

RP1A, RP1B



1-phase PCB mount solid state relays



Main features

- 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 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 480VACrms.

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 1000V, making the RP1 series suitable to drive AC loads such as valve solenoids and small induction motors.


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

References

 **Order code**

 **RP1**

Enter the code entering the corresponding option instead of

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

Selection guide

| Rated operational voltage | Blocking voltage | Control voltage | Rated operational current | | |
|---------------------------|------------------|-----------------|---------------------------|----------------------|----------------------|
| | | | 3 AACrms | 5 AACrms | 5.5 AACrms |
| 230 VACrms | 650 Vp | 3 to 32 VDC | RP1A23D3 RP1B23D3 | RP1A23D5 RP1B23D5 | RP1A23D6 RP1B23D6 |
| | | 16 to 32 VAC | - | - | RP1A23A6 |
| 400 VACrms | 850 Vp | 3 to 32 VDC | RP1A40D3 RP1B40D3 | RP1A40D5 RP1B40D5 | RP1A40D6 RP1B40D6 |
| | | 4 to 32 VDC | | | |
| 480 VACrms | 1000 Vp | 4 to 32 VDC | RP1A48D3 RP1B48D3 | RP1A48D5 RP1B48D5 | RP1A48D6 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 to 34 VDC | RP1A23D3M1 RP1B23D3M1 | RP1A23D5M1 RP1B23D5M1 | RP1A23D6M1 RP1B23D6M1 |
| | | 16 to 32 VAC | - | - | RP1A23A6M1* |
| 480 VACrms | 1000 Vp | 6 to 34 VDC | - | RP1A48D5M2 | - |

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



CARLO GAVAZZI compatible components

| Purpose | Component name/code | Notes |
|--------------|---------------------|--|
| DIN adaptors | RPM1* | DIN adaptor 250V with LED |
| | RPM1V* | DIN adaptor 250V with LED + varistor |
| | RPM1P | DIN adaptor 250V with pins for removal of RP |
| | RPM1PD* | DIN adaptor 250V with pins for removal of RP + LED |
| | RPM2 | DIN adaptor 600V with LED |

*not suitable for use with RP1A23A6

Further reading

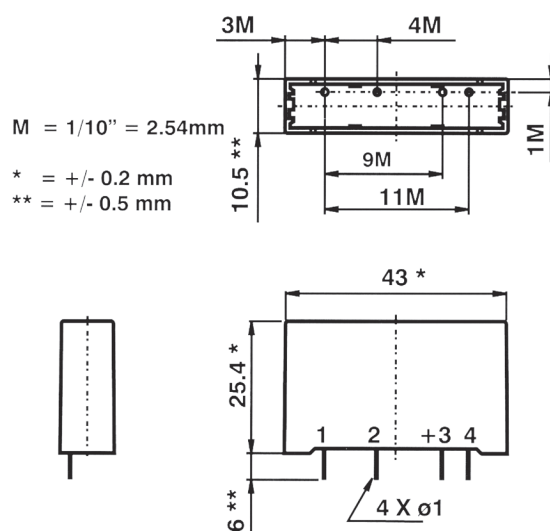
| Information | Where to find it |
|-------------|------------------|
| - | - |

Features

General

| | |
|-----------------------------------|--|
| Material | PBT, RAL7035 |
| Potting compound | Flame-retardant flexible silicone rubber |
| Weight | Approx. 20 g |
| Isolation: input to output | 4 kVACrms |
| Insulation resistance | 10^{10} |
| Insulation capacitance | 8 pF |

Dimensions



Performance

Mains supply

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

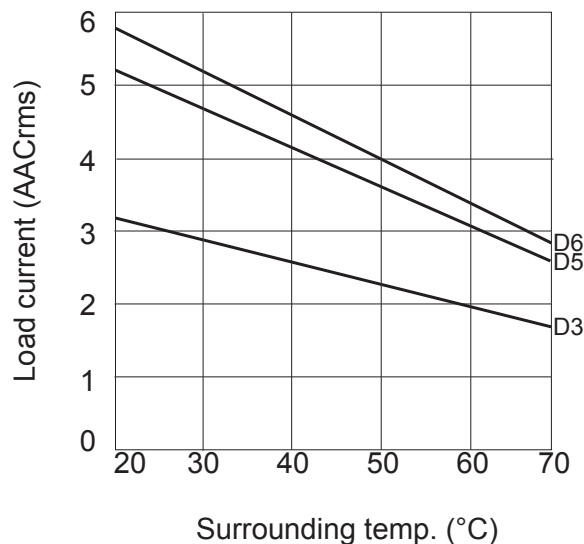
Outputs

| | RP1...3 | RP1...5 | RP1...6 |
|---|----------------------|----------------------|----------------------|
| Rated operational current AC 51 @ $T_a = 25^\circ\text{C}$ AC 53a @ $T_a = 25^\circ\text{C}$ | 3 A 2 A | 5 A 3 A | 5.5 A 5 A |
| Min. operational load current | 20 mA | | |
| Power factor | > 0.5 | | |
| Rep. overload current t=1 s | 10 AACrms | 12 AACrms | 16 AACrms |
| Non-rep. surge current t=20 ms | 65 Ap | 80 Ap | 250 Ap |
| Off-state leakage current | < 1 mA | | |
| I²t for fusing t=10 ms | 20 A ² s | 50 A ² s | 340 A ² s |
| 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..Mx | RP1A23A6 |
|--|--|----------------------|-----------------------|
| Control voltage RP1.23.. RP1A40.. RP1B40.. RP1.48.. | 3-32 VDC 4-32 VDC | 5-34 VDC 6-34 VDC | 16 - 32 VAC - - |
| Pick-up voltage RP1.23.. RP1A40.. RP1B40.. RP1.48.. | 2.8 VDC 3.8 VDC | 4.8 VDC 5.8 VDC | 10 VAC - - |
| Drop-out voltage | 1.2 VDC | | 5 VAC |
| Max. input current RP1A... RP1B... | 10 mADC 15 mADC | | 13 mAAC - - |
| Max. reverse voltage | 32 VDC | 34 VDC | - |
| Response time pick-up RP1A... RP1B... | < 10 ms < 160 μs (12 VDC/ 50 Hz) < 320 μs (5 VDC/ 50 Hz) | | < 20 ms - - |
| Response time drop-out RP1A... RP1B... | < 10 ms < 10 ms | | < 20 ms - - |

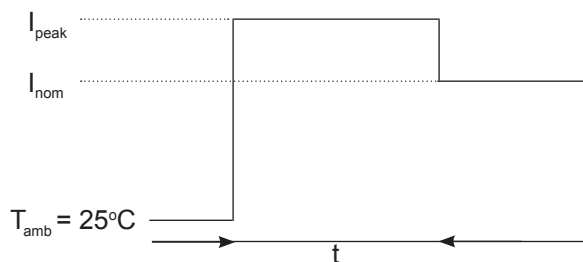
Derating curve



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).

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.

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.

Thermal data

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



Compatibility and conformity

| | |
|-----------------------------|---|
| Standards compliance | LVD: EN 60947-4-3 EMCD: EN 61000-6-2, EN 61000-6-4 UL508 C22.2 No. 14-13 VDE 0700, VDE 0805 (excluding RP1A23A6) |
| Approvals |    |

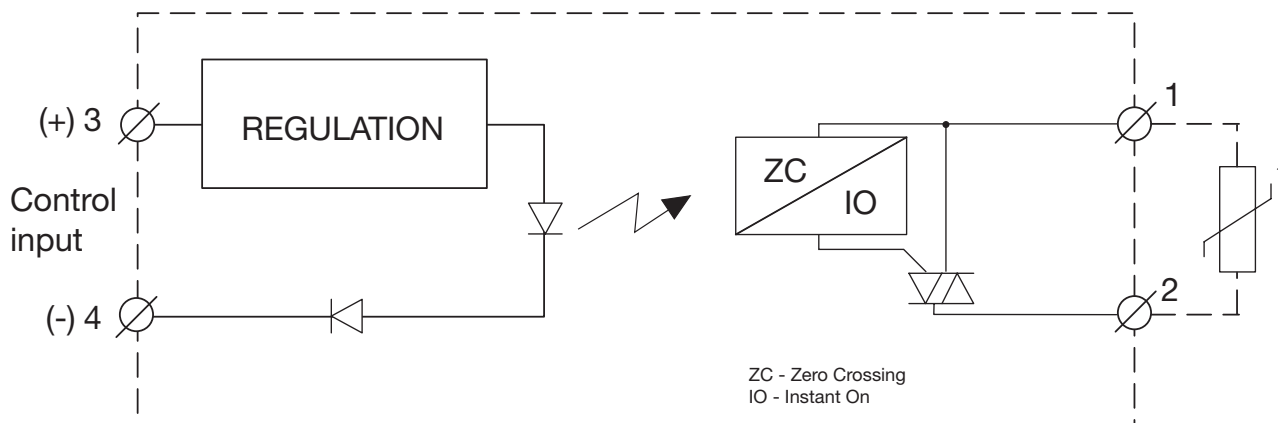
| Electromagnetic compatibility (EMC) - immunity | |
|---|---|
| Electrostatic discharge (ESD) | EN/IEC 61000-4-2 8 kV air discharge, 4 kV contact (PC1) |
| Radiated radio frequency | EN/IEC 61000-4-3 10 V/m, from 80 MHz to 1 GHz (PC1) 10 V/m, from 1.4 to 2 GHz (PC1) 10 V/m, from 2 to 2.7 GHz (PC1) |
| Electrical fast transient (burst) | EN/IEC 61000-4-4 Output: 2 kV, 5 kHz (PC2) Input: 1 kV, 5 kHz (PC2) |
| Conducted radio frequency | EN/IEC 61000-4-6 10V/m, from 0.15 to 80 MHz (PC1) |
| Electrical surge | EN/IEC 61000-4-5 Output, line to line: 1 kV (PC2) Output, line to earth: 1 kV (PC2) ¹ Input, line to line: 500 V (PC2) ² Input, line to earth: 500 V (PC2) ² |
| Voltage dips | EN/IEC 61000-4-11 0% for 0.5, 1 cycle (PC2) 40% for 10 cycles (PC2) 70% for 25 cycles (PC2) |
| Voltage Interruptions | EN/IEC 61000-4-11 0% for 5000ms (PC2) |

| Electromagnetic compatibility (EMC) - emissions | |
|---|--|
| Radio interference field emission (radiated) | EN/IEC 55011 Class A: from 30 to 1000 MHz |
| Radio interference voltage emissions (conducted) | From 0.15 to 30 MHz EN/IEC 55011 Class A (industrial) with filter capacitor across the Mains supply EN/IEC 60947-4-3 Class A (no filtering needed) |

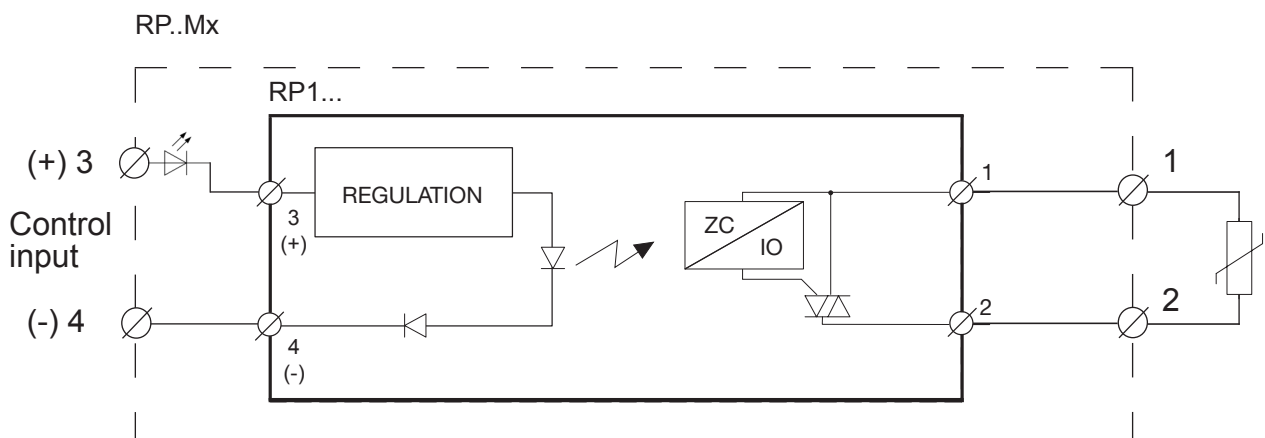
Note:

- 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.
- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference.
- 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.

RP1... Functional diagram



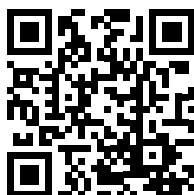
RP..Mx Functional diagram



* 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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