



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

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 highsensitivity 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, highcapacity 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.

SP RELAYS

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.

Compliance with RoHS Directive

ORDERING INFORMATION



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 asil valtage	Single side stable	2 coil latching
	Nominal coll voltage	Part No.	Part No.
	3V DC	SP2-DC3V	SP2-L2-DC3V
	5V DC	SP2-DC5V	SP2-L2-DC5V
2 Earm C	6V DC	SP2-DC6V	SP2-L2-DC6V
2 FOIIII G	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.

* For terminal sockets and mounting boards sockets, see page 177 and 178.

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			100mA	30Ω				
5V DC			60.2mA	83Ω				
6V DC	70%V or less of	10%V or more of nominal voltage (Initial)	10%V or more of	10%V or more of	50mA	120Ω	200mW	150%V of
12V DC	(Initial)		25mA	480Ω	3001177	nominal voltage		
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			100mA	100mA	30Ω	30Ω	300mW 300mW	200mW	150%V of nominal voltage
5V DC		70%V or less of nominal voltage (Initial) (Initial)	60.2mA	60.2mA	83Ω	83Ω			
6V DC	70%V or less of		50mA	50mA	120Ω	120Ω			
12V DC	(Initial)		25mA	25mA	480Ω	480Ω		30011177	
24V DC			12.5mA	12.5mA	1,920Ω	1,920Ω			
48V DC			6.2mA	6.2mA	7,680Ω	7,680Ω			

SP

2. Specifications	2.	Sp	eci	ifi	cat	tio	ns
-------------------	----	----	-----	-----	-----	-----	----

z. opecification	13				
Characteristics	Item		Specifications		
	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)		
Contact	Arrangement		2 Form C, 4 Form C		
	Contact resistance (I	nitial)	Max. 30 m Ω (By voltage drop 6 V DC 1A)		
	Contact material		Stationary contact: Au flashed AgSnO2 type, Movable contact: AgSnO2 type		
	Nominal switching ca	pacity (resistive load)	2 Form C: 15 A 250 V AC, 4 Form C: 10 A 250 V AC		
Rating	Max. switching power	r (resistive load)	2 Form C: 3,750 VA, 300 W, 4 Form C: 2,500 VA, 300 W		
	Max. switching voltag	je	2 Form C, 4 Form C: 250 V AC, 30 V DC (48V DC: Max. 2A)		
	Max. switching currer	nt	2 Form C: 15 A (AC) 10 A (DC), 4 Form C: 10 A		
	Minimum operating p	ower	150mW (Single side stable, 2 coil latching)		
	Nominal operating po	ower	300mW (Single side stable, 2 coil latching)		
	Min. switching capac	ity (Reference value)*1	100 mA 5V DC		
	Insulation resistance	(Initial)	Min. 1,000MΩ (at 500V DC)		
	(25°C, 50% relative h	numidity)	Measurement at same location as "Breakdown voltage" section.		
	Broakdown voltago	Between open contacts	1,500 Vrms for 1 min. (Detection current: 10 mA)		
	(Initial)	Between contact and coil	3,000 Vrms for 1 min. (Detection current: 10 mA)		
Electrical		Between contact sets	3,000 Vrms for 1 min. (Detection current: 10 mA)		
characteristics	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.)		
	Oh a shuna sistema s	Functional	Min. 392 m/s ² (Half-wave pulse of sine wave: 11 ms; detection time: 10µs.)		
Mechanical	Shock resistance	Destructive	Min. 980 m/s ² (Half-wave pulse of sine wave: 6 ms.)		
characteristics		Functional	10 to 55 Hz at double amplitude of 3 mm (Detection time: 10µs.)		
	vibration resistance	Destructive	10 to 55 Hz at double amplitude of 3 mm		
	Mechanical		Min. 5×107 (at 180 times/min.)		
Expected life	ected life 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	b	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

Operate and release time (Single side stable) SP2





Coil temperature rise Tested sample: SP2-DC24V Ambient temperature: 20 to 22°C 68 to 72°F





Electrical life

(SP2, 15 A 250 V AC resistive load)

DIMENSIONS (mm inch)

Tested sample: SP4-DC24V

Ambient temperature: 27 to 29°C 81 to 84°F

2 Form C

Plug-in terminal



The CAD data of the products with a CAD Data mark can be downloaded from: http://panasonic-electric-works.net/ac

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

SP

4 Form C PC board type Plug-in terminal CAD Data External dimensions CAD Data External dimensions Schematic (Bottom view) Single side stable 1 .039 50 0.5 20.5 .807 12 Q 13 Q 7.62 1.5 ç **2**. .079 10 .394 0.5 **36.8** 1.449 15.24 <u>10.16 10.16 10.16 10.16</u> • 10 5.5 217 7.62 .62 7.62 0 14 • 16 0 15 General tolerance: ±0.3 ±.012 (Deenergized condition) 20.5 .807 1.5 059 PC board pattern (Bottom view) 2 coil latching 16-2.5 dia. 12 Q 13 Q 7.15 Q Q Ó 7.62 đ 15.24 4.75 7.62 0 14 • 16 0 15 General tolerance: $\pm 0.3 \pm .012$ (Reset condition) 10.16 10.16 10.16 10.16 Tolerance: ±0.1 ±.004

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

SAFETY STANDARDS

ltam	UL/C-UL (Recognized)			CSA (Certified)	TÜV (Certified)	
nem	File No.	Contact rating	File No.	Contact rating	File No.	Rating
2 Form C	E43028	15A 250V AC ½HP 125, 250V AC 10A 30V DC	LR26550 etc.	15A 250V AC ½HP 125, 250V AC 10A 30V DC	B 0303 13461 010	15A 250V AC (cos <i>φ</i> =1.0) 10A 30V DC
4 Form C	E43028	10A 250V AC 1/3HP 125, 250V AC 10A 30V DC	LR26550 etc.	10A 250V AC 1/3HP 125, 250V AC 10A 30V DC	B 0303 13461 010	10A 250V AC (cos <i>φ</i> =1.0) 10A 30V DC

For Cautions for Use.



ACCESSORIES

SP RELAYS TERMINAL SOCKET

B *LR*

LE LE LE

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://panasonic-electric-works.net/ac SP2 Terminal socket **SP4** Terminal socket CAD Data CAD Data 30±0.6 40.64±0.4 40.64±0.4 23±1 19.5±0.6 32±0.6 30±0.6 181+.02 20.32±0.4 20.32±0. 23±1 4.5±0.3 19.5±0.6 4.5±0.4 70.5± 2.776+ 007 6.5±0.4 300 30.48±0.4 67±1 5.24±0.4 በውስው 6.5±0.3 ◍◍◍ 97+1 15 24+0 4 3.8 ിൽൽ @ @ Part No.: SP2-SF 40.5±0.6 11±0.4 21±0.4 827±016 52±1 2.047±.039 Part No.: SP4-SF 52±1

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

General tolerance: $\pm 0.5 \pm .020$

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 \mathbb{M} mark on top of the relay case matching the direction of the \mathbb{M} mark on the terminal block. (The $\widehat{\Box}$ 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.





ACCESSORIES

TYPES

SP RELAYS MOUNTING BOARD

Ð 1R



Product name	Part No.
Mounting board	SP-MA

Direct chassis mounting possible, and applicable to DIN rail.

DIMENSIONS (mm inch)

The CAD data of the products with a CAD Data mark can be downloaded from: http://panasonic-electric-works.net/ac



Mounting hole diagram



Tolerance: $\pm 0.1 \pm .004$

Use method

 Both the SP relay 2 Form C and 4 Form C can be mounted to the mounting slats.
Use the mounting slats either by attaching them directly to the chassis, or by mounting with a DIN rail.
(A) When attaching directly to chassis Use two M3 screws.
For the mounting pitch, refer to the specification diagram.
(B) 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.

Fig. 1 Fit in Mounting slat DIN rail Ð Press relay in Fig. 2 ᠪᢛᡚᢛᡚᢛᢙᢛᢙ <u>5</u>2 Fit into mounting л, arooves Fig. 3 ᢙᢛᡚᢛᡚᢛᡚ To remove the relay, press down the mounting slats so the claws move to the outside.

Method for mounting on DIN rail Fig. 1 Fit in Mounting Slat 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.