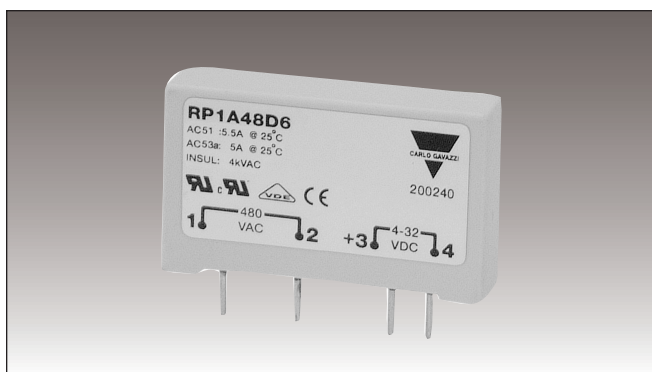


# Solid State Relays PCB, 1-Phase ZS/IO Types RP1A, RP1B

CARLO GAVAZZI



- AC Solid State Relay for PCB mounting
- Zero 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 V<sub>p</sub>
- Non-repetitive surge current: Up to 250 A<sub>p</sub>

## Product 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 480VACrms. Two regulated control voltage ranges cover most standard input requirements in an economic package. These features allow a direct substitution of existing PCB mounted relays with RP1. Internally this new series enjoys an improved technical design with the introduction of stress-free flexible encapsula-

tion and automated assembly of components. Opto-isolation and load switching are performed by individual components, providing higher reliability than monolithic designs. Additionally RP1..6 is a special version with high current surge capability that reduces fusing requirements. This relay can also drive higher AC53a loads up to 5 A. The Solid State technology used can withstand peak voltages of 1000V, making the RP1 series suitable to drive AC loads such as valve solenoids and small induction motors.

## Ordering Key

**RP 1 A 23 D 3**

Solid State Relay (PCB) \_\_\_\_\_  
Number of poles \_\_\_\_\_  
Switching mode \_\_\_\_\_  
Rated operational voltage \_\_\_\_\_  
Control voltage \_\_\_\_\_  
Rated operational current \_\_\_\_\_

## Type Selection

| Switching mode          | Rated operational voltage | Rated operational current | Control voltage                       |
|-------------------------|---------------------------|---------------------------|---------------------------------------|
| A: Zero switching       | 23: 230 VACrms            | 3: 3 AACrms               | D: 3 to 32 VDC*                       |
| B: Instant-On switching | 40: 400 VACrms            | 5: 5 AACrms               | A: 16 to 32 VAC**                     |
|                         | 48: 480 VACrms            | 6: 5.5 AACrms             | * 4 to 32 VDC for RP1A48..            |
|                         |                           |                           | 4 to 32 VDC for RP1B40.. and RP1B48.. |
|                         |                           |                           | ** Only available for 230V, 5.5 A     |

## Selection Guide

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

## Selection Guide (mounted on DIN EN adaptor)

| Rated operational voltage* | Non-rep. voltage | Control voltage | Rated operational current |                          |                          |
|----------------------------|------------------|-----------------|---------------------------|--------------------------|--------------------------|
|                            |                  |                 | 3 AACrms                  | 5 AACrms                 | 5.5 AACrms               |
| 230 VACrms                 | 650 Vp           | 5 to 34 VDC     | RP1A23D3M1<br>RP1B23D3M1  | RP1A23D5M1<br>RP1B23D5M1 | RP1A23D6M1<br>RP1B23D6M1 |
|                            |                  | 16 to 32 VAC    | -                         | -                        | RP1A23A6M1**             |

\* For operational voltages > 230 VACrms add suffix M2 to part no. Refer to RPM2 datasheet.

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

Specifications are subject to change without notice (22.02.2016)

## General Specifications

|                                  | RP1.23..           | RP1.40..           | RP1.48..            |
|----------------------------------|--------------------|--------------------|---------------------|
| Operational voltage range        |                    |                    |                     |
| RP1A...                          | 12 - 265 VACrms    | 20 - 440 VACrms    | 20 - 530 VACrms     |
| RP1B...                          | 12 - 265 VACrms    | 12 - 440 VACrms    | 12 - 530 VACrms     |
| Blocking voltage                 | 650 V <sub>p</sub> | 850 V <sub>p</sub> | 1000 V <sub>p</sub> |
| Rated insulation input to output | 4 kVACrms          | 4 kVACrms          | 4 kVACrms           |
| Operational frequency range      | 45 - 65 Hz         | 45 - 65 Hz         | 45 - 65 Hz          |
| Power factor                     | > 0.5              | > 0.5              | > 0.5               |
| Zero voltage turn-on             | < 10 V             | < 10 V             | < 10 V              |
| Approvals                        | UL, cUL, VDE*      | UL, cUL, VDE*      | UL, cUL, VDE*       |
| CE-marking                       | Yes                | Yes                | Yes                 |

\* VDE 0700, VDE 0805 (excluding RP1A23A6)

## Input Specifications

|                        | RP1...A. | RP1A23A6    |
|------------------------|----------|-------------|
| Control voltage        |          |             |
| RP1.23.. RP1A40..      | 3-32 VDC | 16 - 32 VAC |
| RP1B40.. RP1.48..      | 4-32 VDC | -           |
| Pick-up voltage        |          | 10 VAC      |
| RP1.23.. RP1A40..      | 2.8 VDC  | -           |
| RP1B40.. RP1.48..      | 3.8 VDC  | -           |
| Drop-out voltage       | 1.2 VDC  | 5 VAC       |
| Max. input current     |          | 13 mAAC     |
| RP1A...                | 10 mADC  | -           |
| RP1B...                | 15 mADC  | -           |
| Max. reverse voltage   | 32 VDC   | -           |
| Response time pick-up  |          |             |
| RP1A...                | < 10 ms  | -           |
| RP1B... 12 VDC/ 50 Hz  | < 160 µs | -           |
| 5 VDC/ 50 Hz           | < 320 µs | -           |
| Response time drop-out |          | < 20 ms     |
| RP1A...                | < 10 ms  | -           |
| RP1B...                | < 10 ms  | -           |

## Output Specifications

|                                          | RP1....3            | RP1....5            | RP1....6             |
|------------------------------------------|---------------------|---------------------|----------------------|
| Rated operational current                |                     |                     |                      |
| AC 51 @ T <sub>a</sub> = 25°C            | 3 A                 | 5 A                 | 5.5 A                |
| AC 53a @ T <sub>a</sub> = 25°C           | 2 A                 | 3 A                 | 5 A                  |
| Min. operational load current            | 20 mA               | 20 mA               | 20 mA                |
| Rep. overload current t=1 s              | 10 AACrms           | 12 AACrms           | 16 AACrms            |
| Non-rep. surge current t=20 ms           | 65 A <sub>p</sub>   | 80 A <sub>p</sub>   | 250 A <sub>p</sub>   |
| Off-state leakage current                | < 1 mA              | < 1 mA              | < 1 mA               |
| I <sup>2</sup> t for fusing t=10 ms      | 20 A <sup>2</sup> s | 50 A <sup>2</sup> s | 340 A <sup>2</sup> s |
| Critical dV/dt off state min.            | 250 V/µs            | 500 V/µs            | 500 V/µs             |
| On-state voltage drop<br>@ rated current | < 1.2 Vrms          | < 1.2 Vrms          | < 1.2 Vrms           |

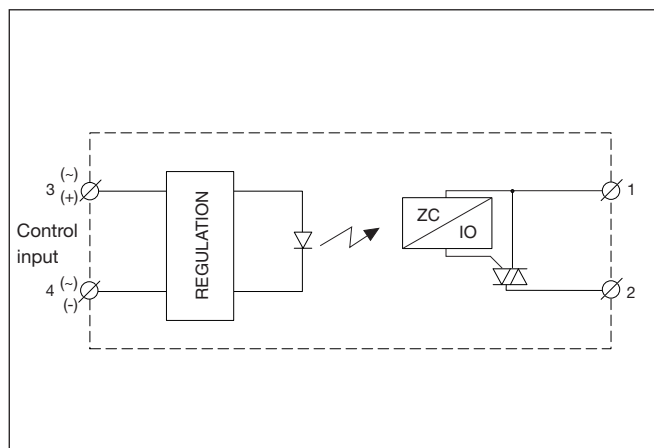
## Thermal Specifications

|                       |                                 |
|-----------------------|---------------------------------|
| Operating temperature | -20° to +70°C (-4° to +158°F)   |
| Storage temperature   | -40° to +100°C (-40° to +212°F) |

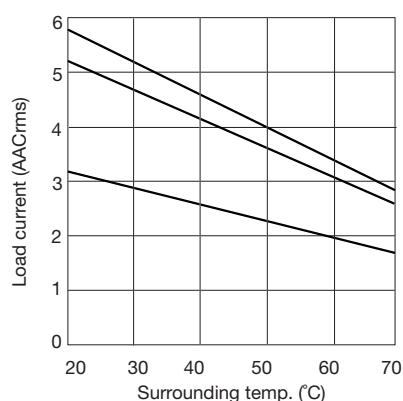
## Insulation Input - Output

|                        |                  |
|------------------------|------------------|
| Insulation resistance  | 10 <sup>10</sup> |
| Insulation capacitance | 8 pF             |

## Functional Diagram

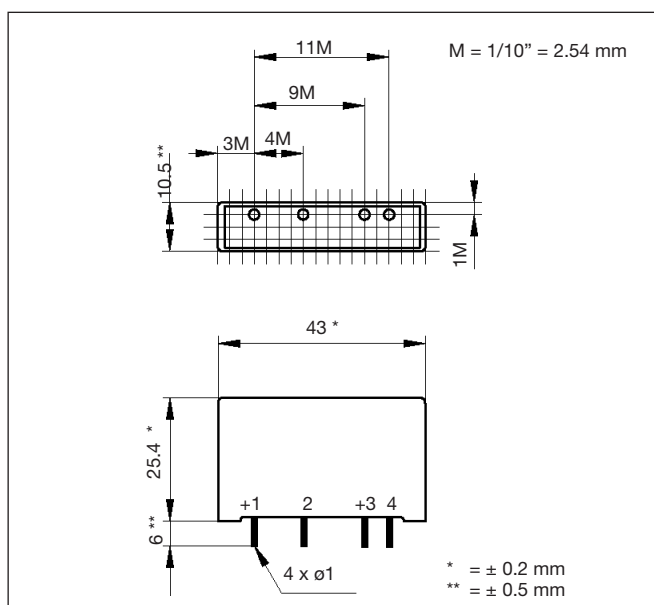


## Derating Curve



Derating curve is used for finding max. load current at an elevated ambient temperature. The 3 lines in the graph represent the 3 nominal current ratings of the RP1 series (RP1...D3/D5/D6).

## Dimensions



## Applications

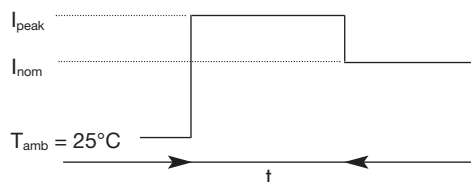
These relays can be used to switch heaters, motors, lights, valves or solenoids.

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.

## Housing Specifications

|                                 |                                          |
|---------------------------------|------------------------------------------|
| Weight                          | Approx. 20 g                             |
| Housing material                | PBT, grey                                |
| Terminals                       | Copper alloy, tin-plated                 |
| Terminals soldering temperature | max. 300°C for 5 sec.                    |
| Potting compound                | Flame-retardant flexible silicone rubber |

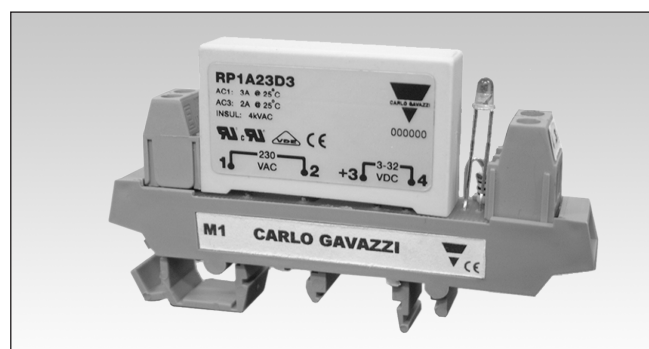
## Increased Current Options



|                  |    |   |    |
|------------------|----|---|----|
| I peak (Amps)    | 6  | 8 | 10 |
| D5 : t (minutes) | 15 | 5 | 3  |
| D6 : t (minutes) | 15 | 5 | 3  |

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

## Accessories



M1 DIN-rail adaptor (photo)  
M2 DIN-rail adaptor (for V > 230VAC)

Varistors

Fuses

For further information refer to "General Accessories".