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

Selection guide

Rated operational voltage	Blocking voltage	Control voltage	Rated operational current		
			3 AACrms	5 AACrms	5.5 AACrms
230 VACrms	650 Vp	3 - 32 VDC	RP1A23D3 RP1B23D3	RP1A23D5 RP1B23D5	RP1A23D6 RP1B23D6
		16 - 32 VAC	-	-	RP1A23A6
400 VACrms	850 Vp	3 - 32 VDC	RP1A40D3	RP1A40D5	RP1A40D6
		4 - 32 VDC	RP1B40D3	RP1B40D5	RP1B40D6
480 VACrms	1000 Vp	4 - 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 - 34 VDC	RP1A23D3M1 RP1B23D3M1	RP1A23D5M1 RP1B23D5M1	RP1A23D6M1 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* RPM1V* RPM1P RPM1PD* RPM2	DIN adaptor 250 V with LED DIN adaptor 250 V with LED + varistor DIN adaptor 250 V with pins for removal of RP DIN adaptor 250 V with pins for removal of RP + LED DIN adaptor 600 V with LED

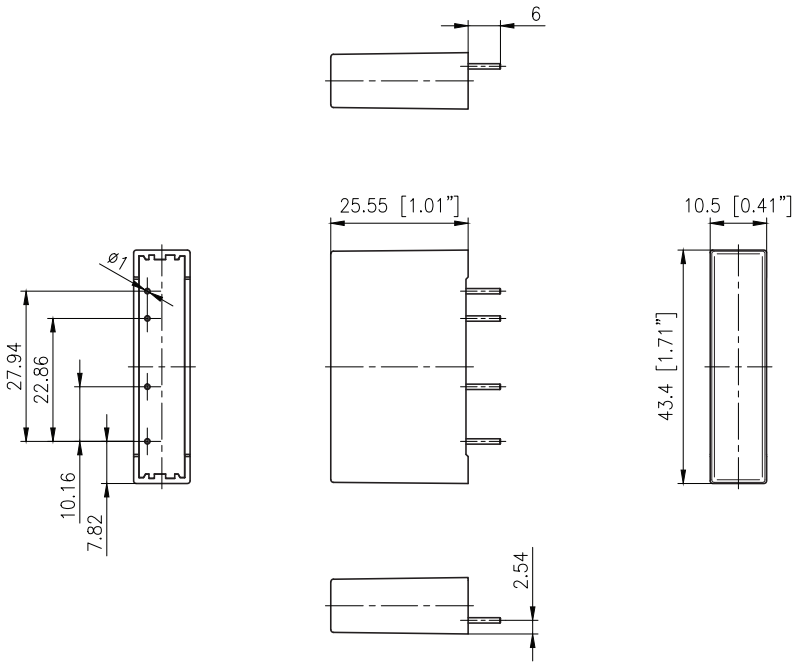
* not suitable for use with RP1A23A6

Features

General data

Material	PBT, RAL7035
Potting compound	Flame-retardant flexible silicone rubber
Weight	Approx. 20 g
Isolation	Input to output: ≥ 4000 VACrms
Insulation resistance	10^{10} Ω
Insulation capacitance	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 **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		

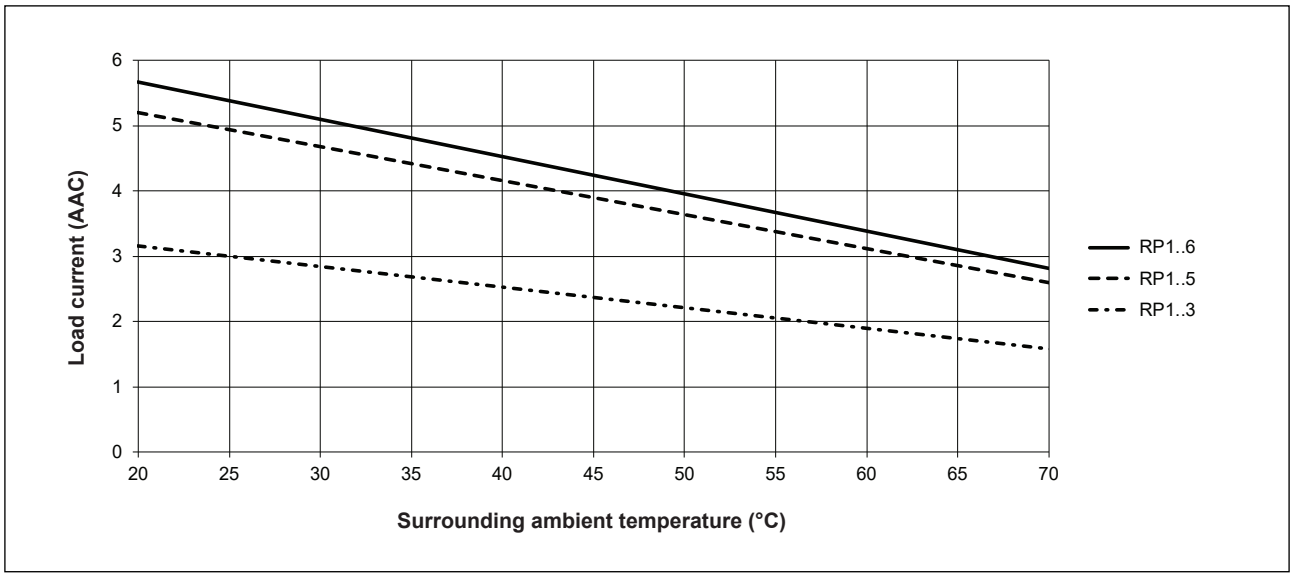
Outputs

	RP1..3	RP1..5	RP1..6
Rated operational current **AC 51 @ T_a = 25°C** **AC 53a @ T_a = 25°C**	 3 A 2 A	 5 A 3 A	 5.5 A 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 (I_{TSM}), t=20 ms	65 Ap	80 Ap	250 Ap
Off-state leakage current	< 1 mA		
I^2t for fusing (t=10 ms)	20 A^2s	50 A^2s	340 A^2s
Critical dV/dt off state min.	250 V/µs	500 V/µs	
On-state voltage drop @ rated current	< 1.2 Vrms		

Inputs

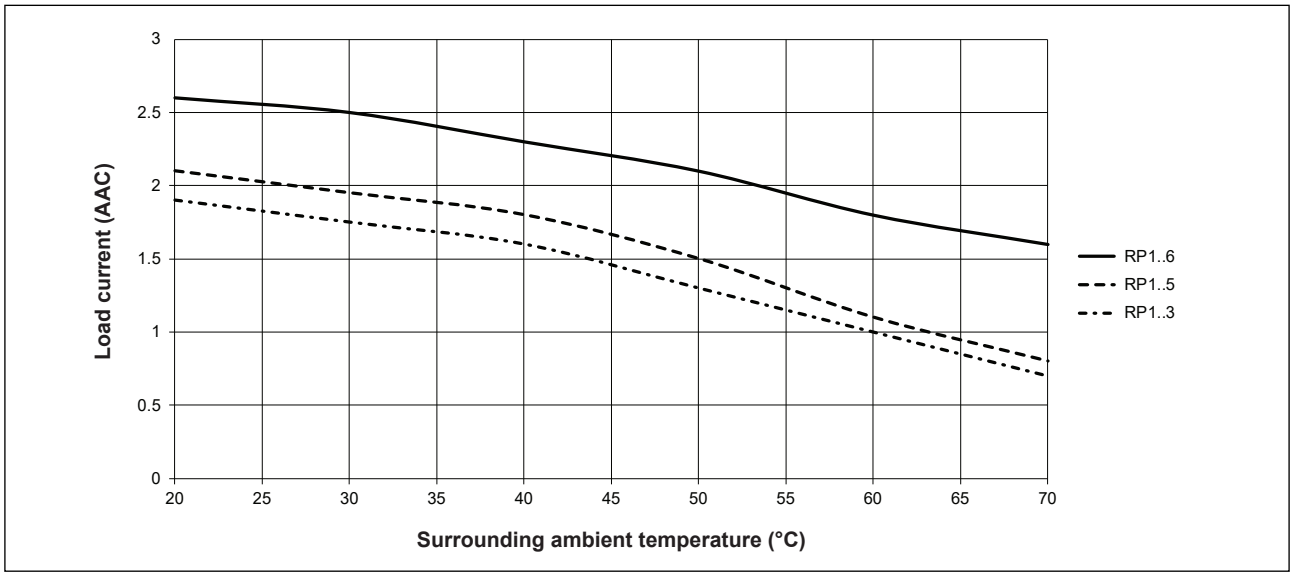
	RP1..D..	RP1..D..M..	RP1A23A6
Control voltage **RP1..23.. RP1A40..** **RP1B40.. RP1..48..**	 3-32 VDC 4-32 VDC	 5-34 VDC 6-34 VDC	16 - 32 VAC - -
Pick-up voltage **RP1..23.. RP1A40..** **RP1B40.. RP1..48..**	 2.8 VDC 3.8 VDC	 4.8 VDC 5.8 VDC	10 VAC - -
Drop-out voltage	1.2 VDC		5 VAC
Max. input curent **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 - -

Current derating

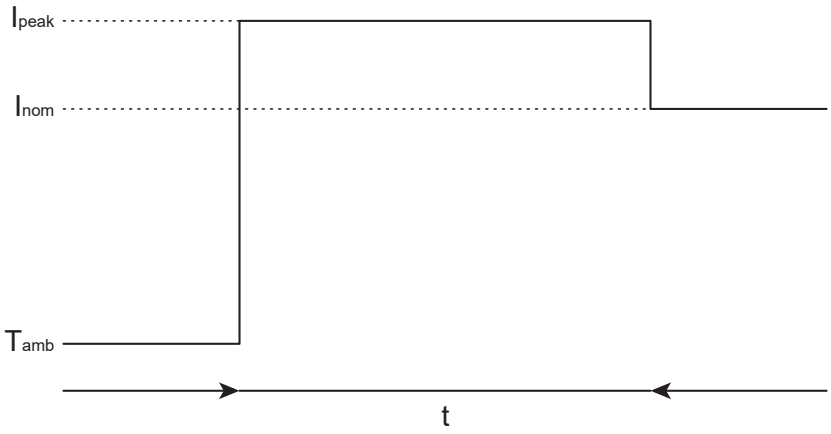


When used at full load current, the relays must be placed vertically. If more than one relay is mounted, please allow a minimum distance of 20 mm in between for sufficient air cooling.

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

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

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 10 V/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 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	
Radio interference field emission (radiated)	EN/IEC 55011 Class A: from 30 to 1000 MHz
Radio interference voltage emissions (conducted)	EN/IEC 55011 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' 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.
- 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 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.

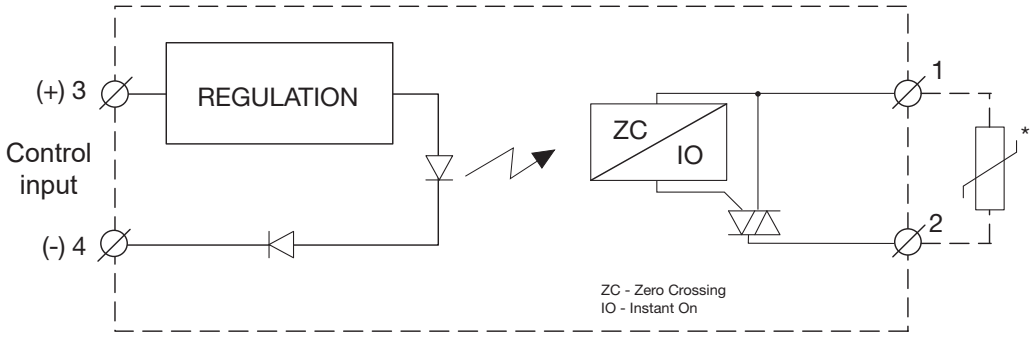
这份申明根据中华人民共和国电子工业标准
SJ/T11364-2014：标注在电子电气产品中限定使用的有害物质

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

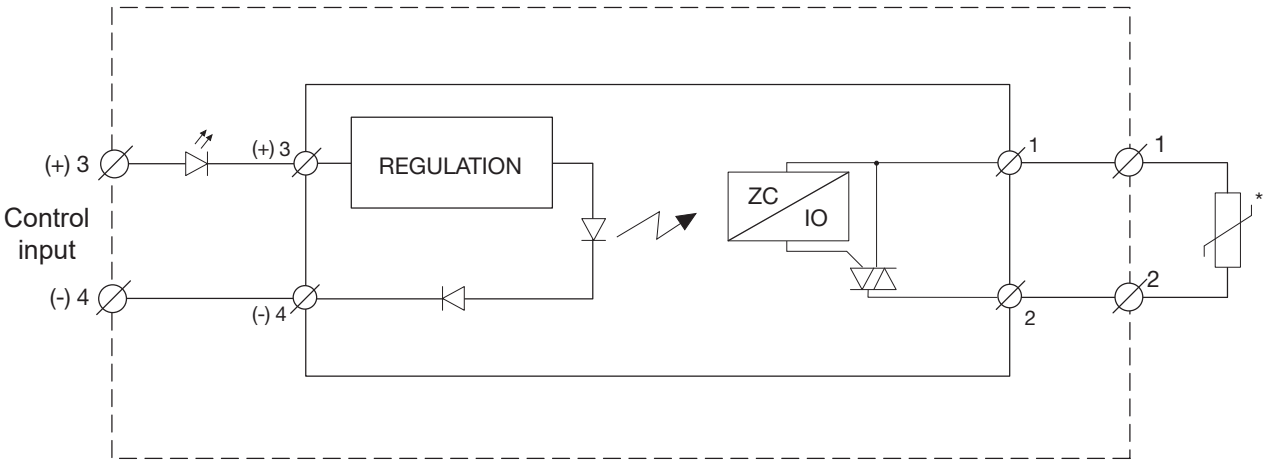
O:此零件所有材料中含有的该有害物低于GB/T 26572的限定。

X: 此零件某种材料中含有的该有害物高于GB/T 26572的限定。

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