2c 15A, 4c 10A polarized power relays

SP RELAYS

RoHS compliant

Protective construction: Dust cover type

Taking advantage of the 4-gap balanced armature mechanism, S relays have met a number of relay needs and earned a reputation for the characteristics that they provide. Building on the same structure, the SP relay was introduced as a high-sensitivity power relay to provide nominal operating power of 300 mW and minimum operating power of 150 mW (single side stable and 2 coil latching types). Even so, with the nominal switching capacity for the 2 Form C at 15 A, and for the 4 Form C at 10 A, high-capacity switching is possible with small input. Moreover, taking full advantage of the excellence of the 4-gap balanced armature mechanism, we have realized a small, slim form factor that also has superior resistance to vibration and shock. This power relay is often chosen for NC machines and electrical power remote monitoring control panels, and for power supplies used in computers and other equipment. The SP also often provides power control for high-end business and industrial equipment.

FEATURES

1. **Small, slim form factor**
   Facilitating the form factor reduction of devices, the overall height of the relay package is less than half that of our HP relay.
2. **High sensitivity**
   The high-efficiency polarized electromagnetic mechanism in conjunction with our exclusive spring alignment method achieves levels of sensitivity higher than relays that have been available up to now. For both the 2 Form C and 4 Form C single side stable and 2 coil latching types, the 150 mW minimum operating power level allows direct driving by transistor or chip controllers.
3. **High reliability and long life**
   With a structure that ensures almost perfectly complete twin contact and minimal contact bounce, you get greater reliability than has so far been provided by power relays.
4. **Latching types also available**
   1 coil latching and 2 coil latching types are available. In cases where it was formerly unavoidable to use plural relays for large power memory, you can now use a single SP relay.
5. **Strong resistance to vibration and shock**
   Our balanced armature technology well withstands vibration and shocks. It provides strong resistance to vibration and shock.
6. **Terminals and mounting boards are available**

ORDERING INFORMATION

SP [ ]-[ ]-[ ] [ ]

Contact arrangement
2: 2 Form C
4: 4 Form C

Terminal shape
Nil: Plug-in type
P: PC board type

Operating function
Nil: Single side stable
L: 1 coil latching
L2: 2 coil latching

Nominal coil voltage
3, 5, 6, 12, 24, 48 V DC

Notes: 1. PC board type and 1 coil latching type are manufactured by lot upon receipt of order.
2. Certified by UL, CSA and TÜV

TYPES

Contact arrangement	Nominal coil voltage	Single side stable	2 coil latching
		Part No.	Part No.
2 Form C	3V DC	SP2-DC3V	SP2-L2-DC3V
	5V DC	SP2-DC5V	SP2-L2-DC5V
	6V DC	SP2-DC6V	SP2-L2-DC6V
	12V DC	SP2-DC12V	SP2-L2-DC12V
	24V DC	SP2-DC24V	SP2-L2-DC24V
	48V DC	SP2-DC48V	SP2-L2-DC48V
4 Form C	3V DC	SP4-DC3V	SP4-L2-DC3V
	5V DC	SP4-DC5V	SP4-L2-DC5V
	6V DC	SP4-DC6V	SP4-L2-DC6V
	12V DC	SP4-DC12V	SP4-L2-DC12V
	24V DC	SP4-DC24V	SP4-L2-DC24V
	48V DC	SP4-DC48V	SP4-L2-DC48V

Standard packing (2 Form C): Carton: 20 pcs.; Case: 200 pcs.
Standard packing (4 Form C): Carton: 10 pcs.; Case: 100 pcs.
Note: PC board type and 1 coil latching type are manufactured by lot upon receipt of order.

* Terminal sockets and mounting boards available.

RATING

1. Coil data

1) Single side stable

Nominal coil voltage	Pick-up voltage (at 20°C 68°F)	Drop-out voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. applied voltage
3V DC	70%V or less of nominal voltage (Initial)	10%V or more of nominal voltage (Initial)	100mA	30Ω	300mW	150%V of nominal voltage
5V DC			60.2mA	83Ω		
6V DC			50mA	120Ω		
12V DC			25mA	480Ω		
24V DC			12.5mA	1,920Ω		
48V DC			6.2mA	7,700Ω		

2) 2 coil latching

Nominal coil voltage	Set voltage (at 20°C 68°F)	Reset voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)		Coil resistance [±10%] (at 20°C 68°F)		Nominal operating power		Max. applied voltage
			Set coil	Reset coil	Set coil	Reset coil	Set coil	Reset coil	
3V DC	70%V or less of nominal voltage (Initial)	70%V or less of nominal voltage (Initial)	100mA	100mA	30Ω	30Ω	300mW	300mW	150%V of nominal voltage
5V DC			60.2mA	60.2mA	83Ω	83Ω			
6V DC			50mA	50mA	120Ω	120Ω			
12V DC			25mA	25mA	480Ω	480Ω			
24V DC			12.5mA	12.5mA	1,920Ω	1,920Ω			
48V DC			6.2mA	6.2mA	7,680Ω	7,680Ω			

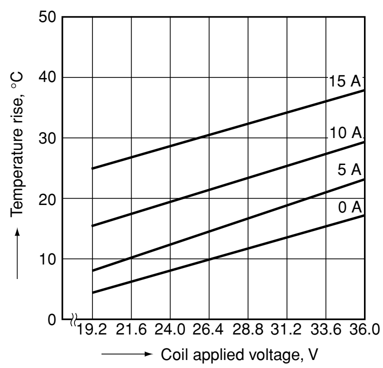
2. Specifications

Characteristics	Item		Specifications
Contact	Initial contact pressure		2 Form C: Approx. 0.392 N (40 g 1.41 oz), 4 Form C: Approx. 0.196 N (20 g 0.71 oz)
	Arrangement		2 Form C, 4 Form C
	Contact resistance (Initial)		Max. 30 mΩ (By voltage drop 6 V DC 1A)
	Contact material		Stationary contact: Au flashed $AgSnO_2$ type, Movable contact: $AgSnO_2$ type
Rating	Nominal switching capacity (resistive load)		2 Form C: 15 A 250 V AC, 4 Form C: 10 A 250 V AC
	Max. switching power (resistive load)		2 Form C: 3,750 VA, 300 W, 4 Form C: 2,500 VA, 300 W
	Max. switching voltage		2 Form C, 4 Form C: 250 V AC, 30 V DC (48V DC: Max. 2A)
	Max. switching current		2 Form C: 15 A (AC) 10 A (DC), 4 Form C: 10 A
	Nominal operating power		300mW (Single side stable, 2 coil latching)
	Min. switching capacity (reference value)*1		100 mA 5V DC
Electrical characteristics	Insulation resistance (Initial) (25°C, 50% relative humidity)		Min. 1,000MΩ (at 500V DC) Measurement at same location as "Breakdown voltage" section.
	Breakdown voltage (Initial)	Between open contacts	1,500 Vrms for 1 min. (Detection current: 10 mA)
		Between contact and coil	3,000 Vrms for 1 min. (Detection current: 10 mA)
		Between contact sets	3,000 Vrms for 1 min. (Detection current: 10 mA)
	Operate time [Set time] (at 20°C 68°F)		Max. 30 ms [Max. 30 ms] (Nominal coil voltage applied to the coil, excluding contact bounce time.)
	Release time [Reset time] (at 20°C 68°F)		Max. 20 ms [Max. 30 ms] (Nominal coil voltage applied to the coil, excluding contact bounce time.) (without diode)
	Temperature rise (coil) (at 20°C 68°F)		Max. 40°C (By resistive method, nominal voltage applied to the coil; nominal switching capacity.)
Mechanical characteristics	Shock resistance	Functional	Min. 392 m/s^2 (Half-wave pulse of sine wave: 11 ms; detection time: 10µs.)
		Destructive	Min. 980 m/s^2 (Half-wave pulse of sine wave: 6 ms.)
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 3 mm (Detection time: 10µs.)
		Destructive	10 to 55 Hz at double amplitude of 3 mm
Expected life	Mechanical		Min. 5×10^7 (at 180 times/min.)
	Electrical (resistive load)		2 Form C: Min. 10^5 (15 A 250 V AC [at 20 times/min.]), Min. 10^5 (10 A 30 V DC [at 20 times/min.]) 4 Form C: Min. 10^5 (15 A 250 V AC [at 20 times/min.]), Min. 10^5 (10 A 30 V DC [at 20 times/min.])
Conditions	Conditions for operation, transport and storage*2		Ambient temperature: –50°C to +60°C –58°F to +140°F; Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)
	Max. operating speed		20 times/min. (at rated load)
Unit weight			2 Form C: 50 g 1.76 oz; 4 Form C: 65 g 2.29 oz

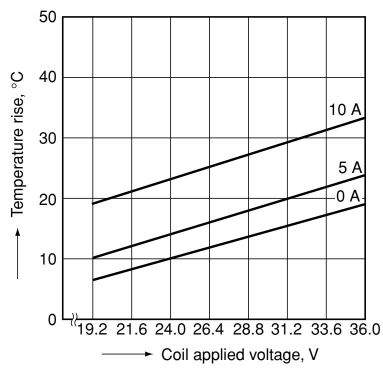
Notes: *1. This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.
*2. The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.

REFERENCE DATA

1.-(1) Coil temperature rise (2 Form C type)
Tested sample: SP2-DC24V

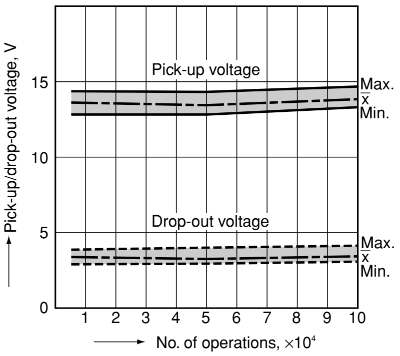


1.-(2) Coil temperature rise (4 Form C type)
Tested sample: SP4-DC24V
Ambient temperature: 27 to 29°C 81 to 84°F

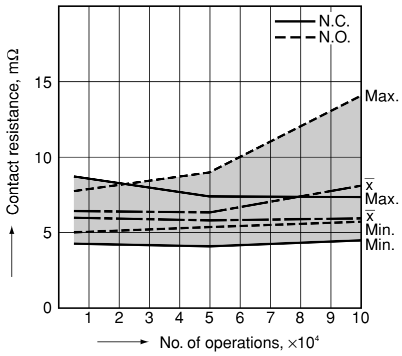


2. Electrical life (SP2, 15 A 250 V AC resistive load)

Change of pick-up and drop-out voltage

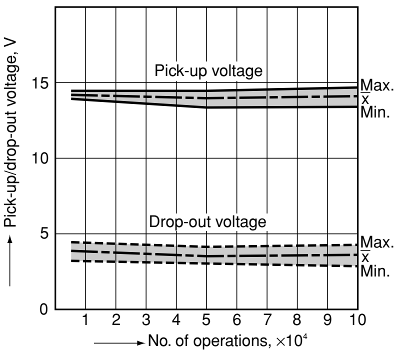


Change of contact resistance

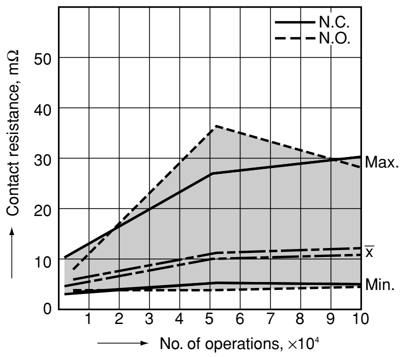


3. Electrical life (SP4, 10 A 250 V AC resistive load)

Change of pick-up and drop-out voltage



Change of contact resistance



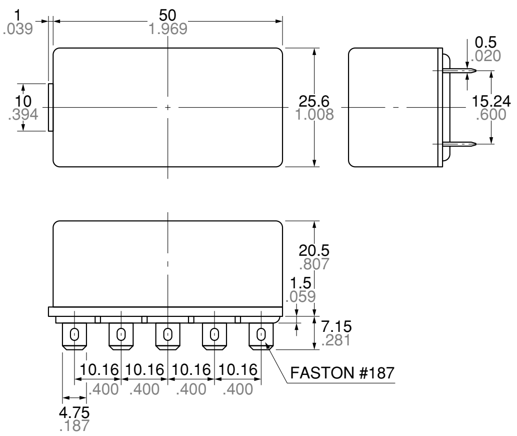
DIMENSIONS (mm inch)

The CAD data of the products with a CAD Data mark can be downloaded from: http://industrial.panasonic.com/ac/e/

2 Form C

1) Plug-in terminal

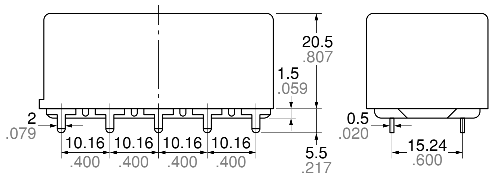
CAD Data External dimensions



General tolerance: ±0.3 ±.012

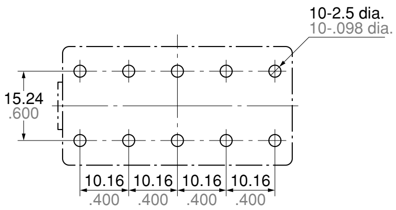
2) PC board type

CAD Data External dimensions



General tolerance: ±0.3 ±.012

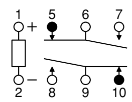
PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

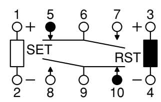
Schematic (Bottom view)

Single side stable type



(Deenergized condition)

2 coil latching type



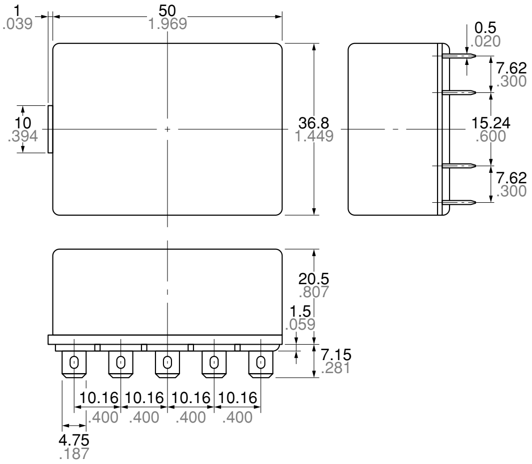
(Reset condition)

Diagram shows the “reset” position when terminals 3 and 4 are energized. Energize terminals 1 and 2 to transfer contacts.

4 Form C

1) Plug-in terminal

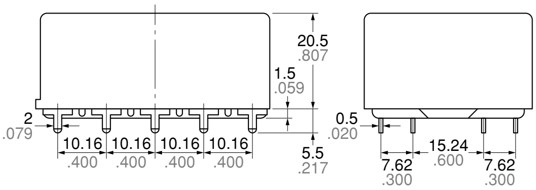
CAD Data External dimensions



General tolerance: ±0.3 ±.012

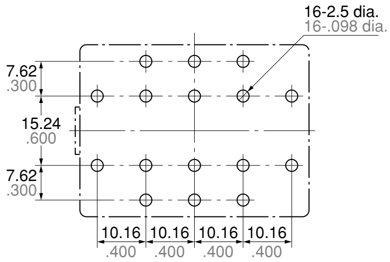
2) PC board type

CAD Data External dimensions



General tolerance: ±0.3 ±.012

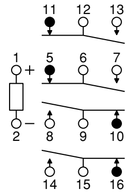
PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

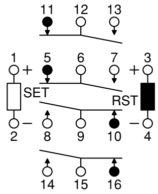
Schematic (Bottom view)

Single side stable type



(Deenergized condition)

2 coil latching type



(Reset condition)

Diagram shows the "reset" position when terminals 3 and 4 are energized. Energize terminals 1 and 2 to transfer contacts.

SAFETY STANDARDS

Item	UL (Recognized)		CSA (Certified)		TÜV (Certified)	
	File No.	Contact rating	File No.	Contact rating	File No.	Rating
2 Form C	E43028	15A 250V AC 1/2HP 125, 250V AC 10A 30V DC	LR26550	15A 250V AC 1/2HP 125, 250V AC 10A 30V DC	B 11 08 13461 308	15A 250V AC (cosϕ=1.0) 10A 30V DC
4 Form C	E43028	10A 250V AC 1/3HP 125, 250V AC 10A 30V DC	LR26550	10A 250V AC 1/3HP 125, 250V AC 10A 30V DC	B 11 08 13461 308	10A 250V AC (cosϕ=1.0) 10A 30V DC

NOTES

1. For cautions for use, please read "GENERAL APPLICATION GUIDELINES" on page B-1.

ACCESSORIES

SP RELAYS TERMINAL SOCKETS

TYPES

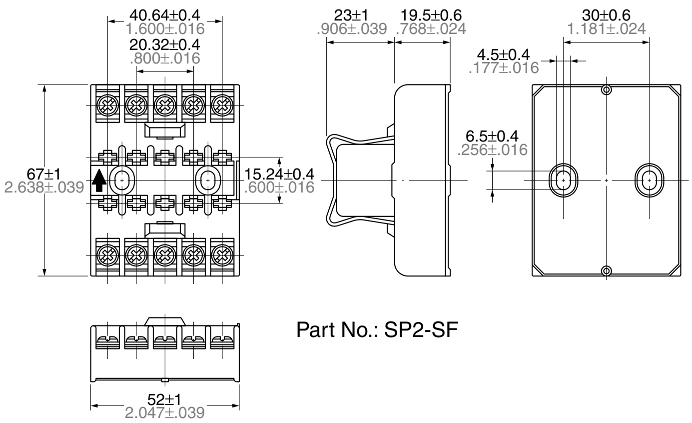
Product name	Part No.
SP2 Terminal socket	SP2-SF
SP4 Terminal socket	SP4-SF

DIMENSIONS (mm inch)

The CAD data of the products with a CAD Data mark can be downloaded from: http://industrial.panasonic.com/ac/e/

SP2 Terminal socket

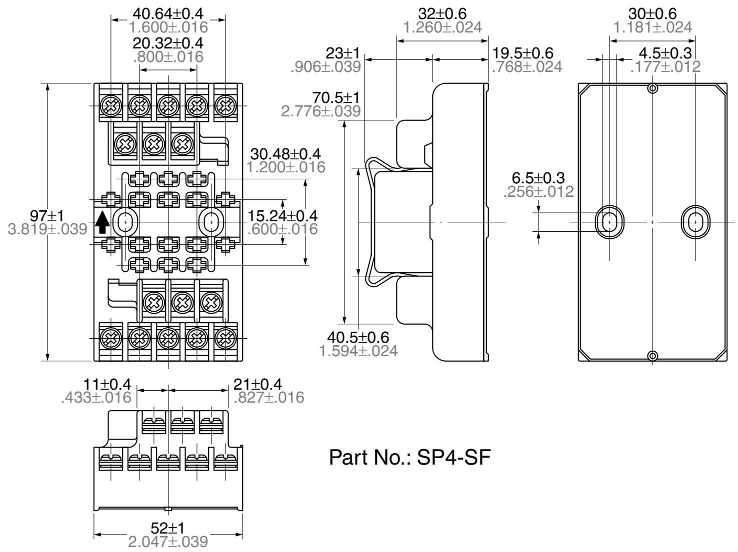
CAD Data



Part No.: SP2-SF

SP4 Terminal socket

CAD Data

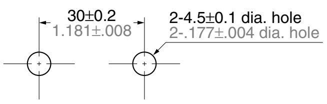


Part No.: SP4-SF

Note: Terminal number marking is on the socket body. Please refer together with the SP relay schematic.

General tolerance: ±0.5 ±.020

Mounting hole diagram



Notes:

(1) Mounting screws and the fastening bracket are included in the package.

(2) Mount the relay with the proper mounting direction — i.e. with the direction of the Ⓜ mark on top of the relay case matching the direction of the Ⓜ mark on the terminal block. (The ⇧ direction of the terminal block is the upward direction of the relay.)

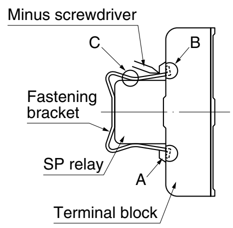
Fastening bracket mounting and removal

1. Mounting

Insert the A part of the fastening bracket into the mounting groove of the terminal block, and then fit the B part into groove, while pressing with the tip of a minus screwdriver.

2. Removal

Slide the B part of the fastening bracket from the groove in the terminal block, while pressing with the tip of a minus screwdriver. While the bracket is in this position, keep pressing the C part of the bracket to the relay side with your finger, and lift up to the left side and remove from the groove, as in the diagram at right.



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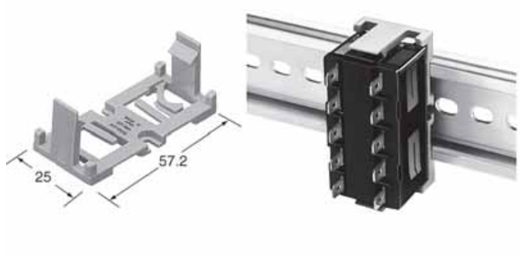
ACCESSORIES	SP RELAYS MOUNTING BOARD



Direct chassis mounting possible, and applicable to DIN rail.

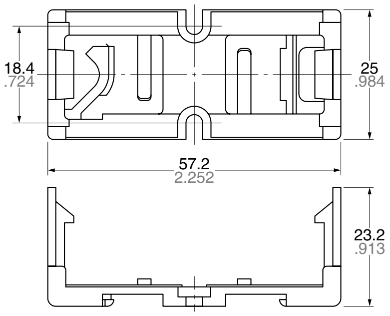
TYPES

Product name	Part No.
Mounting board	SP-MA

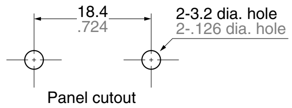
DIMENSIONS (mm inch)

The CAD data of the products with a CAD Data mark can be downloaded from: http://industrial.panasonic.com/ac/e/

CAD Data



Mounting hole diagram

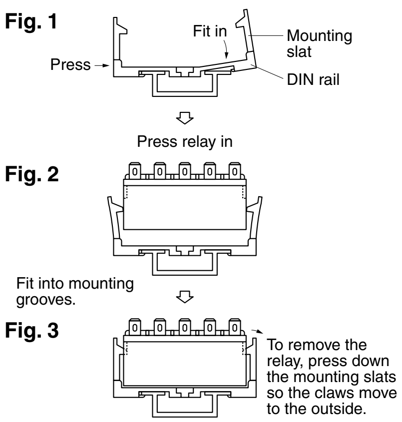


Tolerance: ±0.1 ±.004

Use method

1. Both the SP relay 2 Form C and 4 Form C can be mounted to the mounting slats.
2. Use the mounting slats either by attaching them directly to the chassis, or by mounting with a DIN rail.
1) When attaching directly to chassis
• Use two M3 screws.
• For the mounting pitch, refer to the specification diagram.
2) When mounting on a DIN rail
• Use a 35mm 1.378inch wide DIN rail (DIN46277).
• The mounting method should be as indicated in the diagram at right.

Method for mounting on DIN rail



(1) First fit the arc shaped claw of the mounting slat into the DIN rail.
(2) Press on the side as shown in the diagram below.
(3) Fit in the claw part on the opposite side.

Precautions for use

When mounting to a DIN rail, use a commercially available fastening bracket if there is a need to stop sliding of the mounting slat in the rail direction.

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