Signal Relays (2A or less)

GN RELAYS

Product Catalog
**Signal Relays (2A or less)**

## GN RELAYS

### High sensitivity, 100 mW operating power, 2 Form C, 1A, compact size and slim relays

**FEATURES**
- **High sensitivity:**
  - Rated operating power 100 mW (High sensitivity single side stable)
- **Compact size and slim:**
  - Width (5.7 mm) x Length (10.6 mm) x Height (9 mm)
- **Compliant with Telcordia standard:**
  - Surge withstand voltage 2,500 V (between contact and coil)
- **Conform to FCC Part68:**
  - Surge withstand voltage 1,500 V (between open contacts)

**FEATURES**
- **Telecommunications and measurement equipment**
- **Telephone related equipment**
- **Household electrical appliance and Audio Visual equipment**
- **Security equipment**

### ORDERING INFORMATION (PART NO.)

**AGN 2 0**

- **Operating function**
  - 0 : Single side stable
  - 1 : 1 coil latching
  - 6 : High sensitivity single side stable
- **Terminal shape**
  - Nil : Standard PC board terminal
  - A : Surface-mount terminal A type
  - S : Surface-mount terminal S type
- **Type of operation**
  - 0 : Standard type (B.B.M.)
- **Packing style**
  - Nil : Tube packing
  - X : Tape and reel packing (picked from 1/2/3/4-pin side)
  - W : Tape and reel packing (picked from the 5/6/7/8-pin side)
  - Y : Tape and reel packing (picked from the 5/6/7/8-pin side)
  - With humidity indicator and silica gel in moisture proof bag
  - With humidity indicator and silica gel in moisture proof bag

**Rated coil voltage (DC)**
- 1H : 1.5 V, 03
- 2H : 3 V, 4 H
- 4.5 V DC AGN2004H AGN2104H AGN2604H
- 6 V DC AGN2006 AGN2106 AGN2606
- 9 V DC AGN2009 AGN2109 AGN2609
- 12 V DC AGN2012 AGN2112 AGN2612
- 24 V DC AGN2024 AGN2124 AGN2624

**Packing style**
- Nil : Tube packing
- X : Tape and reel packing (picked from 1/2/3/4-pin side)
- W : Tape and reel packing (picked from the 5/6/7/8-pin side)
- Y : Tape and reel packing (picked from the 5/6/7/8-pin side)
  - With humidity indicator and silica gel in moisture proof bag
  - With humidity indicator and silica gel in moisture proof bag

**Rated coil voltage (DC)**
- JH : 1.5V, 03
- 3V : 3V, 4H
- 4.5V : 4.5V, 06
- 6V : 6V, 09
- 9 V : 9V, 12
- 12V : 12V, 24
- 24V : 24V

### TYPES

**PC board terminal**

- **Tube packing**

<table>
<thead>
<tr>
<th>Contact arrangement</th>
<th>Rated coil voltage</th>
<th>Part No.</th>
<th>Standard packing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single side stable</td>
<td>1 coil latching</td>
<td>High sensitive single side stable</td>
</tr>
<tr>
<td>2 Form C</td>
<td>1.5 V DC</td>
<td>AGN2001H</td>
<td>AGN101H</td>
</tr>
<tr>
<td></td>
<td>3 V DC</td>
<td>AGN2003</td>
<td>AGN1003</td>
</tr>
<tr>
<td></td>
<td>4.5 V DC</td>
<td>AGN2004H</td>
<td>AGN104H</td>
</tr>
<tr>
<td></td>
<td>6 V DC</td>
<td>AGN2006</td>
<td>AGN1006</td>
</tr>
<tr>
<td></td>
<td>9 V DC</td>
<td>AGN2009</td>
<td>AGN1009</td>
</tr>
<tr>
<td></td>
<td>12 V DC</td>
<td>AGN2012</td>
<td>AGN1012</td>
</tr>
<tr>
<td></td>
<td>24 V DC</td>
<td>AGN2024</td>
<td>AGN1024</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Carton (1 Tube packing)</th>
<th>Outer carton</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 pcs.</td>
<td>1,000 pcs.</td>
</tr>
</tbody>
</table>

---

*1: The “W” and “Y” at the end of the part number only appears on the inner and outer packing. It does not appear on the relay itself.

*2: Please inquire if you require a relay, between 1.5 and 24 V DC, with a voltage not listed.

*3: Each reel is packed with humidity indicators and silica gel in the moisture proof pack.
### Surface-mount terminal

<table>
<thead>
<tr>
<th>Contact arrangement</th>
<th>Rated coil voltage</th>
<th>Part No.</th>
<th>Standard packing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Single side stable</td>
<td>1 coil latching</td>
</tr>
<tr>
<td>2 Form C</td>
<td>1.5 V DC</td>
<td>AGN200*1H</td>
<td>AGN210*1H</td>
</tr>
<tr>
<td></td>
<td>3 V DC</td>
<td>AGN200*03</td>
<td>AGN210*03</td>
</tr>
<tr>
<td></td>
<td>4.5 V DC</td>
<td>AGN200*4H</td>
<td>AGN210*4H</td>
</tr>
<tr>
<td></td>
<td>6 V DC</td>
<td>AGN200*06</td>
<td>AGN210*06</td>
</tr>
<tr>
<td></td>
<td>9 V DC</td>
<td>AGN200*09</td>
<td>AGN210*09</td>
</tr>
<tr>
<td></td>
<td>12 V DC</td>
<td>AGN200*12</td>
<td>AGN210*12</td>
</tr>
<tr>
<td></td>
<td>24 V DC</td>
<td>AGN200*24</td>
<td>AGN210*24</td>
</tr>
</tbody>
</table>

#### Tape and reel packing: Z

<table>
<thead>
<tr>
<th>Contact arrangement</th>
<th>Rated coil voltage</th>
<th>Part No.</th>
<th>Standard packing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Single side stable</td>
<td>1 coil latching</td>
</tr>
<tr>
<td>2 Form C</td>
<td>1.5 V DC</td>
<td>AGN200*1HZ</td>
<td>AGN210*1HZ</td>
</tr>
<tr>
<td></td>
<td>3 V DC</td>
<td>AGN200*03Z</td>
<td>AGN210*03Z</td>
</tr>
<tr>
<td></td>
<td>4.5 V DC</td>
<td>AGN200*4HZ</td>
<td>AGN210*4HZ</td>
</tr>
<tr>
<td></td>
<td>6 V DC</td>
<td>AGN200*06Z</td>
<td>AGN210*06Z</td>
</tr>
<tr>
<td></td>
<td>9 V DC</td>
<td>AGN200*09Z</td>
<td>AGN210*09Z</td>
</tr>
<tr>
<td></td>
<td>12 V DC</td>
<td>AGN200*12Z</td>
<td>AGN210*12Z</td>
</tr>
<tr>
<td></td>
<td>24 V DC</td>
<td>AGN200*24Z</td>
<td>AGN210*24Z</td>
</tr>
</tbody>
</table>

### Coil data

- Operating characteristics such as “Operate voltage” and “Release voltage” are influenced by mounting conditions or 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.
- Single side stable

<table>
<thead>
<tr>
<th>Rated coil voltage</th>
<th>Operate voltage* (at 20°C)</th>
<th>Release voltage* (at 20°C)</th>
<th>Rated operating current (±10%, at 20°C)</th>
<th>Coil resistance (±10%, at 20°C)</th>
<th>Rated operating power</th>
<th>Max. allowable voltage (at 20°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 V DC</td>
<td>Max. 75% V of rated coil voltage (Initial)</td>
<td>Min. 10% V of rated coil voltage (Initial)</td>
<td>93.8 mA</td>
<td>16 Ω</td>
<td>140 mW</td>
<td>150% V of rated coil voltage</td>
</tr>
<tr>
<td>3 V DC</td>
<td>46.7 mA</td>
<td>64.2 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5 V DC</td>
<td>31 mA</td>
<td>145 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 V DC</td>
<td>23.3 mA</td>
<td>257 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 V DC</td>
<td>15.5 mA</td>
<td>579 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 V DC</td>
<td>11.7 mA</td>
<td>1,028 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 V DC</td>
<td>9.6 mA</td>
<td>2,504 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*square, pulse drive (JIS C 5442)

### 1 coil latching

<table>
<thead>
<tr>
<th>Rated coil voltage</th>
<th>Set voltage* (at 20°C)</th>
<th>Reset voltage* (at 20°C)</th>
<th>Rated operating current (±10%, at 20°C)</th>
<th>Coil resistance (±10%, at 20°C)</th>
<th>Rated operating power</th>
<th>Max. allowable voltage (at 20°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 V DC</td>
<td>Max. 75% V of rated coil voltage (Initial)</td>
<td>Max. 75% V of rated coil voltage (Initial)</td>
<td>66.7 mA</td>
<td>22.5 Ω</td>
<td>100 mW</td>
<td>150% V of rated coil voltage</td>
</tr>
<tr>
<td>3 V DC</td>
<td>33.3 mA</td>
<td>90 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5 V DC</td>
<td>22.2 mA</td>
<td>202.5 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 V DC</td>
<td>16.7 mA</td>
<td>360 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 V DC</td>
<td>11.1 mA</td>
<td>810 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 V DC</td>
<td>8.3 mA</td>
<td>1,440 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 V DC</td>
<td>5 mA</td>
<td>4,800 Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*square, pulse drive (JIS C 5442)
High sensitive single side stable

<table>
<thead>
<tr>
<th>Rated coil voltage (at 20°C)</th>
<th>Operate voltage* (at 20°C)</th>
<th>Release voltage* (at 20°C)</th>
<th>Rated operating current (±10%, at 20°C)</th>
<th>Coil resistance (±10%, at 20°C)</th>
<th>Rated operating power</th>
<th>Max. allowable voltage (at 20°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 V DC</td>
<td>66.7 mA</td>
<td>22.5 Ω</td>
<td>100 mW</td>
<td></td>
<td></td>
<td>150% V of rated coil voltage</td>
</tr>
<tr>
<td>3 V DC</td>
<td>33.3 mA</td>
<td>90 Ω</td>
<td>100 mW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5 V DC</td>
<td>22.2 mA</td>
<td>202.5 Ω</td>
<td>100 mW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 V DC</td>
<td>16.7 mA</td>
<td>360 Ω</td>
<td>100 mW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 V DC</td>
<td>11.1 mA</td>
<td>810 Ω</td>
<td>100 mW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 V DC</td>
<td>8.3 mA</td>
<td>1,440 Ω</td>
<td>100 mW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 V DC</td>
<td>5 mA</td>
<td>4,800 Ω</td>
<td>120 mW</td>
<td></td>
<td></td>
<td>120% V of rated coil voltage</td>
</tr>
</tbody>
</table>

*Square, pulse drive (JIS C 5442)

Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact data</td>
<td></td>
</tr>
<tr>
<td>Contact arrangement</td>
<td>2 Form C</td>
</tr>
<tr>
<td>Contact resistance (initial)</td>
<td>Max. 100 mΩ (by voltage drop 6 V DC 1 A)</td>
</tr>
<tr>
<td>Contact material</td>
<td>AgPd + Au-clad (Stationary contact), AgPd (Movable contact)</td>
</tr>
<tr>
<td>Contact rating (resistive)</td>
<td>1 A 30 V DC, 0.3 A 125 V AC</td>
</tr>
<tr>
<td>Max. switching power (resistive)</td>
<td>30 W (DC), 37.5 VA (AC)</td>
</tr>
<tr>
<td>Max. switching voltage</td>
<td>110 V DC, 125 V AC</td>
</tr>
<tr>
<td>Max. switching current</td>
<td>1 A (DC), 1 A (AC)</td>
</tr>
<tr>
<td>Min. switching load</td>
<td>10 μA 10 mV DC</td>
</tr>
<tr>
<td>Dielectric strength (initial)</td>
<td>Min. 1,000 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)</td>
</tr>
<tr>
<td>Surge withstand voltage (initial)</td>
<td>750 Vrms for 1 min (detection current: 10 mA)</td>
</tr>
<tr>
<td>Between open contacts</td>
<td>1,500 Vrms for 1 min (detection current: 10 mA)</td>
</tr>
<tr>
<td>Between contact and coil</td>
<td>1,000 Vrms for 1 min (detection current: 10 mA)</td>
</tr>
<tr>
<td>Between contact sets</td>
<td>1,000 Vrms for 1 min (detection current: 10 mA)</td>
</tr>
<tr>
<td>Time characteristics (initial)</td>
<td></td>
</tr>
<tr>
<td>Operate (Set) time</td>
<td>Max. 4 ms at rated coil voltage (at 20°C, without bounce)</td>
</tr>
<tr>
<td>Release (Reset) time</td>
<td>Max. 4 ms at rated coil voltage (at 20°C, without bounce, without diode)</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>Functional 750 m/s² (half-sine shock pulse: 6 ms, detection time: 10 μs)</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Functional 1,000 m/s² (half-sine shock pulse: 6 ms)</td>
</tr>
<tr>
<td>Expected life</td>
<td>Functional 10 to 55 Hz (at double amplitude of: 3.3 mm, detection time: 10 μs)</td>
</tr>
<tr>
<td>Conditions</td>
<td>Functional 10 to 55 Hz (at double amplitude of: 5 mm)</td>
</tr>
<tr>
<td>Unit weight</td>
<td>Approx. 1 g</td>
</tr>
</tbody>
</table>

Note: For AC load, please inquire our sales representative for details.

Electrical life

Conditions: resistance load, switching frequency at 20 times / minute.

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching capacity</th>
<th>Number of operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Form C</td>
<td>1 A 30 V DC</td>
<td>Min. 100 × 10^3 ope.</td>
</tr>
<tr>
<td></td>
<td>0.3 A 125 V AC</td>
<td>Min. 100 × 10^3 ope.</td>
</tr>
</tbody>
</table>

1. This value is a rough indication of the lower limit at which switching is possible at micro load level.
2. 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.
3. For ambient temperature, please refer to the “GUIDELINES FOR RELAY USAGE”.
REFERENCE DATA

1. Max. switching capacity

![Graph showing max. switching capacity]

2. Switching life curve

![Graph showing switching life curve]

3. Coil temperature rise value (Average)

Tested sample: AGN2004H, AGN20024, 6 pcs.
Point measured: Inside the coil
Ambient temperature: Room temperature

![Graph showing coil temperature rise value]

4. Ambient temperature characteristics (Average)

Tested sample: AGQ200A4H, 6 pcs.

![Graph showing ambient temperature characteristics]

5. Mechanical life


![Graph showing mechanical life]

6. Electrical life test (1 A 30 V DC Resistive load)

Tested sample: AGN2004H, 6 pcs.
Operating speed: 20 cpm

![Graph showing electrical life test]

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industrial.panasonic.com/ac/e/

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7-1. Operate and release time (without diode)
Tested sample: AGN2004H, 6 pcs.

![Graph showing operate and release time](image)

7-2. Operate and release time (with diode)
Tested sample: AGN2004H, 6 pcs.

![Graph showing operate and release time](image)

8. Functional shock

![Functional shock graph](image)

9-1. Influence of proximity mounting
Tested sample: AGN20012, 6 pcs.

![Graph showing influence of proximity mounting](image)

9-2. Influence of proximity mounting
Tested sample: AGN20012, 6 pcs.

![Graph showing influence of proximity mounting](image)

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**DIMENSIONS**

The CAD data of the products with a “CAD” mark can be downloaded from our Website.  

**PC board terminal**

![PC board terminal diagram](image)

**Recommended PC board pattern**

(BOTTOM VIEW)

![Recommended PC board pattern](image)

**Schematic**

(BOTTOM VIEW)

Single side stable
High sensitive single side stable (De-energize)

![Schematic diagram](image)

1 coil latching (Reset)

![Schematic diagram](image)
Signal Relays (2A or less) GN RELAYS

**Surface-mount terminal**

**CAD**

<table>
<thead>
<tr>
<th>Type</th>
<th>External dimensions</th>
<th>Recommended PC board pattern (TOP VIEW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>![Diagram A]</td>
<td>![Diagram A Pattern]</td>
</tr>
<tr>
<td>S</td>
<td>![Diagram S]</td>
<td>![Diagram S Pattern]</td>
</tr>
</tbody>
</table>

**Packing Style**

**Tube packing**

1. The relay is packing in a tube with the relay orientation mark on the left side, as shown in the figure below. Be sure to maintain relays in the correct orientation when mounting on PC boards.
2. Conditions for operation, transport and storage: -40 to 70°C.

**Taping packaging**

1. **Tape dimensions**
   - **A Type**
     - Relay polarity bar (2 type)
     - GN relays
     - Tape coming out direction
     - General tolerance: ±0.1 mm
   - **S Type**
     - Relay polarity bar (2 type)
     - GN relays
     - Tape coming out direction
     - General tolerance: ±0.1 mm

2. **Dimensions of plastic reel**
   - 21±0.8 dia.
   - 13±0.2 dia.
   - 24±0.4 dia.
   - 2±0.2 dia.
   - 16±0.8 dia.
   - 8±0.4 dia.
   - 4±0.2 dia.

3. **Conditions for operation, transport and storage:** -40 to 70°C.
EXAMPLE OF RECOMMENDED SOLDERING CONDITIONS

For cautions for use, please read “Relay Soldering and Cleaning Guidelines” and “SMT Soldering Guidelines”.

PC board terminal
In case of hand soldering, the following conditions should be observed.
The effect on the relay depends on the PC board used. Please verify the actual PC board to be used.

Automatic soldering (Flow)

<table>
<thead>
<tr>
<th>Recommended conditions</th>
<th>Temperature</th>
<th>Time</th>
<th>Measurement location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preheating</td>
<td>Max. 120°C</td>
<td>Within 120 seconds</td>
<td>Solder surface terminal</td>
</tr>
<tr>
<td>Soldering</td>
<td>260°C ± 5°C</td>
<td>Within 6 seconds</td>
<td>Solder temperature</td>
</tr>
</tbody>
</table>

Hand soldering

<table>
<thead>
<tr>
<th>Recommended conditions</th>
<th>Temperature</th>
<th>Time</th>
<th>Measurement location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soldering</td>
<td>Max. 350°C</td>
<td>Within 3 seconds</td>
<td>Tip temperature</td>
</tr>
</tbody>
</table>

Surface-mount terminal
In case of automatic soldering (reflow), the following conditions should be observed.

<table>
<thead>
<tr>
<th>IRS (infrared reflow soldering method) heating conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of reflow: 1 time</td>
</tr>
<tr>
<td>Measuring position: Surface of PC board where relay is mounted</td>
</tr>
</tbody>
</table>

Mounting cautions
Cautions to observe when mounting temperature increases in the relay are greatly dependent on the way different parts are located on a PC board and the heating method of the reflow device. Therefore, please conduct testing on the actual device beforehand after making sure the parts soldered on the relay terminals and the top of the relay case are within the temperature conditions.

Measuring position of temperature profile

Note: The soldering temperature profile indicates the pad temperature. In some cases, the ambient temperature may be greatly increased. Check for the specific mounting condition.

Other things to observe
- Exceeding the stipulated conditions when soldering may affect coaxial switch performance. Be sure to consult us beforehand.
- Since thermal stress on a relay will depend on the PC board and process conditions, please be sure to test using the actual PC board.
- Creep-up, wettability and solder strength will differ depending on changes in the mounting conditions and type of solder. Please evaluate based on actual production conditions.
- Only apply coating after the relay has returned to room temperature.

SAFETY STANDARDS
Each standard may be updated at any time, so please check our Website for the latest information.

UL/C-UL (Approved)

<table>
<thead>
<tr>
<th>File No.</th>
<th>Contact rating</th>
<th>Operations</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>E43149</td>
<td>1 A 30 V DC General use</td>
<td>100 × 10³</td>
<td>40°C</td>
</tr>
<tr>
<td></td>
<td>0.3 A 110 V DC General use</td>
<td>30 × 10³</td>
<td>40°C</td>
</tr>
<tr>
<td></td>
<td>0.3 A 125 V AC Resistive</td>
<td>100 × 10³</td>
<td>40°C</td>
</tr>
</tbody>
</table>

CSA (Approved)
CSA standard approved by C-UL.

BSI (Approved)
BSI standard approved by File No. VC648944 (basic insulation).
**GUIDELINES FOR USAGE**

For cautions for use, please read “GUIDELINES FOR SIGNAL RELAYS USAGE” and “GUIDELINES FOR RELAY USAGE”.

### Cautions for usage of GN relay

- **Latching**
  - Use latching when conditions involve continuous carrying current.
  - Regarding the set and reset pulse time, for the purpose of reliable operation under ambient temperature fluctuations and different operating conditions, we recommend setting the coil applied set and reset pulse time to 10 ms or more at the rated coil voltage.
  - The relay is shipped in the reset position. But jolts during transport or impacts during installation can change the reset position. It is, therefore, advisable to build a circuit in which the relay can be initialized (set and reset) just after turning on the power.

### Precautions for usage of automatic insertion machine

Set the chucking pressure of the pick-up mechanism by the automatic mounting machine with the pressure shown in table 1 to maintain the internal function of the relay.

- Precautions for usage of automatic insertion machine

  Set the chucking pressure of the pick-up mechanism by the automatic mounting machine with the pressure shown in table 1 to maintain the internal function of the relay.

  Please chuck the portion. Avoid chucking the center of the relay. In addition, excessive chucking pressure to the pinpoint of the relay should be also avoided.

<table>
<thead>
<tr>
<th>Table 1: Chucking pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B and D direction</td>
</tr>
<tr>
<td>C and E direction</td>
</tr>
</tbody>
</table>
GUIDELINES FOR SIGNAL RELAYS USAGE

For precautions 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 latching 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 failsafe 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.

■ Maximum allowable voltage and temperature rise
Proper usage requires that the rated coil voltage be impressed on the coil.
Note, however, that if a voltage greater than or equal to the maximum continuous voltage is impressed on the coil, the coil may burn or its layers short due to the temperature rise.
Furthermore, do not exceed the usable ambient temperature range listed in the catalog.

■ Operate voltage change due to coil temperature rise (hot start)
In DC relays, after continuous passage of current in the coil, if the current is turned OFF, then immediately turned ON again, due to the temperature rise in the coil, the operate voltage will become somewhat higher. Also, it will be the same as using it in a higher temperature atmosphere.
The resistance/temperature relationship for copper wire is about 0.4% for 1°C, and with this ratio the coil resistance increases.
That is, in order to operate of the relay, it is necessary that the voltage be higher than the operate voltage and the operate voltage rises in accordance with the increase in the resistance value.
However, for some polarized relays, this rate of change is considerably smaller.
NOTES

Usage, Storage, and Transport Conditions

Usage, storage, or transportation, avoid locations subject to direct sunlight and maintain normal temperature, humidity, and pressure conditions.

The allowable specifications for environments suitable for usage, storage, and transportation are given below.

1) Temperature: The allowable temperature range differs for each relay, so refer to the relay's individual specifications.

   In addition, when transporting or storing relays while they are tube packaged, there are cases when the temperature may differ from the allowable range. In this situation, be sure to consult the individual specifications.

2) Humidity: 5 to 85% RH

   The humidity range varies with the temperature.

   Use within the range indicated in the graph.

   (The allowable temperature depends on the relays.)

3) Pressure: 86 to 106 kPa

   - Condensation
     Condensation occurs when the ambient temperature drops suddenly from a high temperature and humidity, or the relay and microwave device 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 Industry Co., Ltd. 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 Industry Co., Ltd. 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.

   - 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.
GUIDELINES FOR SIGNAL RELAYS USAGE

- Storage requirements
  Since the surface-mount terminal type is sensitive to humidity, it is packaged with tightly sealed anti-humidity packaging. However, when storing, please be careful of the following.
  1) Please use promptly once the anti-humidity pack is opened.
    (within 72 hours, Max. 30°C / 70% RH).
    If left with the pack open, the relay will absorb moisture which will cause thermal stress when reflow mounting and thus cause the case to expand. As a result, the seal may break.
  2) If relays will not be used within 72 hours, please store relays in a humidity controlled desiccator or in an anti-humidity bag to which silica gel has been added.
    * If the relay is to be soldered after it has been exposed to excessive humidity atmosphere, cracks and leaks can occur.
    Be sure to mount the relay under the required mounting conditions.
  3) When relays (which is packaged with humidity indicator and silica gel) meeting one of below criteria, please bake (dry) before use.
    - When the storage conditions specified in 1) are exceeded.
    - When humidity indicator is in III or IV status according to judgement standard.

<How to judge>
Please check humidity indicator color and decide if baking is necessary or not.
● : indicate brown, ○ : Other than brown (blueish color)

<table>
<thead>
<tr>
<th></th>
<th>5%</th>
<th>10%</th>
<th>60%</th>
<th>Bake treatment necessity judgment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>No need to bake</td>
</tr>
<tr>
<td>II</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>No need to bake</td>
</tr>
<tr>
<td>III</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>Need to bake</td>
</tr>
<tr>
<td>IV</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>Need to bake</td>
</tr>
</tbody>
</table>

- 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).

- NOx Generation
  When relay is used in an atmosphere high in humidity to switch a load which easily produces an arc, the NOx created by the arc and the water absorbed from outside the relay combine to produce nitric acid.
  This corrodes the internal metal parts and adversely affects operation.
  Avoid use at an ambient humidity of 85% RH or higher (at 20°C).
  If use at high humidity is unavoidable, please contact our sales representative.

4) The following cautionary label is affixed to the anti-humidity pack.

**Caution**
This vacuum-sealed bag contains **Moisture Sensitive Products**
After this bag is opened, the product must be used **within 72 hours**
If product is not used within 72 hours, baking is necessary.
For baking conditions please contact us.

- **Baking (Drying) conditions**
  - With reel: 45°C, 96 hours or more.
  - Without reel (including relay only): 60°C, 35 hours or more.
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) Surface-mount terminal type relay is sealed type and it can be cleaned by immersion. Use pure water or alcohol-based cleaning solvent.

3) 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 the ultrasonic energy.

Please refer to "the latest product specifications" when designing your product.

• Requests to customers:
  https://industrial.panasonic.com/ac/e/salespolicies/