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**

TYPICAL APPLICATIONS

1. Electrical power device
2. Robots
3. Railway signal equipment

---

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

SP RELAYS

Protective construction: Dust cover type

(Unit: mm)
ORDERING INFORMATION

TYPES

<table>
<thead>
<tr>
<th>Contact arrangement</th>
<th>Nominal coil voltage</th>
<th>Single side stable</th>
<th>2 coil latching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Part No.</td>
<td>Part No.</td>
</tr>
<tr>
<td>2 Form C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3V DC</td>
<td>SP2-DC3V</td>
<td>SP2-L2-DC3V</td>
<td></td>
</tr>
<tr>
<td>5V DC</td>
<td>SP2-DC5V</td>
<td>SP2-L2-DC5V</td>
<td></td>
</tr>
<tr>
<td>6V DC</td>
<td>SP2-DC6V</td>
<td>SP2-L2-DC6V</td>
<td></td>
</tr>
<tr>
<td>12V DC</td>
<td>SP2-DC12V</td>
<td>SP2-L2-DC12V</td>
<td></td>
</tr>
<tr>
<td>24V DC</td>
<td>SP2-DC24V</td>
<td>SP2-L2-DC24V</td>
<td></td>
</tr>
<tr>
<td>48V DC</td>
<td>SP2-DC48V</td>
<td>SP2-L2-DC48V</td>
<td></td>
</tr>
<tr>
<td>4 Form C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3V DC</td>
<td>SP4-DC3V</td>
<td>SP4-L2-DC3V</td>
<td></td>
</tr>
<tr>
<td>5V DC</td>
<td>SP4-DC5V</td>
<td>SP4-L2-DC5V</td>
<td></td>
</tr>
<tr>
<td>6V DC</td>
<td>SP4-DC6V</td>
<td>SP4-L2-DC6V</td>
<td></td>
</tr>
<tr>
<td>12V DC</td>
<td>SP4-DC12V</td>
<td>SP4-L2-DC12V</td>
<td></td>
</tr>
<tr>
<td>24V DC</td>
<td>SP4-DC24V</td>
<td>SP4-L2-DC24V</td>
<td></td>
</tr>
<tr>
<td>48V DC</td>
<td>SP4-DC48V</td>
<td>SP4-L2-DC48V</td>
<td></td>
</tr>
</tbody>
</table>

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

- Operating characteristics such as 'Operate voltage' and 'Release voltage' are influenced by mounting conditions, ambient temperature, etc.
- Therefore, please use the relay within ±5% of rated coil voltage.
- 'Initial' means the condition of products at the time of delivery.

1) Single side stable

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

2) 2 coil latching

<table>
<thead>
<tr>
<th>Nominal coil voltage</th>
<th>Set voltage (at 20°C 68°F)</th>
<th>Reset voltage (at 20°C 68°F)</th>
<th>Nominal operating current [±10%] (at 20°C 68°F)</th>
<th>Coil resistance [±10%] (at 20°C 68°F)</th>
<th>Nominal operating power</th>
<th>Max. applied voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>3V DC</td>
<td>70%V or less of nominal voltage</td>
<td>70%V or less of nominal voltage</td>
<td>100mA</td>
<td>30Ω</td>
<td>300mW</td>
<td>150%V of nominal voltage</td>
</tr>
<tr>
<td>5V DC</td>
<td>60.2mA</td>
<td>50mA</td>
<td>83Ω</td>
<td>30Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6V DC</td>
<td>50mA</td>
<td>50mA</td>
<td>120Ω</td>
<td>30Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12V DC</td>
<td>25mA</td>
<td>25mA</td>
<td>480Ω</td>
<td>30Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24V DC</td>
<td>12.5mA</td>
<td>12.5mA</td>
<td>1,920Ω</td>
<td>30Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48V DC</td>
<td>6.2mA</td>
<td>6.2mA</td>
<td>7,700Ω</td>
<td>30Ω</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 2. Specifications

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact</strong></td>
<td>Initial contact pressure</td>
<td>2 Form C: Approx. 0.392 N (40 g 1.41 oz), 4 Form C: Approx. 0.196 N (20 g 0.71 oz)</td>
</tr>
<tr>
<td></td>
<td>Arrangement</td>
<td>2 Form C, 4 Form C</td>
</tr>
<tr>
<td></td>
<td>Contact resistance (initial)</td>
<td>Max. 30 mA (By voltage drop 6 V DC 1A)</td>
</tr>
<tr>
<td></td>
<td>Contact material</td>
<td>Stationary contact: Au flashed AgSnO type, Movable contact: AgSnO type</td>
</tr>
<tr>
<td><strong>Rating</strong></td>
<td>Nominal switching capacity (resistive load)</td>
<td>2 Form C: 15 A 250 V AC, 4 Form C: 10 A 250 V AC</td>
</tr>
<tr>
<td></td>
<td>Max. switching power (resistive load)</td>
<td>2 Form C: 3.750 VA, 300 W, 4 Form C: 2.500 VA, 300 W</td>
</tr>
<tr>
<td></td>
<td>Max. switching voltage</td>
<td>2 Form C, 4 Form C: 250 V AC, 30 V DC (48V DC, Max. 2A)</td>
</tr>
<tr>
<td></td>
<td>Max. switching current</td>
<td>2 Form C: 15 A (AC), 10 A (DC), 4 Form C: 10 A</td>
</tr>
<tr>
<td></td>
<td>Nominal operating power</td>
<td>300mW (Single side stable, 2 coil latching)</td>
</tr>
<tr>
<td></td>
<td>Min. switching capacity (reference value)*1</td>
<td>100 mA 5V DC</td>
</tr>
</tbody>
</table>

#### 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.

#### Electrical characteristics

- **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) (Initial)**
  - 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) (Initial)**
  - Max. 20 ms [Max. 30 ms] (Nominal coil voltage applied to the coil, excluding contact bounce time.) (without diode)

#### Mechanical characteristics

- **Shock resistance**
  - Functional: Min. 392 m/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10µs.)
  - Destructive: Min. 980 m/s² (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. 5×10⁷ (at 180 times/min.)

- **Electrical (resistive load)**
  - Min. 10⁷ (15 A 250 V AC [at 20 times/min.]), Min. 10⁷ (10 A 30 V DC [at 20 times/min.])
  - Min. 10⁷ (15 A 250 V AC [at 20 times/min.]), Min. 10⁷ (10 A 30 V DC [at 20 times/min.])

#### Conditions

- **Conditions for operation, transport and storage**
  - 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

### REFERENCE DATA

#### 1.-1(1) Coil temperature rise (2 Form C type)

**Tested sample**: SP2-24V DC

<table>
<thead>
<tr>
<th>Temperature rise (℃)</th>
<th>Coil applied voltage (%V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15A</td>
<td>19.2 21.6 24.0 26.4 28.8 31.2 33.6 36.0</td>
</tr>
<tr>
<td>10A</td>
<td>15A</td>
</tr>
<tr>
<td>5A</td>
<td>10A</td>
</tr>
<tr>
<td>0A</td>
<td>5A</td>
</tr>
</tbody>
</table>

#### 1.-1(2) Coil temperature rise (4 Form C type)

**Tested sample**: SP4-24V DC

<table>
<thead>
<tr>
<th>Temperature rise (℃)</th>
<th>Coil applied voltage (%V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10A</td>
<td>19.2 21.6 24.0 26.4 28.8 31.2 33.6 36.0</td>
</tr>
<tr>
<td>5A</td>
<td>10A</td>
</tr>
<tr>
<td>0A</td>
<td>5A</td>
</tr>
</tbody>
</table>

**Ambient temperature**: 27 to 29°C
2. Electrical life (SP2, 15 A 250 V AC resistive load)

Change of operate and release voltage

Change of contact resistance

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

Change of operate and release voltage

Change of contact resistance

DIMENSIONS (mm)

2 Form C

1) Plug-in terminal

2) PC board type

Schematic (Bottom view)

Single side stable type

(Deenergized condition)

2 coil latching type

PC board pattern (Bottom view)

CAD The CAD data of the products with a "CAD" mark can be downloaded from our Website.
ASCTB208E  201903

4 Form C
1) Plug-in terminal

External dimensions

General tolerance ±0.3

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

Schematic (Bottom view)

2) PC board type

External dimensions

General tolerance ±0.3

PC board pattern (Bottom view)

Tolerance ±0.1

SAFETY STANDARDS

<table>
<thead>
<tr>
<th>Item</th>
<th>UL (Recognized)</th>
<th>CSA (Certified)</th>
<th>TÜV (Certified)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>File No.</td>
<td>Contact rating</td>
<td>File No.</td>
</tr>
<tr>
<td>2 Form C</td>
<td>E43028</td>
<td>15A 250V AC General Use</td>
<td>LR26550</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/3HP 125, 250V AC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10A 30V DC</td>
<td></td>
</tr>
<tr>
<td>4 Form C</td>
<td>E43028</td>
<td>10A 250V AC General Use</td>
<td>LR26550</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/3HP 125, 250V AC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10A 30V DC</td>
<td></td>
</tr>
</tbody>
</table>

NOTES

1. For cautions for use, please read “GENERAL APPLICATION GUIDELINES”.

Please refer to "the latest product specifications" when designing your product.
- Requests to customers:
  https://industrial.panasonic.com/ac/e/salespolicies/

Downloaded from Arrow.com.
**ACCESSORIES**

**SP RELAYS TERMINAL SOCKETS**

### TYPES

<table>
<thead>
<tr>
<th>Product name</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP2 Terminal socket</td>
<td>SP2-SF</td>
</tr>
<tr>
<td>SP4 Terminal socket</td>
<td>SP4-SF</td>
</tr>
</tbody>
</table>

### DIMENSIONS (mm)

**SP2 Terminal socket**

- **CAD**

![CAD diagram of SP2 Terminal socket]

- **General tolerance ±0.5**
- **Part No.: SP2-SF**

**SP4 Terminal socket**

- **CAD**

![CAD diagram of SP4 Terminal socket]

- **General tolerance ±0.5**
- **Part No.: SP4-SF**

### Mounting hole diagram

- **30±0.2**
- **2×φ4.5±0.1**

**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.
Direct chassis mounting possible, and applicable to DIN rail.

### TYPES

<table>
<thead>
<tr>
<th>Product name</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting board</td>
<td>SP-MA</td>
</tr>
</tbody>
</table>

### DIMENSIONS (mm)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.4</td>
<td>±0.1</td>
</tr>
<tr>
<td>2~3.2dia.</td>
<td></td>
</tr>
</tbody>
</table>

General tolerance ±0.5

### Mounting hole diagram

Press relay in

To remove the relay, press down the mounting slats so the claws move to the outside.

### 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.
GUIDELINES FOR POWER RELAYS AND HIGH-CAPACITY DC CUT OFF RELAYS USAGE

For cautions for use, please read “GUIDELINES FOR RELAY USAGE”.
https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp

**Precautions for Coil Input**

- **Long term current carrying**
  A circuit that will be carrying a current continuously for long periods without relay switching operation. (circuits for emergency lamps, alarm devices and error inspection that, for example, revert only during malfunction and output warnings with form B contacts). Continuous, long-term current to the coil will facilitate deterioration of coil insulation and characteristics due to heating of the coil itself.

  For circuits such as these, please use a magnetic-hold type latch relay. If you need to use a single stable relay, use a sealed type relay that is not easily affected by ambient conditions and make a fail-safe circuit design that considers the possibility of contact failure or disconnection.

- **DC Coil operating power**
  Steady state DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5%.

  However, please check with the actual circuit since the electrical characteristics may vary. The rated coil voltage should be applied to the coil and the set/reset pulse time of latching type relay differs for each relays, please refer to the relay's individual specifications.

- **Coil connection**
  When connecting coils of polarized relays, please check coil polarity (+,-) at the internal connection diagram (Schematic). If any wrong connection is made, it may cause unexpected malfunction, like abnormal heat, fire and so on, and circuit do not work. Avoid impressing voltages to the set coil and reset coil at the same time.

**Ambient Environment**

- **Usage, Transport, and Storage Conditions**
  During usage, storage, or transportation, avoid locations subjected to direct sunlight and maintain normal temperature, humidity and pressure conditions.

- **Temperature/Humidity/Pressure**

  **1) Temperature:**
  The tolerance temperature range differs for each relays, please refer to the relay’s individual specifications.

  **2) Humidity:**
  5 to 85 % RH

  **3) Pressure:**
  86 to 106 kPa

- **Dew condensation**
  Condensation occurs when the ambient temperature drops suddenly from a high temperature and humidity, or the relay is suddenly transferred from a low ambient temperature to a high temperature and humidity. Condensation causes the failures like insulation deterioration, wire disconnection and rust etc.

  Panasonic Corporation does not guarantee the failures caused by condensation.

  The heat conduction by the equipment may accelerate the cooling of device itself, and the condensation may occur. Please conduct product evaluations in the worst condition of the actual usage. (Special attention should be paid when high temperature heating parts are close to the device. Also please consider the condensation may occur inside of the device.)

- **Icing**
  Condensation or other moisture may freeze on relays when the temperature become lower than 0°C. This icing causes the sticking of movable portion, the operation delay and the contact conduction failure etc. Panasonic Corporation does not guarantee the failures caused by the icing.

  The heat conduction by the equipment may accelerate the cooling of relay itself and the icing may occur. Please conduct product evaluations in the worst condition of the actual usage.

- **Low temperature and low humidity**
  The plastic becomes brittle if the switch is exposed to a low temperature, low humidity environment for long periods of time.

- **High temperature and high humidity**
  Storage for extended periods of time (including transportation periods) at high temperature or high humidity levels or in atmospheres with organic gases or sulfide gases may cause a sulfide film or oxide film to form on the surfaces of the contacts and/or it may interfere with the functions. Check out the atmosphere in which the units are to be stored and transported.
GUIDELINES FOR POWER RELAYS AND HIGH-CAPACITY DC CUT OFF RELAYS USAGE

**Package**
In terms of the packing format used, make every effort to keep the effects of moisture, organic gases and sulfide gases to the absolute minimum.

**Silicon**
When a source of silicone substances (silicone rubber, silicone oil, silicone coating materials and silicone filling materials etc.) is used around the relay, the silicone gas (low molecular siloxane etc.) may be produced.
This silicone gas may penetrate into the inside of the relay. When the relay is kept and used in this condition, silicone compound may adhere to the relay contacts which may cause the contact failure. Do not use any sources of silicone gas around the relay (Including plastic seal types).

**Others**

**Cleaning**
1) Although the environmentally sealed type relay (plastic sealed type, etc.) can be cleaned, avoid immersing the relay into cold liquid (such as cleaning solvent) immediately after soldering. Doing so may deteriorate the sealing performance.
2) Cleaning with the boiling method is recommended (The temperature of cleaning liquid should be 40°C or lower).
Avoid ultrasonic cleaning on relays. Use of ultrasonic cleaning may cause breaks in the coil or slight sticking of the contacts due to ultrasonic energy.

| Please refer to “the latest product specifications” when designing your product.
| Requests to customers: https://industrial.panasonic.com/ac/e/salespolicies/ |