



**Discontinued**  
Last time buy: August 31, 2012

**Panasonic**  
ideas for life

**1.5 GHz  
MICROWAVE RELAYS**

**RK RELAYS**



**RoHS compliant**

## FEATURES

### 1. Excellent high frequency characteristics

|                               |                              |                  |
|-------------------------------|------------------------------|------------------|
| Impedance<br>50Ω<br>(Initial) | V.S.W.R. (Max.)              | 1.5 (at 900 MHz) |
|                               | Insertion loss<br>(dB. Max.) | 0.3 (at 900 MHz) |
| Impedance<br>75Ω<br>(Initial) | Isolation<br>(dB. Min.)      | 60 (at 1.5 GHz)  |
|                               | V.S.W.R. (Max.)              | 1.2 (at 900 MHz) |
| Impedance<br>75Ω<br>(Initial) | Insertion loss<br>(dB. Max.) | 0.2 (at 900 MHz) |
|                               | Isolation<br>(dB. Min.)      | 60 (at 1.5 GHz)  |

### 2. High sensitivity in small size

Size: 20.2 × 11.2 × 9.7 mm

.795 × .441 × .382 inch

Nominal power consumption:

200 mW (single side stable type, 1 coil latching)

### 3. Sealed construction for automatic cleaning

### 4. Reversed contact types and latching types (1 coil latching/2 coil latching) are also available

## TYPICAL APPLICATIONS

#### • Audio visual equipment

Broadcast satellite tuners VCRs, CATVs, TVs

#### • Communication equipment

Automobile telephones, maritime telephones, emergency and disaster prevention communications, PCM switches

#### • Instrumentation

Testing equipment, measuring equipment

If you wish to use in applications with low level loads or with high frequency switching, please consult us.

## ORDERING INFORMATION

RK □ - □ - □

Contact arrangement

1: Standard contact type  
1R: Reversed contact type

Operating function

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

Coil voltage, DC

3, 4.5, 5, 6, 9, 12, 24 V

Notes: 1. For transistor drive with 5 V circuits, we recommend the 4.5 V type in order to take into account voltage drops.  
2. No part number distinguishment on impedance in RK relays.

## TYPES

### 1. Standard type

| Contact arrangement | Nominal coil voltage | Single side stable type | 1 coil latching type | 2 coil latching type |
|---------------------|----------------------|-------------------------|----------------------|----------------------|
|                     |                      | Part No.                | Part No.             | Part No.             |
| 1 Form C            | 3 V DC               | RK1-3V                  | RK1-L-3V             | RK1-L2-3V            |
|                     | 4.5V DC              | RK1-4.5V                | RK1-L-4.5V           | RK1-L2-4.5V          |
|                     | 5 V DC               | RK1-5V                  | RK1-L-5V             | RK1-L2-5V            |
|                     | 6 V DC               | RK1-6V                  | RK1-L-6V             | RK1-L2-6V            |
|                     | 9 V DC               | RK1-9V                  | RK1-L-9V             | RK1-L2-9V            |
|                     | 12 V DC              | RK1-12V                 | RK1-L-12V            | RK1-L2-12V           |
|                     | 24 V DC              | RK1-24V                 | RK1-L-24V            | RK1-L2-24V           |

Standard packing: 50 pcs. in an inner package; 500 pcs. in an outer package



**2. Reversed type**

| Contact arrangement    | Nominal coil voltage | Single side stable type | 1 coil latching type | 2 coil latching type |
|------------------------|----------------------|-------------------------|----------------------|----------------------|
|                        |                      | Part No.                | Part No.             | Part No.             |
| 1 Form C reversed type | 3 V DC               | RK1R-3V                 | RK1R-L-3V            | RK1R-L2-3V           |
|                        | 4.5V DC              | RK1R-4.5V               | RK1R-L-4.5V          | RK1R-L2-4.5V         |
|                        | 5 V DC               | RK1R-5V                 | RK1R-L-5V            | RK1R-L2-5V           |
|                        | 6 V DC               | RK1R-6V                 | RK1R-L-6V            | RK1R-L2-6V           |
|                        | 9 V DC               | RK1R-9V                 | RK1R-L-9V            | RK1R-L2-9V           |
|                        | 12 V DC              | RK1R-12V                | RK1R-L-12V           | RK1R-L2-12V          |
|                        | 24 V DC              | RK1R-24V                | RK1R-L-24V           | RK1R-L2-24V          |

Standard packing: 50 pcs. in an inner package; 500 pcs. in an outer package

**RATING**

**1. Coil data**

1) Single side stable type

| 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 (at 60°C 140°F) |
|----------------------|---|---|---|---------------------------------------|-------------------------|--------------------------------------|
| 3 V DC               | 75%V or less of nominal voltage (Initial) | 10%V or more of nominal voltage (Initial) | 66.7mA  | 45Ω                                   | 200mW                   | 110%V of nominal voltage             |
| 4.5V DC              |   |   | 44.4mA  | 101Ω                                  |                         |                                      |
| 5 V DC               |   |   | 40.0mA  | 125Ω                                  |                         |                                      |
| 6 V DC               |   |   | 33.3mA  | 180Ω                                  |                         |                                      |
| 9 V DC               |   |   | 22.2mA  | 405Ω                                  |                         |                                      |
| 12 V DC              |   |   | 16.7mA  | 720Ω                                  |                         |                                      |
| 24 V DC              |   |   | 8.3mA   | 2,880Ω                                |                         |                                      |

2) 1 coil latching type

| 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 (at 60°C 140°F) |
|----------------------|---|---|---|---------------------------------------|-------------------------|--------------------------------------|
| 3 V DC               | 75%V or less of nominal voltage (Initial) | 75%V or less of nominal voltage (Initial) | 66.7mA  | 45Ω                                   | 200mW                   | 110%V of nominal voltage             |
| 4.5V DC              |   |   | 44.4mA  | 101Ω                                  |                         |                                      |
| 5 V DC               |   |   | 40.0mA  | 125Ω                                  |                         |                                      |
| 6 V DC               |   |   | 33.3mA  | 180Ω                                  |                         |                                      |
| 9 V DC               |   |   | 22.2mA  | 405Ω                                  |                         |                                      |
| 12 V DC              |   |   | 16.7mA  | 720Ω                                  |                         |                                      |
| 24 V DC              |   |   | 8.3mA   | 2,880Ω                                |                         |                                      |

3) 2 coil latching type

| 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 (at 60°C 140°F) |
|----------------------|---|---|---|------------|---------------------------------------|------------|-------------------------|------------|--------------------------------------|
|                      |   |   | Set coil  | Reset coil | Set coil                              | Reset coil | Set coil                | Reset coil |                                      |
| 3 V DC               | 75%V or less of nominal voltage (Initial) | 75%V or less of nominal voltage (Initial) | 133.3mA   | 133.3mA    | 22.5Ω                                 | 22.5Ω      | 400mW                   | 400mW      | 110%V of nominal voltage             |
| 4.5V DC              |   |   | 88.9mA  | 88.9mA     | 50.6Ω                                 | 50.6Ω      |                         |            |                                      |
| 5 V DC               |   |   | 80.0mA  | 80.0mA     | 62.5Ω                                 | 62.5Ω      |                         |            |                                      |
| 6 V DC               |   |   | 66.7mA  | 66.7mA     | 90.0Ω                                 | 90.0Ω      |                         |            |                                      |
| 9 V DC               |   |   | 44.4mA  | 44.4mA     | 202.5Ω                                | 202.5Ω     |                         |            |                                      |
| 12 V DC              |   |   | 33.3mA  | 33.3mA     | 360.0Ω                                | 360.0Ω     |                         |            |                                      |
| 24 V DC              |   |   | 16.7mA  | 16.7mA     | 1,440.0Ω                              | 1,440.0Ω   |                         |            |                                      |



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## 2. Specifications

| Characteristics  | Item   | Specifications   |   |
|--|--|--|---|
| Contact  | Arrangement                                      | 1 Form C   |   |
|  | Contact material                                 | Stationary: Gold plating, Movable: Gold clad                   |   |
|  | Initial contact resistance, max.                 | Max. 100mΩ (By voltage drop 10V AC 10mA)                       |   |
| Rating   | Nominal switching capacity                       | 0.01A 24V DC (resistive load), 10 W (at 1.2GHz, Impedance 50Ω) |   |
|  | Contact carrying power                           | 10W (at 1.2GHz, Impedance 50Ω)                                 |   |
|  | Max. switching voltage                           | 30V DC   |   |
|  | Max. switching current                           | 0.5A   |   |
|  | Nominal operating power                          | Single side stable   | 200mW   |
|  |  | 1 coil latching  | 200mW   |
| 2 coil latching  |  | 400mW  |   |
| High frequency characteristics (Initial) (Impedance 50Ω) | V.S.W.R.   | Max. 1.5 (at 900MHz)   |   |
|  | Insertion loss                                   | Max. 0.3dB (at 900MHz)   |   |
|  | Isolation  | Min. 60dB (at 1.5GHz)  |   |
| High frequency characteristics (Initial) (Impedance 75Ω) | V.S.W.R.   | Max. 1.2 (at 900MHz)   |   |
|  | Insertion loss                                   | Max. 0.2dB (at 900MHz)   |   |
|  | Isolation  | Min. 60dB (at 1.5GHz)  |   |
| Electrical characteristics                               | Insulation resistance (Initial)                  |  | Min. 100MΩ (at 500V DC)<br>Measurement at same location as "Initial breakdown voltage" section.   |
|  | Breakdown voltage (Initial)                      | Between open contacts  | 500 Vrms for 1min. (Detection current: 10mA)  |
|  |  | Between contact and coil                                       | 1,000 Vrms for 1min. (Detection current: 10mA)  |
|  |  | Between contact and earth terminal                             | 500 Vrms for 1min. (Detection current: 10mA)  |
|  | Temperature rise (at 20°C)                       |  | Max. 60°C (By resistive method, nominal voltage applied to the coil and at nominal switching capacity)  |
|  | Operate time [Set time] (at 20°C)                |  | Max. 10ms (Approx. 6ms) [Max. 10ms [Approx. 5ms] (Nominal operating voltage applied to the coil, excluding contact bounce time.)                |
|  | Release time [Reset time] (at 20°C)              |  | Max. 6ms (Approx. 3ms) [Max. 10ms [Approx. 5ms] (Nominal operating voltage applied to the coil, excluding contact bounce time.) (without diode) |
| Mechanical characteristics                               | Shock resistance                                 | Functional   | Min. 196 m/s <sup>2</sup> {20 G} (Half-wave pulse of sine wave: 11ms; detection time: 10μs.)  |
|  |  | Destructive  | Min. 980 m/s <sup>2</sup> {100 G} (Half-wave pulse of sine wave: 6ms.)  |
|  | Vibration resistance                             | Functional   | 10 to 55 Hz at double amplitude of 3mm (Detection time: 10μs.)  |
|  |  | Destructive  | 10 to 55 Hz at double amplitude of 5mm  |
| Expected life  | Mechanical                                       |  | Min. 5×10 <sup>6</sup> (at 180 cpm)   |
|  | Electrical (rated load)                          |  | Min. 3×10 <sup>6</sup> (10mA 24V DC (resistive load)), Min. 10 <sup>6</sup> (10W, 1.2GHz, Impedance 50Ω)  |
| Conditions   | Conditions for operation, transport and storage* |  | Ambient temperature: -40°C to +70°C -40°F to +158°F<br>Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)                 |
| Unit weight  |  |  | Approx. 4.4 g .155 oz   |

Note: \* The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. Refer to [6] AMBIENT ENVIRONMENT in GENERAL APPLICATION GUIDELINES.

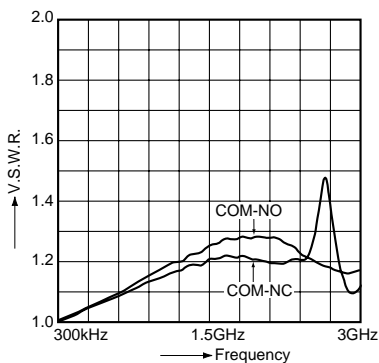
## REFERENCE DATA

1.-(1) High frequency characteristics (Impedance 75Ω)

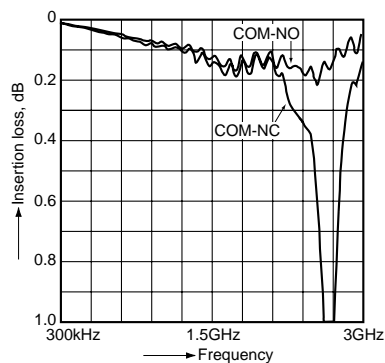
Sample: RK1-12V

Measuring method: Measured with HP network analyzer (HP8753C)

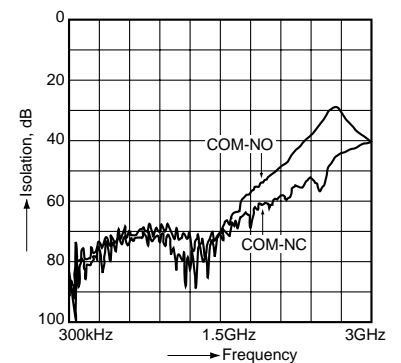
• V.S.W.R. characteristics



• Insertion loss characteristics



• Isolation characteristics



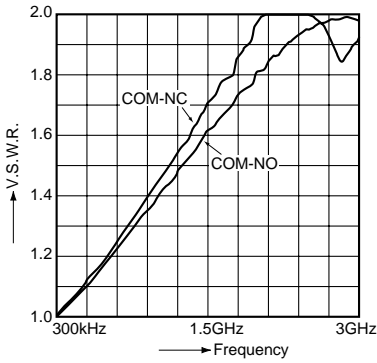


1.-(2) High frequency characteristics (Impedance 50Ω)

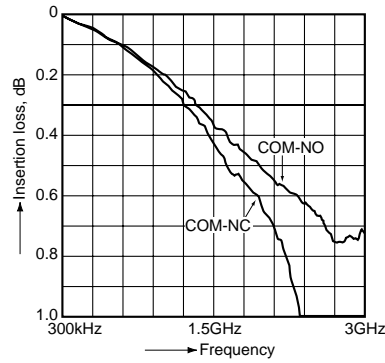
Sample: RK1-5V

Measuring method: Measured with HP network analyzer (HP8753C)

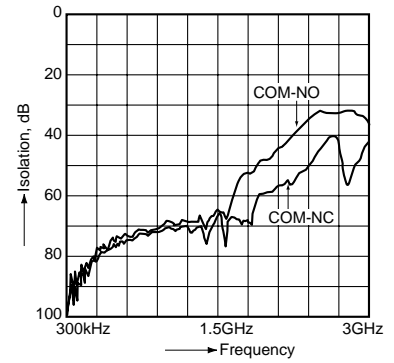
• V.S.W.R. characteristics



• Insertion loss characteristics



• Isolation characteristics



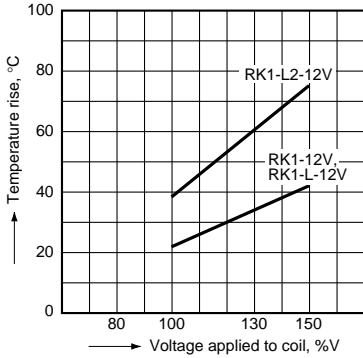
2. Coil temperature rise

Sample: RK1-12V, RK1-L-12V, RK1-L2-12V

No. of samples: n = 6

Carrying current: 10 mA

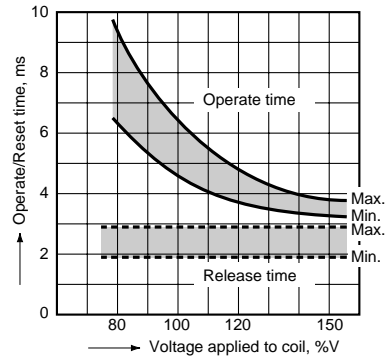
Ambient temperature: 25°C 77°F



3.-(1) Operate/Release time

(Single side stable)

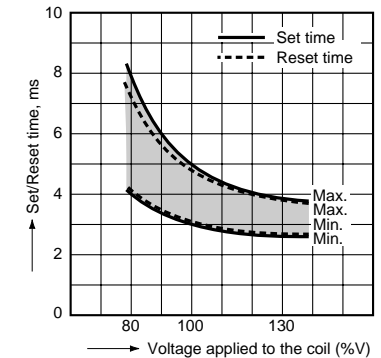
Sample: RK1-12V; No. of samples: n = 6



3.-(2) Set/Reset time (Latching)

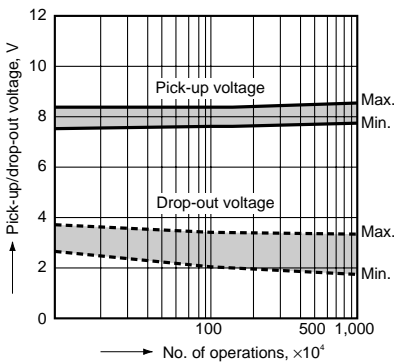
Sample: RK1-L-12V, RK1-L2-12V

No. of samples: n = 12



4.-(1) Mechanical life test (Single side stable)

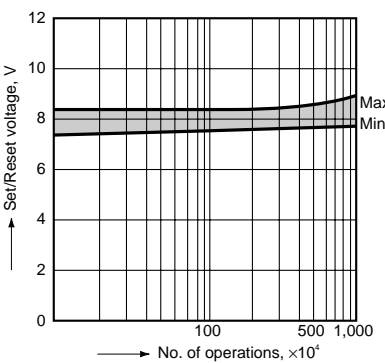
Sample: RK1-12V; No. of samples: n = 12



4.-(2) Mechanical life test (Latching)

Sample: RK1-L2-12V

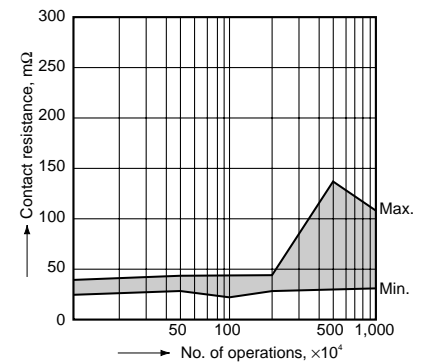
No. of samples: n = 12



4.-(3) Mechanical life test

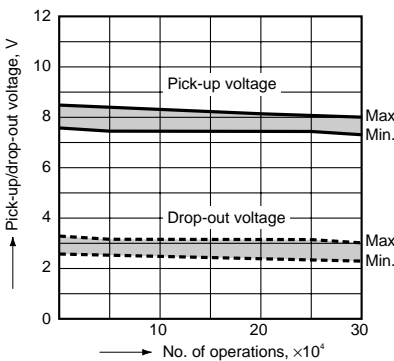
Sample: RK1-12V

No. of samples: n = 20 (20 × 2 contacts)



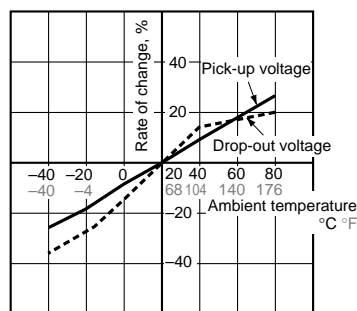
5. Electrical life test (0.01 A 24 V DC)

Sample: RK1-12V; No. of samples: n = 6



6. Ambient temperature characteristics

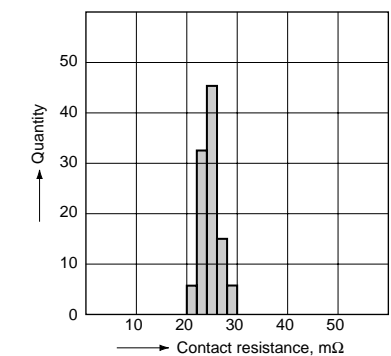
Sample: RK1-12V; No. of samples: n = 6



7. Contact resistance distribution (initial)

Sample: RK1-12V

No. of samples: n = 50 (50 × 2 contacts)



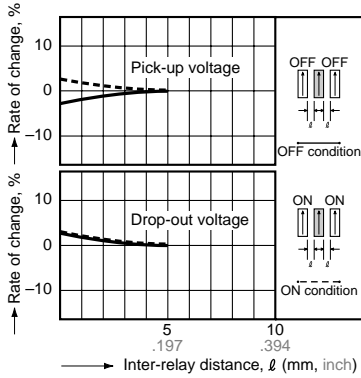


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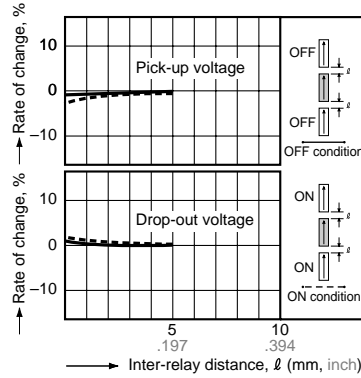
8.-(1) Influence of adjacent mounting

Sample: RK1-12V; No. of sample: n = 10



8.-(2) Influence of adjacent mounting

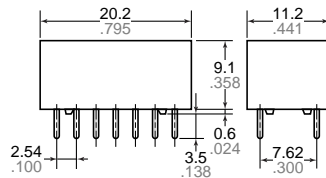
Sample: RK1-12V; No. of samples: n = 10



**DIMENSIONS** (mm inch)

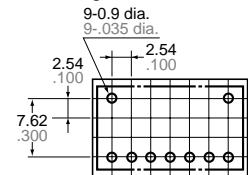
The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://industrial.panasonic.com/ac/e>

**CAD Data**

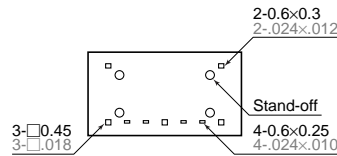


PC board pattern (Bottom view)

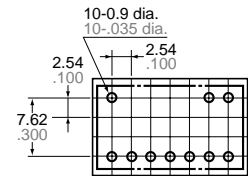
Single side stable and 1 coil latching



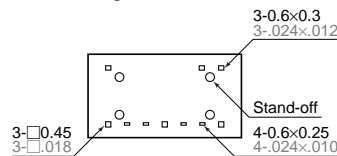
Single side stable and 1 coil latching



2 coil latching



2 coil latching

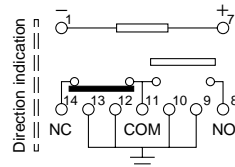


Tolerance:  $\pm 0.1 \pm 0.003$

General tolerance:  $\pm 0.3 \pm 0.012$

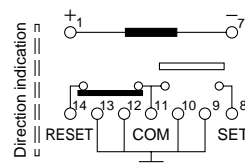
Schematic (Bottom view)

Single side stable



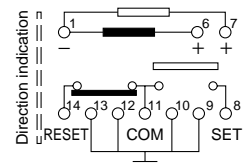
(Deenergized condition)

1 coil latching



(Reset condition)

2 coil latching



(Reset condition)

**NOTES**

**1. Coil operating power**

Pure 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, check it with the actual circuit since the characteristics may be slightly different. The nominal operating voltage should be applied to the coil for more than 20 ms to set/reset the latching type relay.

**2. Coil connection**

When connecting coils, refer to the wiring diagram to prevent mis-operation or malfunction.

**3. External magnetic field**

Since RK relays are highly sensitive polarized relays, their characteristics will be affected by a strong external magnetic field. Avoid using the relay under that condition.

**4. Soldering and cleaning**

1) Perform manual soldering under the conditions below.

- Within 10 s at 260°C 500°F
- Within 3 s at 350°C 662°F

Preheat according to the following conditions.

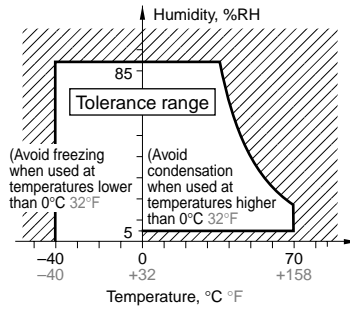
|             |                     |
|-------------|---------------------|
| Temperature | 120°C 248°F or less |
| Time        | Within 2 minute     |

Soldering should be done at 260±5°C 500±9°F within 6 s.

2) For automatic cleaning, the boiling method is recommended. Avoid ultrasonic cleaning which subjects the relays to high frequency vibrations, which may cause the contacts to stick. It is recommended that alcoholic solvents be used.

**5. Conditions for operation, transport and storage conditions**

- 1) Ambient temperature, humidity, and atmospheric pressure during usage, transport, and storage of the relay:
  - (1) Temperature: -40 to +70°C -40 to +158°F
  - (2) Humidity: 5 to 85% RH (Avoid freezing and condensation.) The humidity range varies with the temperature. Use within the range indicated in the graph below.
  - (3) Atmospheric pressure: 86 to 106 kPa
- Temperature and humidity range for usage, transport, and storage:



2) Condensation

Condensation forms when there is a sudden change in temperature under high temperature and high humidity conditions. Condensation will cause deterioration of the relay insulation.

3) Freezing

Condensation or other moisture may freeze on the relay when the temperature is lower than 0°C 32°F. This causes problems such as sticking of movable parts or operational time lags.

4) Low temperature, low humidity environments

The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

**6. Latching relay**

In order to assure proper operating regardless of changes in the ambient usage temperature and usage conditions, nominal operating voltage should be applied to the coil for more than 30 ms to set/reset the latching type relay.

**For general cautions for use, please refer to the “General Application Guidelines”.**