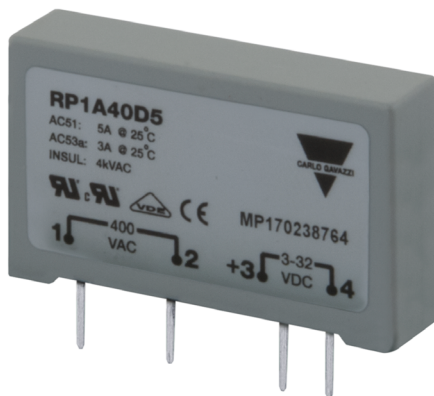


# RP1A, RP1B



## 1-phase PCB mount solid state relays



### Main features

- AC Solid State Relay for PCB mounting
- Zero-cross switching or instant-on
- Rated operational current: 3, 5 or 5.5 AACrms
- Rated operational voltage: up to 480 VACrms
- Surface mount technology
- Flexible encapsulation for extended life
- Control voltage: 3 to 32 VDC / 16 to 32 VAC
- Opto-isolation: > 4000 VACrms
- Blocking voltage: up to 1000 Vp
- Non-repetitive surge current: up to 250 Ap

### Description

The **RP1** is an SSR series for socket or PCB mounting, providing an ideal interface between logic controls and AC loads.

The **RP1** is designed for resistive and inductive loads up to 480 VACrms.

Internally this new series enjoys an improved technical design with the introduction of stress-free flexible encapsulation and automated assembly of components.

The solid state technology used can withstand peak voltages of 1000 V, making the **RP1** series suitable to drive AC loads such as valve solenoids and small induction motors.

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

### Applications

These relays can be used to switch heaters, motors, lights, valves or solenoids.

### Main functions

- Zero-cross or instant-on AC switching
- Ratings up to 480 VACrms, 5.5 AACrms
- 3-32 VDC or 16-32 VAC control voltage

## Order code

 **RP1** ☐ ☐ ☐ ☐ ☐ ☐

Enter the code option instead of ☐. Refer to the Selection guide section for valid part numbers.

| Code                     | Option    | Description                                 | Comments                                                        |
|--------------------------|-----------|---------------------------------------------|-----------------------------------------------------------------|
| <b>R</b>                 | -         | Solid State Relay (PCB)                     |                                                                 |
| <b>P</b>                 | -         |                                             |                                                                 |
| <b>1</b>                 | -         | 1-pole switching                            |                                                                 |
| <input type="checkbox"/> | <b>A</b>  | Switching mode: zero-cross switching        |                                                                 |
|                          | <b>B</b>  | Switching mode: instant-on switching        |                                                                 |
| <input type="checkbox"/> | <b>23</b> | Rated operational voltage: 230 VACrms       |                                                                 |
|                          | <b>40</b> | Rated operational voltage: 400 VACrms       |                                                                 |
|                          | <b>48</b> | Rated operational voltage: 480 VACrms       |                                                                 |
| <input type="checkbox"/> | <b>D</b>  | Control voltage: 3 - 32 VDC                 | 4 - 32 VDC for RP1A48..<br>4 - 32 VDC for RP1B40.. and RP1B48.. |
|                          | <b>A</b>  | Control voltage: 16 - 32 VAC                | Only available for 230 V, 5.5 A                                 |
| <input type="checkbox"/> | <b>3</b>  | Rated operational current: 3 AACrms         |                                                                 |
|                          | <b>5</b>  | Rated operational current: 5 AACrms         |                                                                 |
|                          | <b>6</b>  | Rated operational current: 5.5 AACrms       |                                                                 |
| <input type="checkbox"/> | <b>Mx</b> | M1 = Mounting on DIN EN adaptor <b>RPM1</b> | Max. 250 V                                                      |
|                          |           | M2 = Mounting on DIN EN adaptor <b>RPM2</b> | Max. 600 V                                                      |

## Selection guide

| Rated operational voltage | Blocking voltage | Control voltage | Rated operational current |                      |                      |
|---------------------------|------------------|-----------------|---------------------------|----------------------|----------------------|
|                           |                  |                 | 3 AACrms                  | 5 AACrms             | 5.5 AACrms           |
| <b>230 VACrms</b>         | 650 Vp           | 3 - 32 VDC      | RP1A23D3<br>RP1B23D3      | RP1A23D5<br>RP1B23D5 | RP1A23D6<br>RP1B23D6 |
|                           |                  | 16 - 32 VAC     | -                         | -                    | RP1A23A6             |
| <b>400 VACrms</b>         | 850 Vp           | 3 - 32 VDC      | RP1A40D3                  | RP1A40D5             | RP1A40D6             |
|                           |                  | 4 - 32 VDC      | RP1B40D3                  | RP1B40D5             | RP1B40D6             |
| <b>480 VACrms</b>         | 1000 Vp          | 4 - 32 VDC      | RP1A48D3<br>RP1B48D3      | RP1A48D5<br>RP1B48D5 | RP1A48D6<br>RP1B48D6 |



## Selection guide: mounted on DIN EN adaptor

| Rated operational voltage | Blocking voltage | Control voltage | Rated operational current |                          |                          |
|---------------------------|------------------|-----------------|---------------------------|--------------------------|--------------------------|
|                           |                  |                 | 3 AACrms                  | 5 AACrms                 | 5.5 AACrms               |
| 230 VACrms                | 650 Vp           | 5 - 34 VDC      | RP1A23D3M1<br>RP1B23D3M1  | RP1A23D5M1<br>RP1B23D5M1 | RP1A23D6M1<br>RP1B23D6M1 |
|                           |                  | 16 - 32 VAC     | -                         | -                        | RP1A23A6M1*              |
| 480 VACrms                | 1000 Vp          | 6 - 34 VDC      | -                         | RP1A48D5M2               | -                        |

\* Version RP1A23A6M1 does not include an LED on the DIN adaptor.

## Carlo Gavazzi compatible components

| Description  | Component code                              | Notes                                                                                                                                                                                                     |
|--------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DIN adaptors | RPM1*<br>RPM1V*<br>RPM1P<br>RPM1PD*<br>RPM2 | DIN adaptor 250 V with LED<br>DIN adaptor 250 V with LED + varistor<br>DIN adaptor 250 V with pins for removal of RP<br>DIN adaptor 250 V with pins for removal of RP + LED<br>DIN adaptor 600 V with LED |

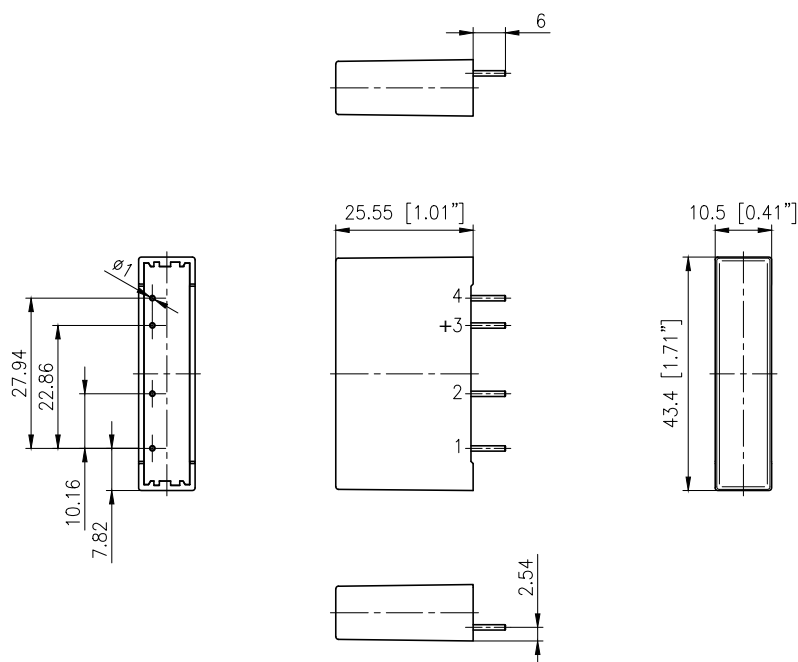
\* Not suitable for use with RP1A23A6

## Features

### General data

|                               |                                          |
|-------------------------------|------------------------------------------|
| <b>Material</b>               | PBT, RAL7035                             |
| <b>Potting compound</b>       | Flame-retardant flexible silicone rubber |
| <b>Weight</b>                 | Approx. 20 g                             |
| <b>Isolation</b>              | Input to output: $\geq 4000$ VACrms      |
| <b>Insulation resistance</b>  | $10^{10} \Omega$                         |
| <b>Insulation capacitance</b> | 8 pF                                     |

### Dimensions



Dimensions in mm unless otherwise noted.  
Tolerances +/- 0.5 mm.

# Performance

## Mains supply

|                                           | RP1..23..                          | RP1..40..                          | RP1..48..                          |
|-------------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| Operational voltage range<br>RP1A<br>RP1B | 12 - 265 VACrms<br>12 - 265 VACrms | 20 - 440 VACrms<br>12 - 440 VACrms | 20 - 530 VACrms<br>12 - 530 VACrms |
| Operational frequency range               | 45 - 65 Hz                         |                                    |                                    |
| Blocking voltage                          | 650 Vp                             | 850 Vp                             | 1000 Vp                            |
| Zero voltage turn-on                      | < 10 V                             |                                    |                                    |

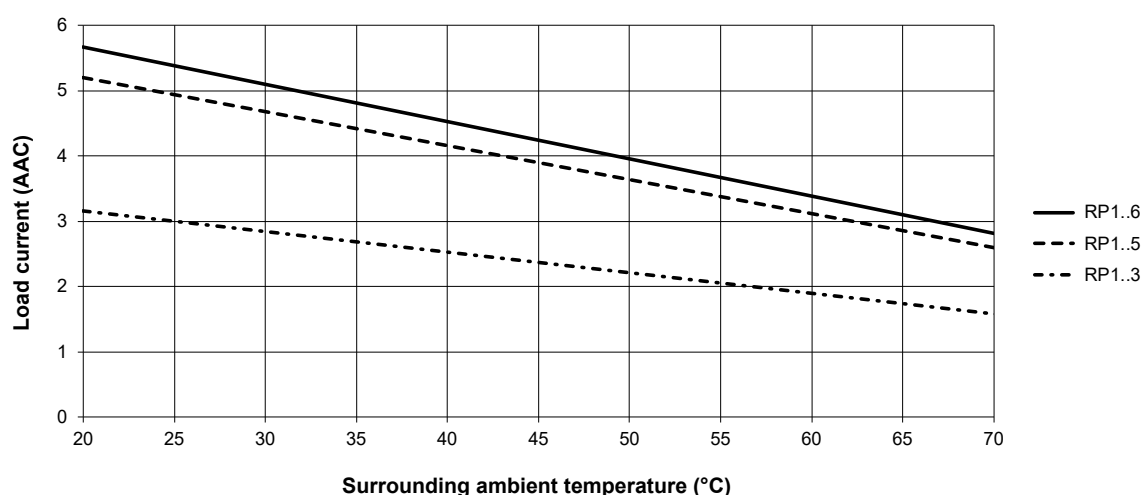
## Outputs

|                                                                                              | RP1..3     | RP1..5     | RP1..6       |
|----------------------------------------------------------------------------------------------|------------|------------|--------------|
| Rated operational current<br>AC 51 @ T <sub>a</sub> = 25°C<br>AC 53a @ T <sub>a</sub> = 25°C | 3 A<br>2 A | 5 A<br>3 A | 5.5 A<br>5 A |
| Minimum operational current                                                                  | 20 mA      |            |              |
| Power factor                                                                                 | > 0.5      |            |              |
| Rep. overload current t=1 s                                                                  | 10 AACrms  | 12 AACrms  | 16 AACrms    |
| Non-repetitive surge current<br>(I <sub>TSM</sub> ), t=20 ms                                 | 65 Ap      | 80 Ap      | 250 Ap       |
| Off-state leakage current                                                                    | < 1 mA     |            |              |
| I²t for fusing (t=10 ms)                                                                     | 20 A²s     | 50 A²s     | 340 A²s      |
| Critical dV/dt off state min.                                                                | 250 V/µs   | 500 V/µs   |              |
| On-state voltage drop @ rated current                                                        | < 1.2 Vrms |            |              |

## Inputs

|                                                                    | RP1..D..                                                                   | RP1..D..M..          | RP1A23A6              |
|--------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------|-----------------------|
| <b>Control voltage</b><br>RP1..23.. RP1A40..<br>RP1B40.. RP1..48.. | 3-32 VDC<br>4-32 VDC                                                       | 5-34 VDC<br>6-34 VDC | 16 - 32 VAC<br>-<br>- |
| <b>Pick-up voltage</b><br>RP1..23.. RP1A40..<br>RP1B40.. RP1..48.. | 2.8 VDC<br>3.8 VDC                                                         | 4.8 VDC<br>5.8 VDC   | 10 VAC<br>-<br>-      |
| <b>Drop-out voltage</b>                                            | 1.2 VDC                                                                    |                      | 5 VAC                 |
| <b>Max. input current</b><br>RP1A<br>RP1B                          | 10 mADC<br>15 mADC                                                         |                      | 13 mAAC<br>-<br>-     |
| <b>Max. reverse voltage</b>                                        | 32 VDC                                                                     | 34 VDC               | -                     |
| <b>Response time pick-up</b><br>RP1A<br>RP1B                       | < 10 ms<br>< 160 $\mu$ s (12 VDC / 50 Hz)<br>< 320 $\mu$ s (5 VDC / 50 Hz) |                      | < 20 ms<br>-<br>-     |
| <b>Response time drop-out</b><br>RP1A<br>RP1B                      | < 10 ms<br>< 10 ms                                                         |                      | < 20 ms<br>-<br>-     |

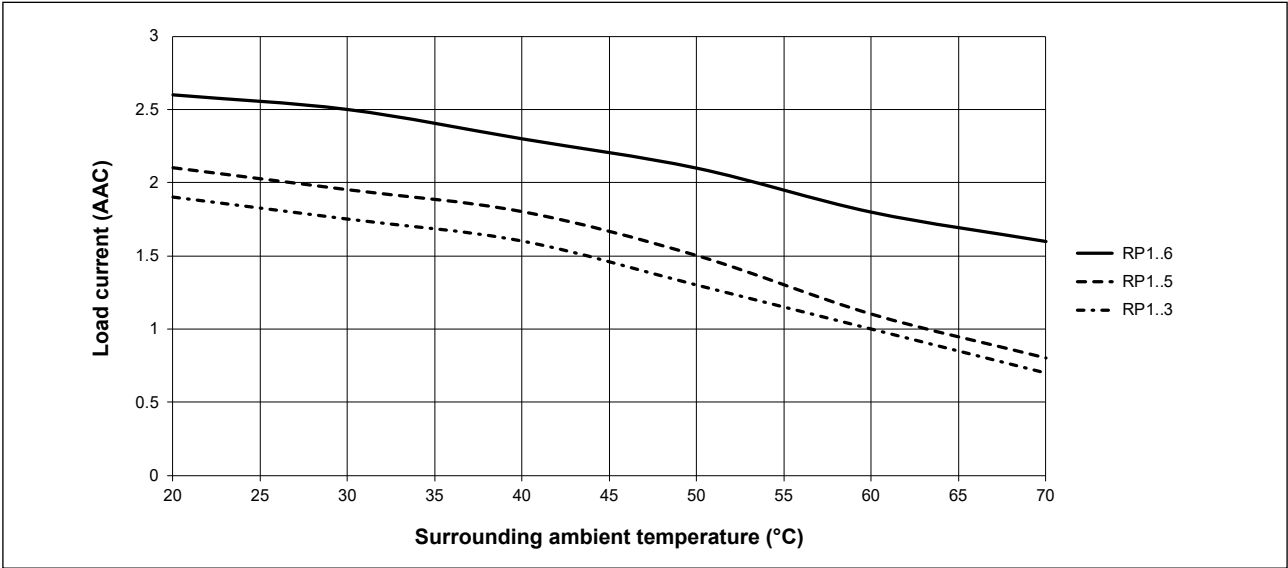
## Current derating



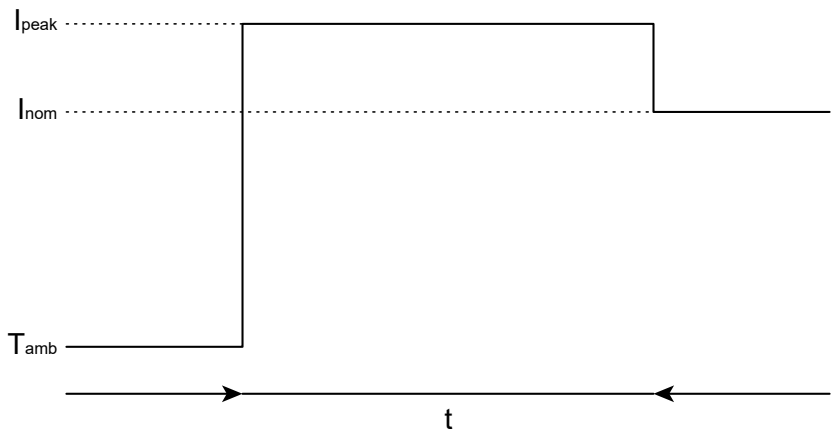
When used at full load current, the relays must be placed vertically. If more than one relay is mounted, please allow a minimum distance of 20 mm in between for sufficient air cooling.



▶ Current derating with 0 mm spacing



▶ Increased current options



|                   |    |   |    |
|-------------------|----|---|----|
| $I_{peak}$ (Amps) | 6  | 8 | 10 |
| D5 : t (minutes)  | 15 | 5 | 3  |
| D6 : t (minutes)  |    |   |    |

Note: even though the D3 can withstand a slight increase in current for a limited time, it is not recommended for this purpose.



## Compatibility and conformance

|                             |                                                                                                                                                                                 |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Approvals</b>            |                                                                                                                                                                                 |
| <b>Standards compliance</b> | LVD: EN 60947-4-3<br>EMCD: EN 60947-4-3<br>cURus: UL508 Recognized (E80573), NRNT2, NRNT8<br>CSA: C22.2 No. 14 (204075)<br>VDE: VDE 0600-100, VDE 0600-109 (excluding RP1A23A6) |

| Electromagnetic compatibility (EMC) - Immunity |                                                                                                                                                                                                           |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Electrostatic discharge (ESD)</b>           | EN/IEC 61000-4-2<br>8 kV air discharge, 4 kV contact (PC1)                                                                                                                                                |
| <b>Radiated radio frequency</b>                | 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)                                                                              |
| <b>Electrical fast transient (burst)</b>       | EN/IEC 61000-4-4<br>Output: 2 kV, 5 kHz (PC2)<br>Input: 1 kV, 5 kHz (PC2)                                                                                                                                 |
| <b>Conducted radio frequency</b>               | EN/IEC 61000-4-6<br>10 V/m, from 0.15 to 80 MHz (PC1)                                                                                                                                                     |
| <b>Electrical surge</b>                        | EN/IEC 61000-4-5<br>Output, line to line: 1 kV (PC2)<br>Output, line to earth: 1 kV (PC2) <sup>1</sup><br>Input, line to line: 500 V (PC2) <sup>2</sup><br>Input, line to earth: 500 V (PC2) <sup>2</sup> |
| <b>Voltage dips</b>                            | 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)                                                                                                      |
| <b>Voltage interruptions</b>                   | EN/IEC 61000-4-11<br>0% for 5000 ms (PC2)                                                                                                                                                                 |

1. A suppression device, such as a varistor, needs to be connected across the output terminals L1, T1 for immunity against higher voltage levels.  
2. A suppression device, such as a transil, needs to be connected across the control terminals A1, A2 for immunity against higher voltage levels.

| Electromagnetic compatibility (EMC) - Emissions         |                                                                                               |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Radio interference field emission (radiated)</b>     | EN/IEC 55011<br>Class A: from 30 to 1000 MHz                                                  |
| <b>Radio interference voltage emissions (conducted)</b> | EN/IEC 55011<br>Class A: from 0.15 to 30 MHz, with filter capacitor across the mains supply.* |

\* For conformance to EN/IEC 55011, an external capacitor class X1, 100 nF is to be connected across the output terminals 1-2.

### 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.
- 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.



## Environmental specifications

|                       |                                                                                   |
|-----------------------|-----------------------------------------------------------------------------------|
| Operating temperature | -20°C to +70°C (-4°F to +158°F)                                                   |
| Storage temperature   | -40°C to +100°C (-40°F to +212°F)                                                 |
| Pollution degree      | 2                                                                                 |
| 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 Hazardous 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 for 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.

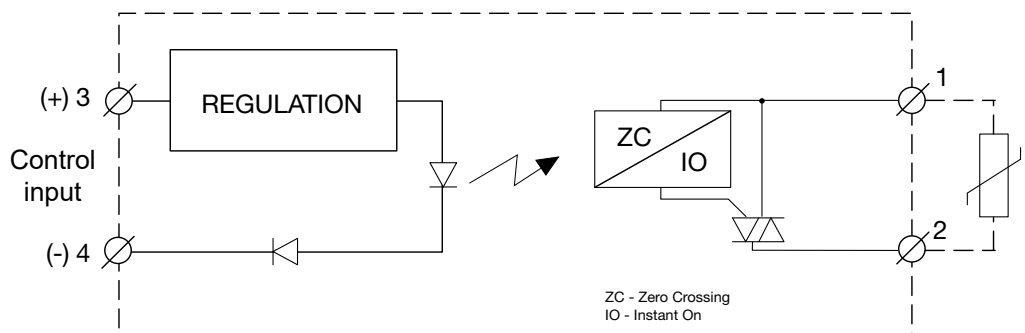
这份申明根据中华人民共和国电子工业标准  
SJ/T11364-2014：标注在电子电气产品中限定使用的有害物质

| 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            |

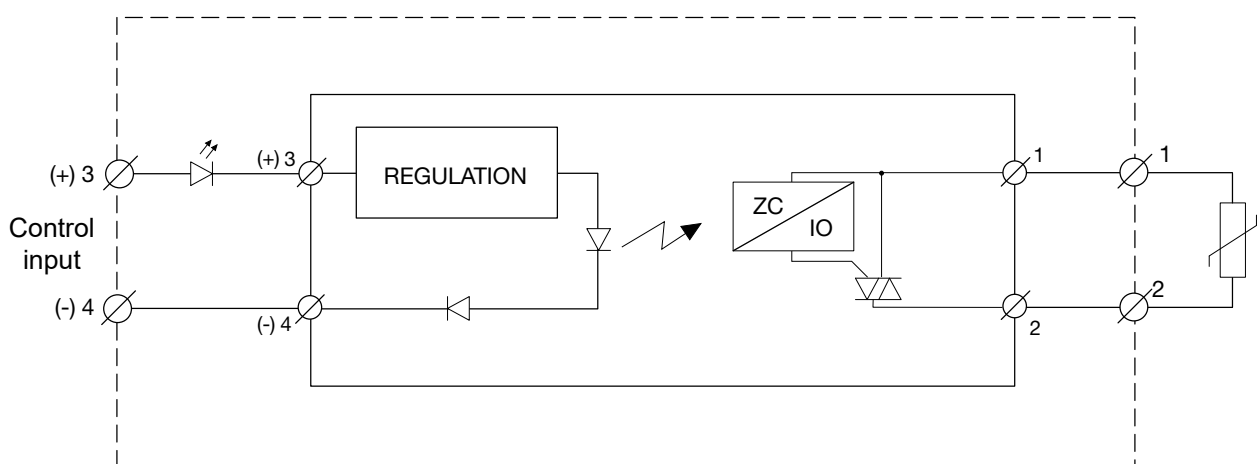
O:此零件所有材料中含有的该有害物低于GB/T 26572的限定。

X: 此零件某种材料中含有的该有害物高于GB/T 26572的限定。

## Functional diagram: RP1..



## Functional diagram: RP1..Mx



\* The varistor is not included in the solid state relay. Connecting a varistor across terminals 1-2 helps protect the solid state relay against damages by over-voltage.

## Connection specifications

|                                 |                          |
|---------------------------------|--------------------------|
| Terminals                       | Copper alloy, tin-plated |
| Terminals soldering temperature | Max. 300°C for 5 seconds |



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