

# NAIS

## MINIATURE RELAY FOR WIDER APPLICATIONS

# HJ-RELAYS



### FEATURES

- **2 contact arrangements**  
4 Form C (for 5 A 250 V AC),  
2 Form C (for 7 A 250 V AC),
- **Same footprint as our popular HC Relay**
- **Environmentally friendly Cd-free contacts**
- **Coil breakdown detection function (AC type with LED only)**
- **Convenient Screw terminal sockets with finger protection also available**

### TYPICAL APPLICATIONS

- Control panels
- Power supply units
- Molding machines
- Machine tools
- Welding equipment
- Agricultural equipment
- Office equipment
- Vending machines
- Communications equipment
- Amusement machines

### ORDERING INFORMATION

Ex. HJ  -  -

| Contact arrangement        | Operation indication                                  | Coil voltage   |
|----------------------------|---|--|
| 2: 2 Form C<br>4: 4 Form C | Nil: Without LED indication<br>L: With LED indication | AC 12, 24, 48, 100, 120, 200,<br>220/240 V<br>DC 12, 24, 48, 110 V |

### SPECIFICATIONS

#### Contacts

| Arrangement   |   | 2 Form C   | 4 Form C   |
|---|---|--|--|
| Initial contact resistance, max. (By voltage drop 6 V DC 1 A) |   | 50mΩ   |  |
| Contact material  |   | Silver alloy   |  |
| Rating (resistive load)                                       | Nominal switching capacity              | 7A 250V AC,<br>5A 250V AC  | 5A 250V AC,<br>3A 250V AC  |
|   | Max. switching power                    | 1,750 VA   | 1,250 VA   |
|   | Max. switching voltage                  | 250 V AC   |  |
|   | Max. switching current                  | 7 A  | 5 A  |
| Expected life (min. operations)                               | Mechanical (at 180 cpm)                 | 2 × 10 <sup>7</sup>  |  |
|   | Electrical (at 20 cpm) (resistive load) | 10 <sup>2</sup><br>(7A 250 V AC)<br>2 × 10 <sup>2</sup><br>(5A 250 V AC) | 10 <sup>2</sup><br>(5A 250 V AC)<br>2 × 10 <sup>2</sup><br>(3A 250 V AC) |

#### Coil

|                         |             |
|-------------------------|-------------|
| Nominal operating power | 0.9W 1.2V A |
|-------------------------|-------------|

#### Remarks

- \* Specifications will vary with foreign standards certification ratings.
- \*1 Measurement at same location as "Initial breakdown voltage" section
- \*2 Detection current: 10mA
- \*3 Excluding contact bounce time
- \*4 For the AC coil types, the operate/release time will differ depending on the phase.
- \*5 Half-wave pulse of sine wave: 11ms; detection time: 10μs
- \*6 Half-wave pulse of sine wave: 6ms
- \*7 Detection time: 10μs
- \*8 Refer to 4. Conditions for operation, transport and storage mentioned in NOTES

#### Characteristics

|  |                          | 2 Form C                                  | 4 Form C               |
|--|--------------------------|---|------------------------|
| Max. operating speed   |                          | 20 cpm (at max. rating)                   |                        |
| Initial insulation resistance*1  |                          | Min. 100 MΩ at 500 V DC                   |                        |
| Initial breakdown voltage*2  | Between open contacts    | 1,000 Vrms for 1 min.                     |                        |
|  | Between contact sets     | 2,000 Vrms for 1 min.                     |                        |
|  | Between contact and coil | 2,000 Vrms for 1 min.                     |                        |
| Operate time*3 (at nominal voltage)  |                          | Max. 20 ms*4                              |                        |
| Release time (without diode)*3 (at nominal voltage)  |                          | Max. 20 ms*4                              |                        |
| Temperature rise, max. (at 70°C) (at nominal voltage)  |                          | 60°C                                      |                        |
| Shock resistance   | Functional*5             | Min. 100 m/s <sup>2</sup> {10 G}          |                        |
|  | Destructive*6            | Min. 1,000 m/s <sup>2</sup> {100 G}       |                        |
| Vibration resistance   | Functional*7             | 10 to 55 Hz at double amplitude of 1.0 mm |                        |
|  | Destructive              | 10 to 55 Hz at double amplitude of 1.0 mm |                        |
| Conditions for operation, transport and storage*8 (Not freezing and condensing at low temperature) | Ambient temp.            | -40°C to +70°C<br>-40°F to +158°F         |                        |
|  | Humidity                 | 5 to 85% R.H.                             |                        |
| Unit weight  |                          | Approx. 31g<br>1.09 oz                    | Approx. 32g<br>1.13 oz |

## TYPES

### 1. Plug-in type

| Coil voltage | 2 Form C       | 4 Form C       | Packing quantity |              |
|--------------|----------------|----------------|------------------|--------------|
|              | Part No.       | Part No.       | Inner carton     | Outer carton |
| 12V DC       | HJ2-DC 12V     | HJ4-DC 12V     | 20pcs.           | 200pcs.      |
| 24V DC       | HJ2-DC 24V     | HJ4-DC 24V     |                  |              |
| 48V DC       | HJ2-DC 48V     | HJ4-DC 48V     |                  |              |
| 110V DC      | HJ2-DC110V     | HJ4-DC110V     |                  |              |
| 12V AC       | HJ2-AC 12V     | HJ4-AC 12V     |                  |              |
| 24V AC       | HJ2-AC 24V     | HJ4-AC 24V     |                  |              |
| 48V AC       | HJ2-AC 48V     | HJ4-AC 48V     |                  |              |
| 100V AC      | HJ2-AC100V     | HJ4-AC100V     |                  |              |
| 120V AC      | HJ2-AC120V     | HJ4-AC120V     |                  |              |
| 200V AC      | HJ2-AC200V     | HJ4-AC200V     |                  |              |
| 220/240V AC  | HJ2-AC220/240V | HJ4-AC220/240V |                  |              |

### 2. Plug-in type (with LED indication)

| Coil voltage | 2 Form C         | 4 Form C         | Packing quantity |              |
|--------------|------------------|------------------|------------------|--------------|
|              | Part No.         | Part No.         | Inner carton     | Outer carton |
| 12V DC       | HJ2-L-DC 12V     | HJ4-L-DC 12V     | 20pcs.           | 200pcs.      |
| 24V DC       | HJ2-L-DC 24V     | HJ4-L-DC 24V     |                  |              |
| 48V DC       | HJ2-L-DC 48V     | HJ4-L-DC 48V     |                  |              |
| 110V DC      | HJ2-L-DC110V     | HJ4-L-DC110V     |                  |              |
| 12V AC       | HJ2-L-AC 12V     | HJ4-L-AC 12V     |                  |              |
| 24V AC       | HJ2-L-AC 24V     | HJ4-L-AC 24V     |                  |              |
| 48V AC       | HJ2-L-AC 48V     | HJ4-L-AC 48V     |                  |              |
| 100V AC      | HJ2-L-AC100V     | HJ4-L-AC100V     |                  |              |
| 120V AC      | HJ2-L-AC120V     | HJ4-L-AC120V     |                  |              |
| 200V AC      | HJ2-L-AC200V     | HJ4-L-AC200V     |                  |              |
| 220/240V AC  | HJ2-L-AC220/240V | HJ4-L-AC220/240V |                  |              |

### 3. Accessories

| Type            | No. of channels       | Item                                      | Part No.  | Packing quantity |              |
|-----------------|-----------------------|---|-----------|------------------|--------------|
|                 |                       |   |           | Inner carton     | Outer carton |
| Terminal socket | 2 channels            | HJ2 terminal socket                       | HJ2-SFD   | 10pcs.           | 100pcs.      |
|                 |                       | HJ2 terminal socket (Finger protect type) | HJ2-SFD-S |                  |              |
|                 | 2/4 channels (common) | HJ4 terminal socket                       | HJ4-SFD   |                  |              |
|                 |                       | HJ4 terminal socket (Finger protect type) | HJ4-SFD-S |                  |              |

- Notes) 1. Use the retainer that is shipped with the terminal socket.  
 2. Products conform to UL, CSA and TÜV, as standard.  
 3. In order to prevent breakage and disfiguring, the screw tightening torque for the terminal socket should be within the range of 0.5 to 0.8 N•m.  
 4. When attaching directly to a chassis, please use an M3.5 × 0.6 metric coarse screw thread, a spring washer, and a hexagonal nut.

## COIL DATA

### DC coils

| Coil voltage<br>V DC | Pick-up voltage,<br>V DC (max.)<br>(at 20°C 68°F)<br>(Initial) | Drop-out voltage,<br>V DC (max.)<br>(at 20°C 68°F)<br>(Initial) | Nominal coil<br>current, mA<br>(±20%) | Coil resistance, Ω<br>(at 20°C 68°F)<br>(±20%) | Nominal operating<br>power,<br>W (±20%) | Max. allowable<br>voltage, V DC<br>(at 70°C 158°F) |
|----------------------|--|---|---------------------------------------|--|---|--|
| 12                   | 9.6  | 1.2   | 75                                    | 160 (±10%)                                     | 0.9                                     | 13.2   |
| 24                   | 19.2   | 2.4   | 37                                    | 650 (±10%)                                     | 0.9                                     | 26.4   |
| 48                   | 38.4   | 4.8   | 18                                    | 2,600 (±15%)                                   | 0.9                                     | 52.8   |
| 110                  | 88   | 11  | 10                                    | 11,000 (±15%)                                  | 1.1                                     | 121  |

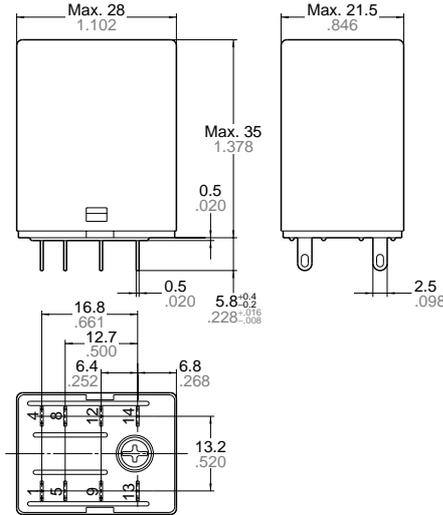
**AC coils (50/60Hz)**

| Coil voltage<br>V AC | Pick-up voltage,<br>V AC (max.)<br>(at 20°C 68°F)<br>(Initial) | Drop-out voltage,<br>V AC (max.)<br>(at 20°C 68°F)<br>(Initial) | Nominal coil current, mA<br>(±20%) |         | Nominal operating power, V A<br>(±20%) |                       | Max. allowable<br>voltage, V AC<br>(at 70°C 158°F) |
|----------------------|--|---|------------------------------------|---------|--|-----------------------|--|
|                      |  |   | 50Hz                               | 60Hz    | 50Hz                                   | 60Hz                  |  |
| 12                   | 9.6  | 3.6   | 102.9                              | 85.4    | Approx.<br>1.2 to 1.5                  | Approx.<br>1.0 to 1.3 | 13.2   |
| 24                   | 19.2   | 7.2   | 54.5                               | 45.6    |  |                       | 26.4   |
| 48                   | 38.4   | 14.4  | 30.7                               | 25.9    |  |                       | 52.8   |
| 100                  | 80   | 30  | 11.8                               | 10.0    |  |                       | 110  |
| 120                  | 96   | 36  | 12.5                               | 10.3    |  |                       | 132  |
| 200                  | 160  | 60  | 6.8                                | 5.7     |  |                       | 220  |
| 220/240              | 176  | 72  | 6.8/7.8                            | 5.6/6.4 |  |                       | 264  |

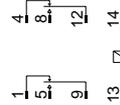
**DIMENSIONS**

mm inch

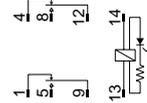
**1. Plug-in type 2 Form C**



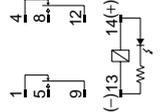
Schematic (Bottom view)  
Standard type



LED AC type

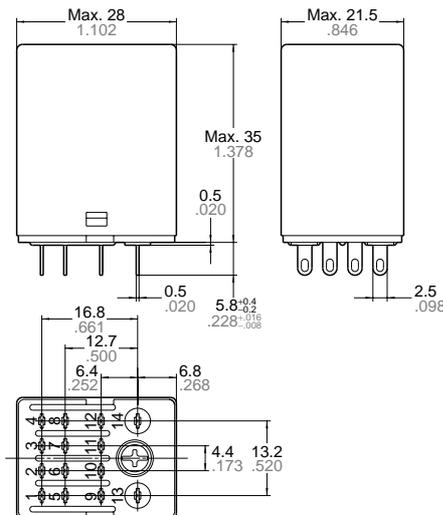


LED DC type

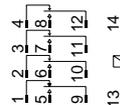


|                             |                  |
|-----------------------------|------------------|
| <b>Dimension:</b>           | <b>Tolerance</b> |
| Max. 1mm .039 inch:         | ±0.1 ±.004       |
| 1 to 3mm .039 to .118 inch: | ±0.2 ±.008       |
| Min. 3mm .118 inch:         | ±0.3 ±.012       |

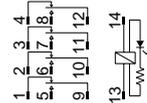
**2. Plug-in type 4 Form C**



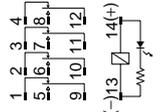
Schematic (Bottom view)  
Standard type



LED AC type



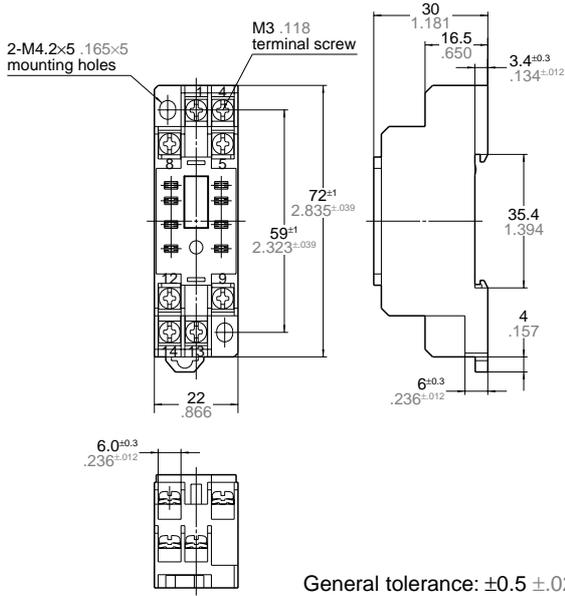
LED DC type



|                             |                  |
|-----------------------------|------------------|
| <b>Dimension:</b>           | <b>Tolerance</b> |
| Max. 1mm .039 inch:         | ±0.1 ±.004       |
| 1 to 3mm .039 to .118 inch: | ±0.2 ±.008       |
| Min. 3mm .118 inch:         | ±0.3 ±.012       |

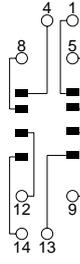
## 3. Terminal socket HJ2 terminal socket

mm inch

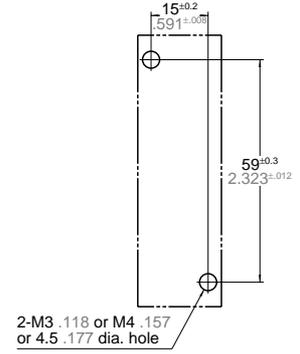


General tolerance:  $\pm 0.5 \pm .020$

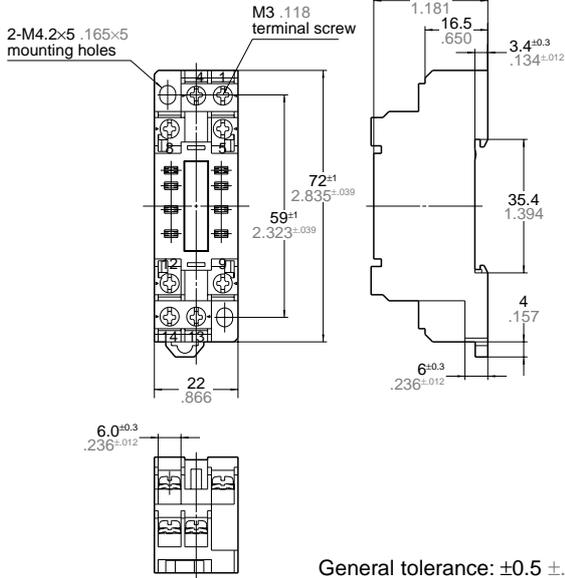
Schematic (Bottom view)



Mounting hole dimensions

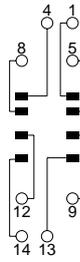


## HJ2 terminal socket (Finger protect type)

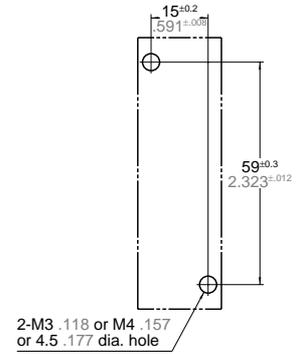


General tolerance:  $\pm 0.5 \pm .020$

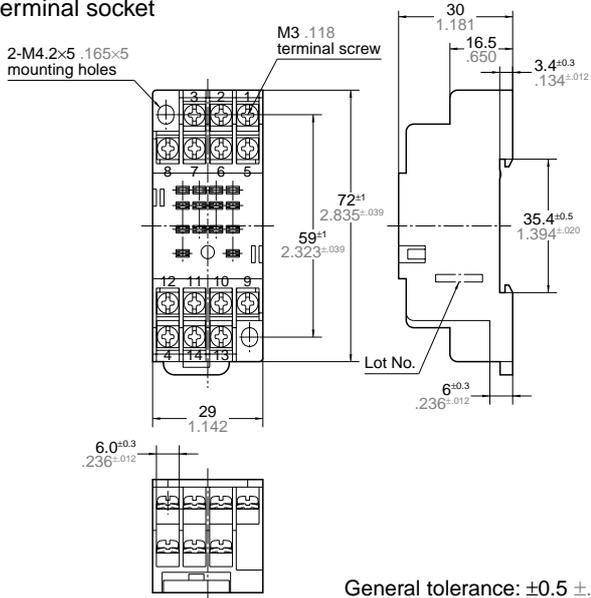
Schematic (Bottom view)



Mounting hole dimensions

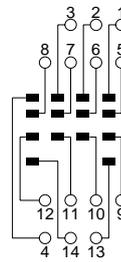


## HJ4 terminal socket

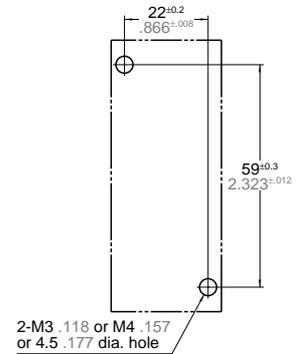


General tolerance:  $\pm 0.5 \pm .020$

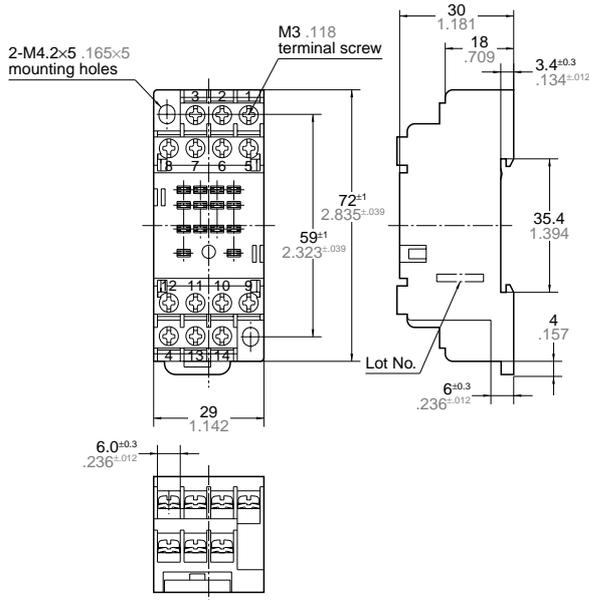
Schematic (Bottom view)



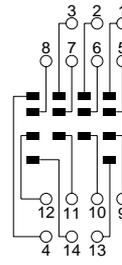
Mounting hole dimensions



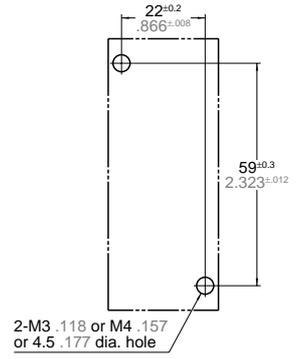
HJ4 terminal socket (Finger protect type)



Schematic (Bottom view)



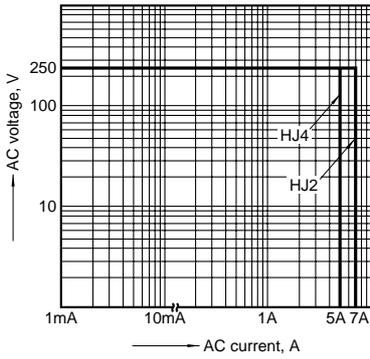
Mounting hole dimensions



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

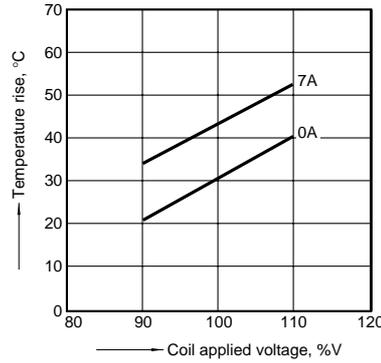
REFERENCE DATA

1. Max. switching capacity (resistive load)



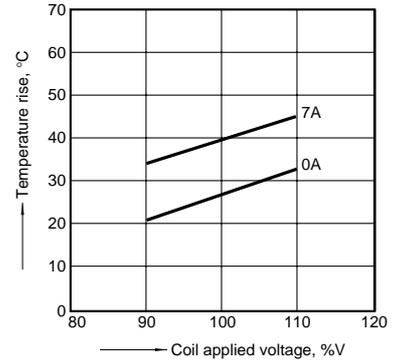
2-(1). Coil temperature rise (2 Form C/AC type)

Measured portion: Inside the coil  
Ambient temperature: 70°C 158°F



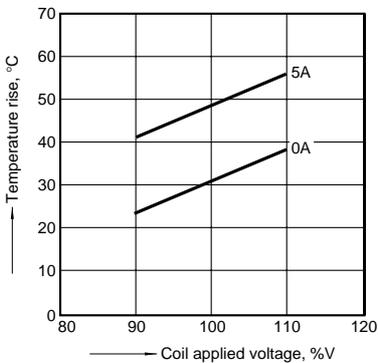
2-(2). Coil temperature rise (2 Form C/DC type)

Measured portion: Inside the coil  
Ambient temperature: 70°C 158°F



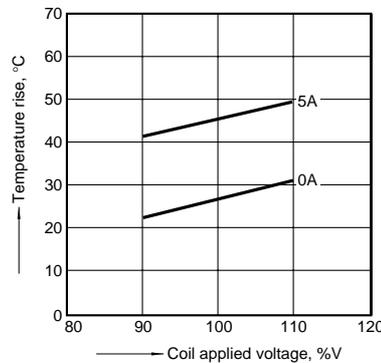
2-(3). Coil temperature rise (4 Form C/AC type)

Measured portion: Inside the coil  
Ambient temperature: 70°C 158°F



2-(4). Coil temperature rise (4 Form C/DC type)

Measured portion: Inside the coil  
Ambient temperature: 70°C 158°F



## NOTES

### 1. Coil operating power

To ensure proper operation, the voltage applied to both terminals of the coil should be  $\pm 5\%$  (at  $20^{\circ}\text{C}$   $68^{\circ}\text{F}$ ) the rated operating voltage of the coil. Also, be aware that the pick-up and drop-out voltages will fluctuate depending on the ambient temperature and operating conditions.

### 2. LED indications

The light of the light emitting diode is what displays operation. If voltage remains after relay dropout, the LED might illuminate briefly.

### 3. Switching lifetime

The switching lifetime is defined under the standard test condition specified in the JIS\* C 5442-1996 standard (temperature  $15$  to  $35^{\circ}\text{C}$   $59$  to  $95^{\circ}\text{F}$ , humidity  $25$  to  $75\%$ ). Check this with the real device as it is affected by coil driving circuit, load type, activation frequency, activation phase, ambient conditions and other factors. Also, be especially careful of loads such as those listed below.

(1) When used for AC load-operating and the operating phase is synchronous.

Rocking and fusing can easily occur due to contact shifting.

(2) High-frequency load-operating

When high-frequency opening and closing of the relay is performed with a load that causes arcs at the contacts, nitrogen and oxygen in the air is fused by the arc energy and  $\text{HNO}_3$  is formed. This can corrode metal materials.

Three countermeasures for these are listed here.

- (1) Incorporate an arc-extinguishing circuit.
- (2) Lower the operating frequency
- (3) Lower the ambient humidity

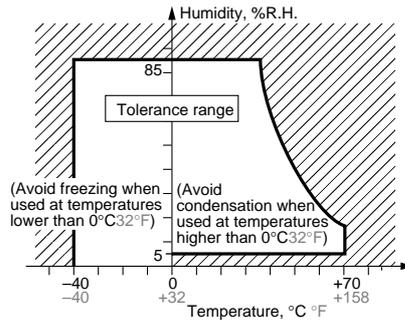
### 4. Conditions for operation, transport and storage

1) Ambient temperature, humidity, and atmospheric pressure during usage, transport, and storage of the relay:

(1) Temperature:  
 $-40$  to  $+70^{\circ}\text{C}$   $-40$  to  $+158^{\circ}\text{F}$

(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 temperatures is lower than  $0^{\circ}\text{C}$   $32^{\circ}\text{F}$ . 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.

5. Screwing torque of pressure screw block should be less than  $0.5$  to  $0.8\text{N}\cdot\text{m}$  to avoid breaking heads and bodies.

### 6. Rating

| Standard | File No.  | Ratings   |   |
|----------|-----------|---|---|
|          |           | 2 Form C  | 4 Form C  |
| UL       | E43149    | 7A 250 V AC<br>7A 30V DC                            | 5A 250 V AC<br>5A 30V DC                            |
| TÜV      | R 2024382 | 7A 250 V~<br>( $\cos\phi=20$ )<br>7A 30V ~<br>(0ms) | 5A 250 V~<br>( $\cos\phi=20$ )<br>5A 30V ~<br>(0ms) |

(CSA: C-UL approved)