 AAC | 22 AAC | 30 AAC |
| **Operational frequency range** | 45 to 65 Hz | | |
| **Output protection** | Integrated overvoltage protection | | |
| **Leakage current @ rated voltage** | <5 mAAC | | |
| **Minimum operational current** | 100 mAAC | 150 mAAC | 150 mAAC |
| **Repetitive overload current UL508: Ta=40°C, $t_{ON}$=1 s, $t_{OFF}$=9 s, 50 cycles** | 22.5 AAC | 33 AAC | 45 AAC |
| **Non-repetitive surge current ($I_{TSM}$), t=10 ms** | 212 Ap | 500 Ap | 500 Ap |
| **$I^2t$ for fusing (t=10 ms), minimum** | 225 $A^2s$ | 1250 $A^2s$ | 1250 $A^2s$ |
| **Power factor** | >0.9 at rated voltage | | |
| **Critical dV/dt (@Tj init = 40°C)** | 1000 V/µs | | |

1. Refer to Current derating curves

## Output voltage specifications

| | RLC..40.. | RLC..48.. |
|---|---|---|
| **Operational voltage range** | 24 - 440 VAC | 42 - 530 VAC |
| **Blocking voltage** | 600 Vp | 1200 Vp |



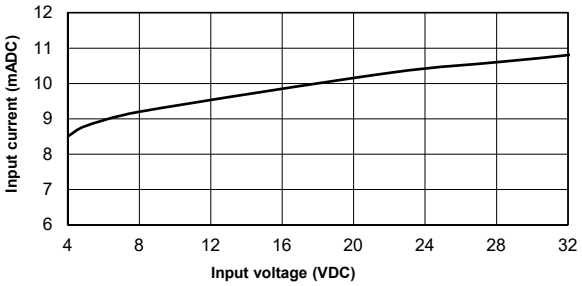
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## Input specifications

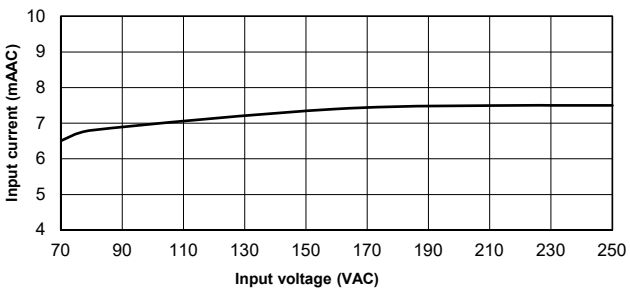
| | RLC..D.. | RLC..A.. |
|---|---|---|
| **Control voltage range**[2] | 4 - 32 VDC | 80 - 250 VAC |
| **Pick-up voltage** | 4.0 VDC | 70 VAC |
| **Drop-out voltage** | 1.2 VDC | 10 VAC[3] |
| **Maximum reverse voltage** | 32 VDC | - |
| **Maximum response time** | ½ mains cycle | 52 ms @ 50 Hz |
| **Response time drop-out** | ½ mains cycle | 40 ms @ 50 Hz |
| **Input current @ 40°C** | See diagrams below | |

2. DC control to be supplied by class 2 power source according to UL1310
3. RL output is OFF @ 10 VAC but LED may still be ON in the range 4-10 VAC

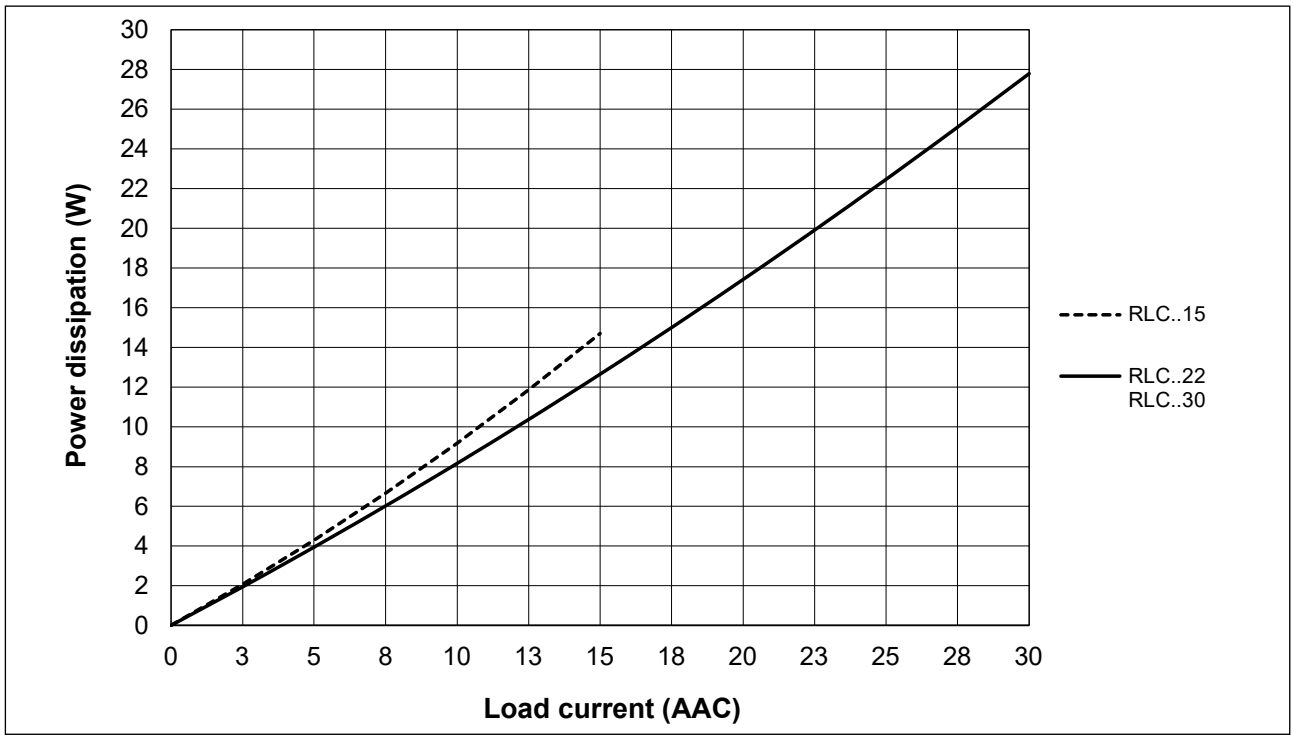
**RL..D..: DC input current vs. input voltage**




**RL..A..: AC input current vs. input voltage**




## Output power dissipation

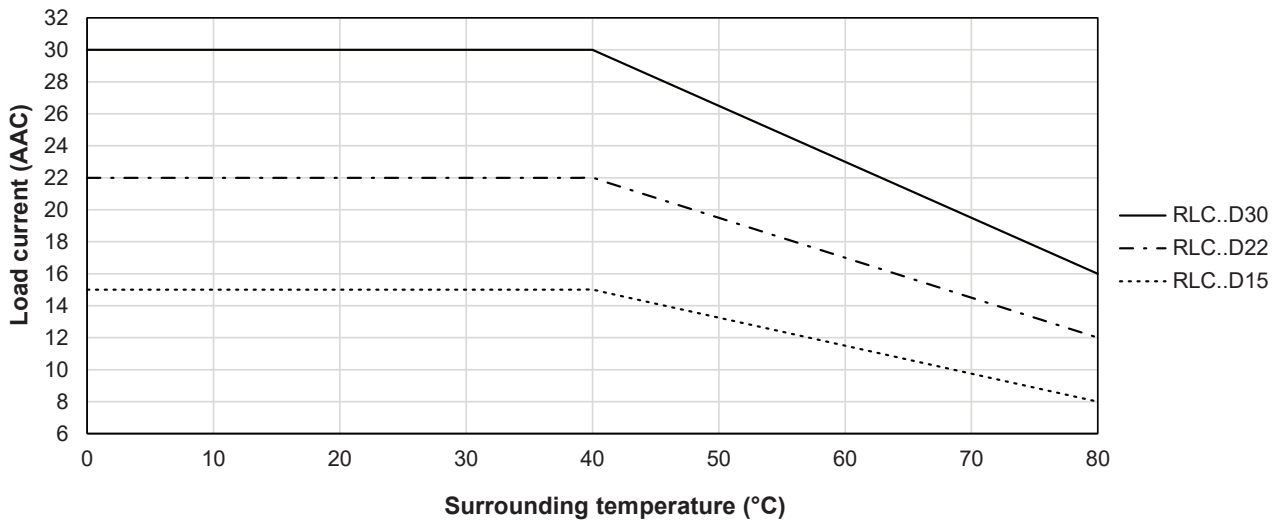




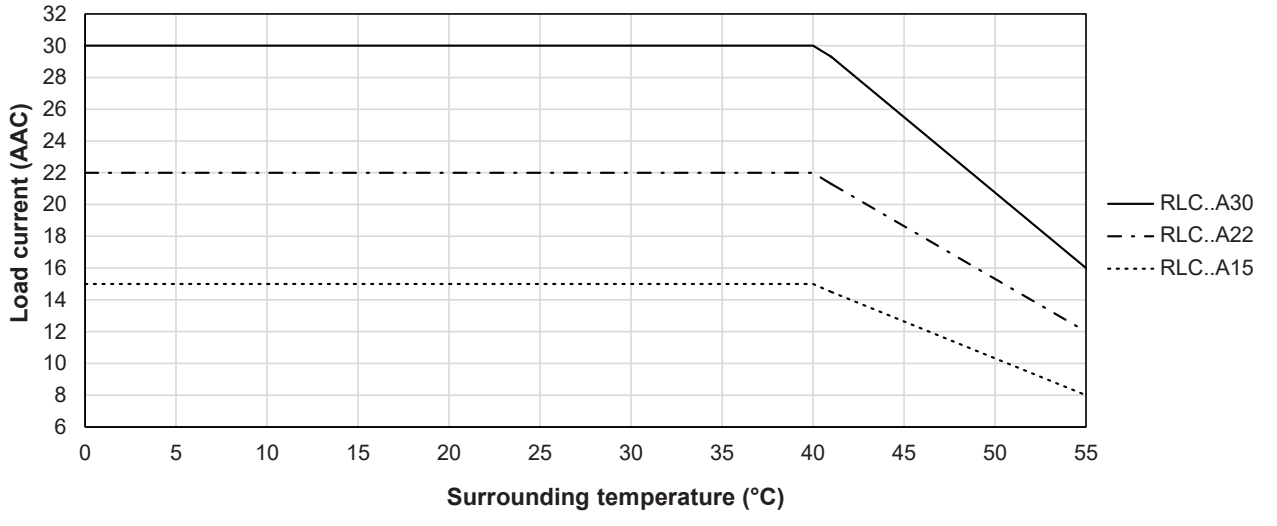

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## Current derating

**RLC..D..**




**RLC..A..**

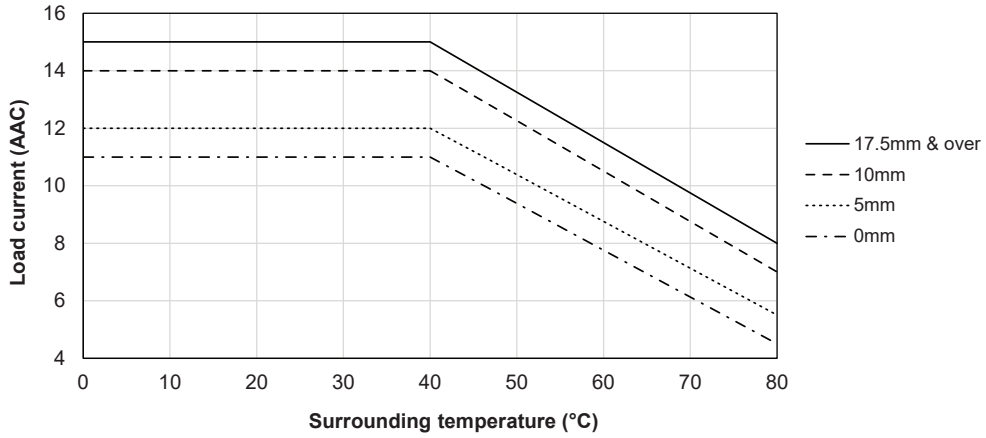




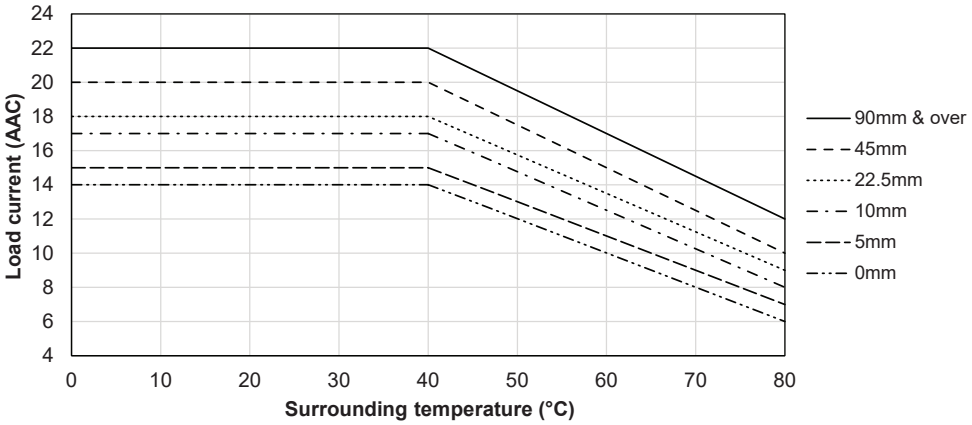

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## Derating vs. spacing curves

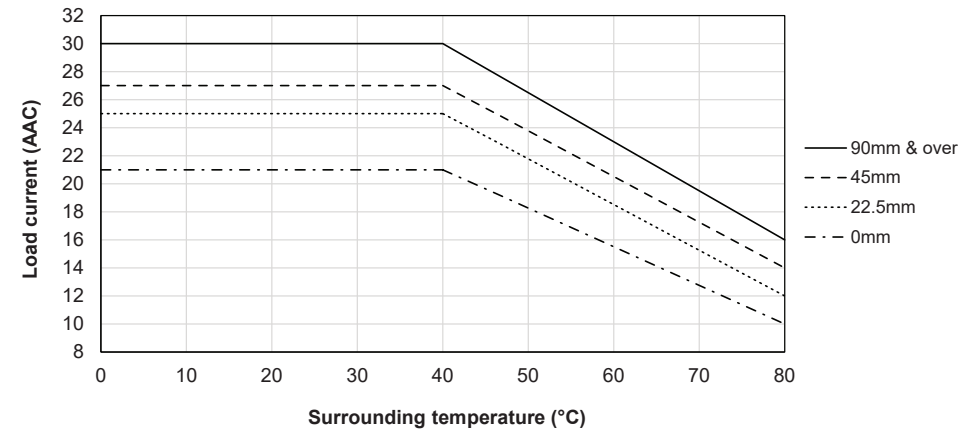
**RLC..D15**




**RLC..D22**




**RLC..D30**

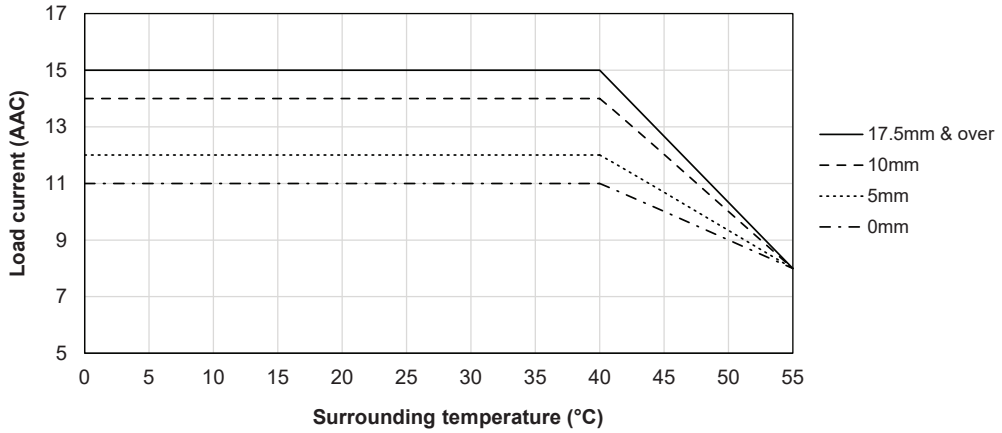




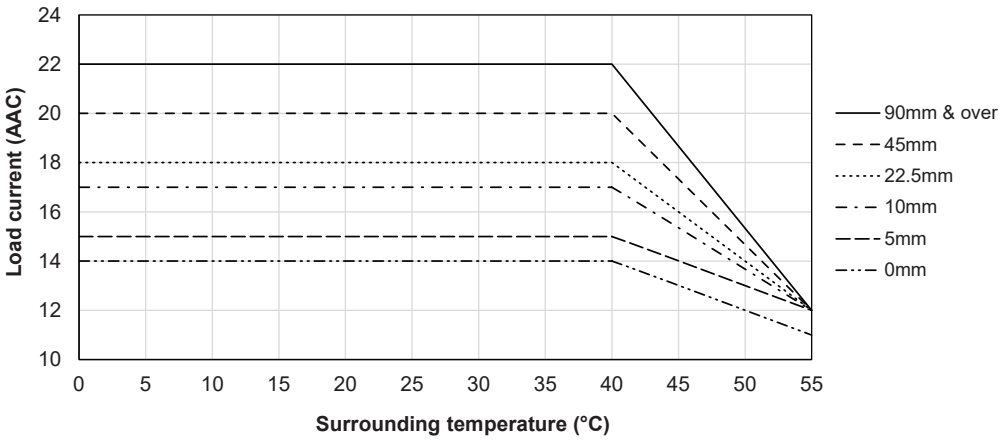

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## Derating vs. spacing curves (continued)

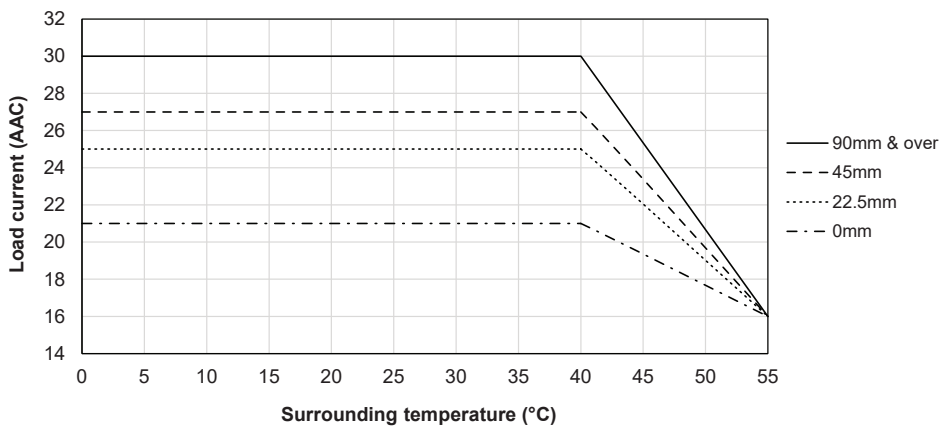
**RLC..A15**




**RLC..A22**




**RLC..A30**






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## Compatibility and conformance

| | |
|---|---|
| **Approvals** | CE cULus LISTED UKCA |
| **Standards compliance** | LVD: EN 60947-4-3<br>EMCD: EN 60947-4-3<br>EE: EN 60947-4-3<br>EMC: EN 60947-4-3<br>UL: UL508 (E80573), NRNT<br>cUL: C22.2 No. 14 (E80573), NRNT7 |

| **Electromagnetic compatibility (EMC) - Immunity** | |
|---|---|
| **Electrostatic discharge (ESD)** | EN/IEC 61000-4-2<br>8 kV air discharge (PC2)<br>4 kV contact (PC1) |
| **Radiated radio frequency** | EN/IEC 61000-4-3<br>10 V/m, from 80 MHz to 1 GHz (PC1)<br>10 V/m, from 1.4 to 2 GHz (PC1)<br>10 V/m, from 2 to 2.7 GHz (PC1) |
| **Electrical fast transient (burst)** | EN/IEC 61000-4-4<br>Output: 2 kV, 5 kHz (PC2)<br>Input: 1 kV, 5 kHz (PC1) |
| **Conducted radio frequency** | EN/IEC 61000-4-6<br>10 V/m, from 0.15 to 80 MHz (PC1) |
| **Electrical surge**<br>**RLC..A..**<br>**RLC..A..** | EN/IEC 61000-4-5<br>Output, line to line: 1 kV (PC2)<br>Output, line to earth: 2 kV (PC2)<br>Input, line to line, 1 kV (PC2)<br>Input, line to earth, 2 kV (PC2) |
| **Voltage dips** | EN/IEC 61000-4-11<br>0% for 0.5, 1 cycle (PC2)<br>40% for 10 cycles (PC2)<br>70% for 25 cycles (PC2)<br>80% for 250 cycles (PC2) |
| **Voltage interruptions** | EN/IEC 61000-4-11<br>0% for 5000 ms (PC2) |

| **Electromagnetic compatibility (EMC) - Emissions** | |
|---|---|
| **Radio interference field emission (radiated)** | EN/IEC 55011<br>Class A: from 30 to 1000 MHz |
| **Radio interference voltage emissions (conducted)** | EN/IEC 55011<br>Class A: from 0.15 to 30 MHz<br>(External filter may be required - refer to Filtering section) |

Notes:

- Control input lines must be installed together to maintain products' susceptability 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.
- This product has been designed for Class A equipment. Use of this product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.

- Performance Criteria 1 (PC1): No degradation of performance or loss of function is allowed when the product is operated as intended.
- Performance Criteria 2 (PC2): 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 (PC3): Temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.



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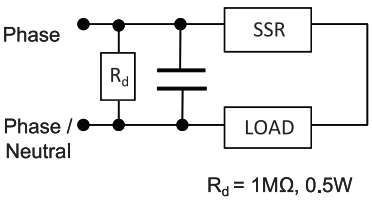
## Filtering

| Part number | Suggested filter for EN 55011 Class A compliance | Maximum heater current [AAC] |
|---|---|---|
| RLC..15 | 68 nF / xx V / X1 | 15 AAC |
| RLC..22 | 220 nF / xx V / X1 | 22 AAC |
| RLC..30 | 220 nF / xxV / X1 | 30 AAC |

xx represents the voltage rating of the capacitor. This shall not be lower than the mains supply voltage to which it will be connected.

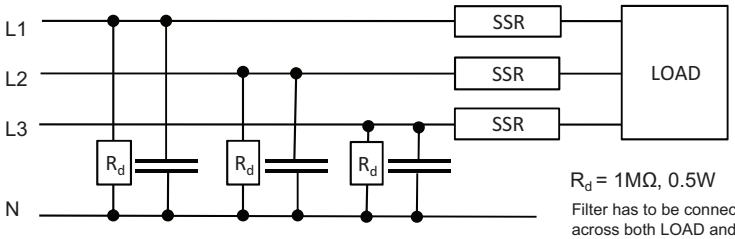
## Filter connection diagram

1-Phase




$R_d$ = 1MΩ, 0.5W

3-Phase




$R_d$ = 1MΩ, 0.5W
Filter has to be connected across both LOAD and SSR

## Short circuit protection, co-ordination type 2

| Part No. | Prospective short circuit current [kArms] | Ferraz Shawmut (Mersen) | | Siba | |
|---|---|---|---|---|---|
| | | Max fuse size [A] | Part number | Max fuse size [A] | Part number |
| **RLC..15** | 10 | 20 | 6.921 CP GR 22x58 /20 FR22GR69V20T | 20 | 50 124 06.20 |
| **RLC..22** | 10 | 40 | 6.921 CP GR 22x58 /40 FR22GR69V40T | 40 | 50 124 06.40 |
| **RLC..30** | | | | | |



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## Environmental specifications

| | |
|---|---|
| **Operating temperature** | -30°C to +80°C (-22°F to +176°F)<br>max. +55°C (+131°F) for RL..A.. |
| **Storage temperature** | -40°C to +100°C (-40°F to +212°F) |
| **Relative humidity** | 95% non-condensing @ 40°C |
| **Pollution degree** | 2 |
| **Installation altitude** | 0-1000 m. Above 1000 m derate linearly by 1% of FLC per 100 m up to a maximum of 2000 m |
| **Vibration resistance** | 2g / axis (2-100Hz, IEC 60068-2-6, EN 50155, EN 61373) |
| **Impact resistance** | 15/11 g/ms (EN50155, EN61373) |
| **EU RoHS compliant** | Yes |
| **China RoHS** |  |

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 requirement 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.

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 |

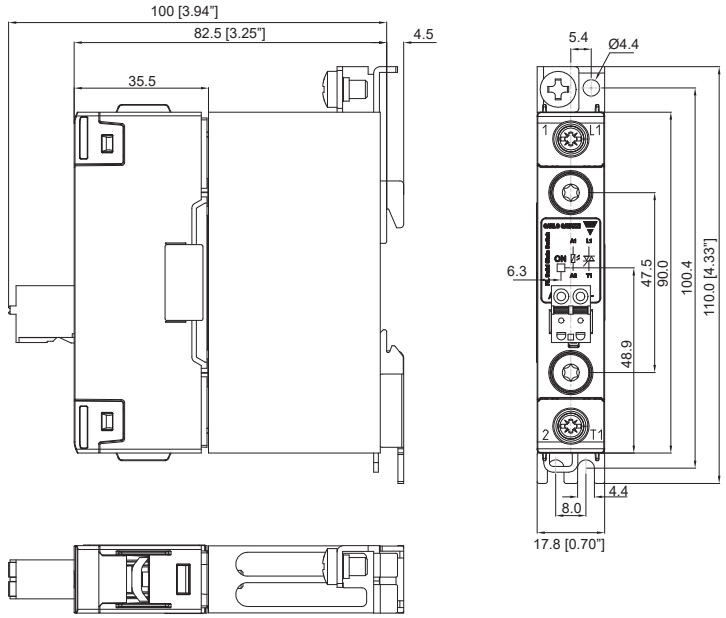
O:此零件所有材料中含有的该有害物低于GB/T 26572的限定。
X: 此零件某种材料中含有的该有害物高于GB/T 26572的限定。



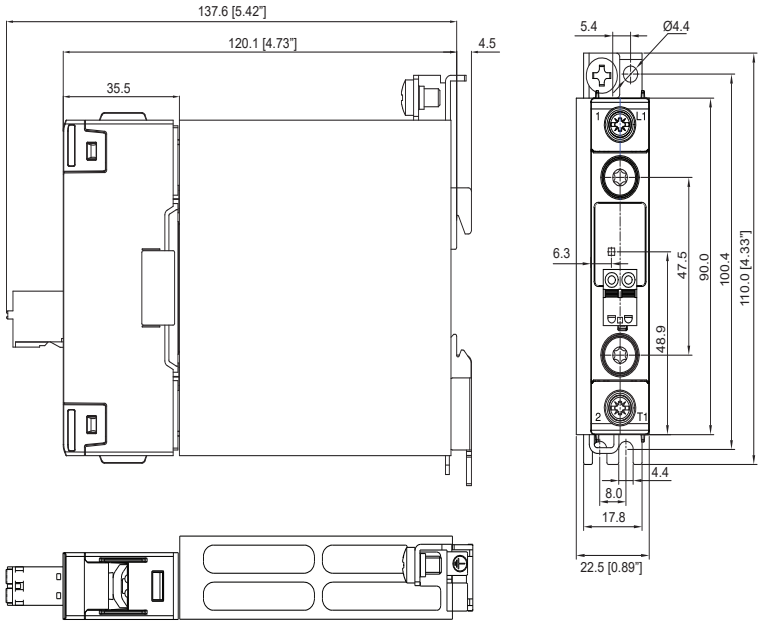
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## Dimensions

### RLC..15, RLC..22




### RLC..30

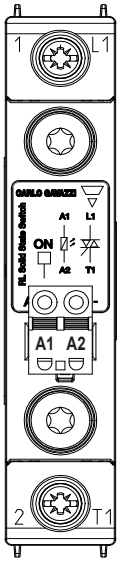



Housing width tolerance +0.5mm, -0mm as per DIN 43880. All other tolerances +/- 0.5mm.
Dimensions in mm.



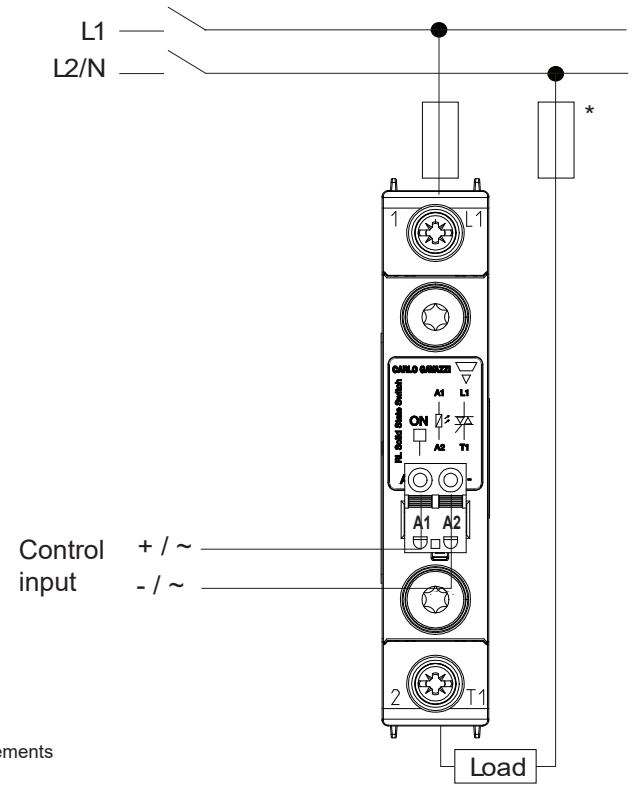
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## Terminal layout




1/L1: Mains supply connection
2/T1: Load connection
A1(+): Positive control signal
A2(-): Control ground
⏚ : Protective earth

## Connection diagram



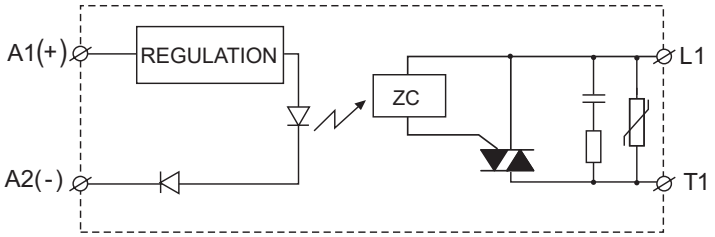

* depends on system requirements



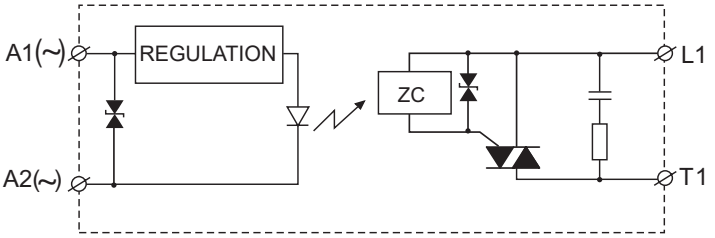
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## Functional diagram

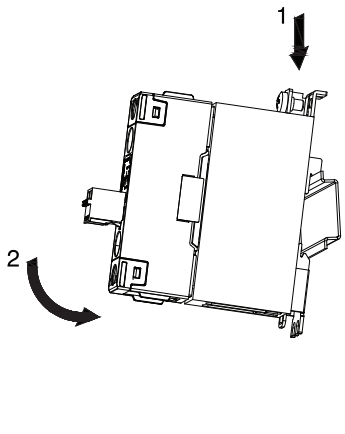
**DC control**



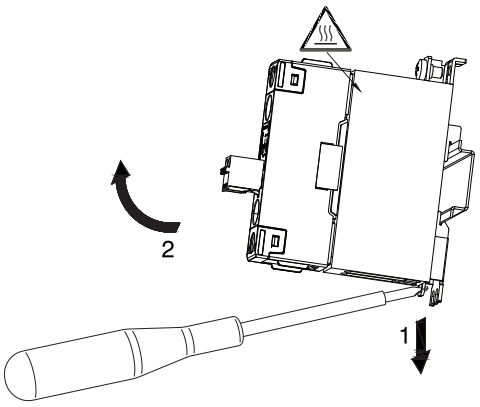

**AC control**



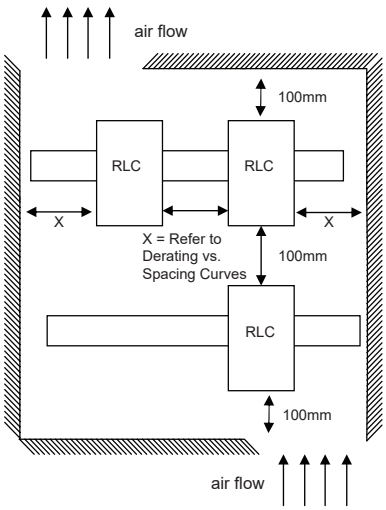

## Installation




Mounting on DIN rail



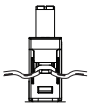
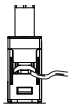
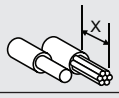

Dismounting from DIN rail

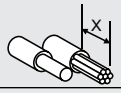
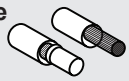





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# Connection specifications

| Power connections | | |
|---|---|---|
| **Terminals** | 1/L1, 2/T1 | |
| **Conductors** | Use 75°C copper (Cu) conductors | |
| |  |  |
| **Connection type** | M4 screw with captivated washer | |
| **Stripping length** | X = 12 mm | |
| **Rigid (solid & stranded)**<br>**UL/cUL rated data**  | 2x 2.5 – 6.0 mm²<br>2x 14 – 10 AWG | 1x 2.5 – 6.0 mm²<br>1x 14 – 10 AWG |
| **Flexible with end sleeve**  | 2x 1.0 – 2.5 mm²<br>2x 2.5 – 4.0 mm²<br>2x 18 – 14 AWG<br>2x 14 – 12 AWG | 1x 1.0 – 4.0 mm²<br>1x 18 – 12 AWG |
| **Flexible without end sleeve**  | 2x 1.0 – 2.5 mm²<br>2x 2.5 – 6.0 mm²<br>2x 18 – 14 AWG<br>2x 14 – 10 AWG | 1x 1.0 – 6.0mm²<br>1x 18 –10 AWG |
| **Torque specifications**  | Posidrive bit 2<br>UL: 2.0 Nm (17.7 lb-in)<br>IEC: 1.5 – 2.0 Nm (13.3 – 17.7 lb-in) | |
| **Aperture for termination lug (fork or ring)** | 12.3 mm | |
| **Protective Earth (PE) connection** | M5, 1.5 Nm (13.3 lb-in)<br>M5 PE screw is not provided with the solid state relay.<br>PE connection is required when product is intended to be used in Class 1 applications according to EN/IEC 61140. | |

| Control connections | | |
|---|---|---|
| **Terminals** | A1+, A2- | |
| **Conductors** | Use 60/75°C copper (Cu) conductors | |
| |  | |
| **Connection type** | Spring loaded | |
| **Stripping length** | X = 12-13 mm | |
| **Rigid (solid & stranded)**<br>**UL/cUL rated data**  | 1x 0.2 - 2.5 mm²<br>1x 24 - 12 AWG | |
| **Flexible with or without end sleeve**  | 1x 0.2 - 2.5 mm²<br>1x 24 - 12 AWG | |
| **Flexible with end sleeve using TWIN ferrules** | 2x 0.2 - 1.0 mm²<br>2x 24 - 18 AWG | |



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## Bulk packaging option



- Packing quantity: 20 pcs.
- Total weight (including packaging): 4.8 kg

Applicable only to RLC..15 and RLC..22 variants.



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