



RoHS compliant

### FEATURES

- High electrical noise immunity
- High switching capacity in a compact package
- High sensitivity: 200 mW (1a), 400 mW (1c)
- High surge voltage: 8,000 V between contacts and coil
- UL, CSA, VDE, SEMKO approved and TÜV available
- Class B coil insulation type also available.

### TYPICAL APPLICATIONS

- Air conditioners
- Refrigerators
- Microwave ovens
- Heaters

## ORDERING INFORMATION

JQ     -   -   - F

Contact arrangement

1a: 1 Form A

1 : 1 Form C

Contact capacity

Nil: Standard (5A)

P: High capacity (10A)

Coil insulation class

Nil: Class E coil insulation

B: Class B coil insulation (UL)

Nominal coil voltage (DC)

5V, 6V, 9V, 12V, 18V, 24V, 48V\*

Contact material

F: AgSnO<sub>2</sub> type

Certified by UL, CSA, VDE and SEMKO

Note: \*Available only for 1 Form C type

## TYPES

### 1) Standard type

| Nominal coil voltage | Standard type |           | High capacity type |            |
|----------------------|---------------|-----------|--------------------|------------|
|                      | 1 Form A      | 1 Form C  | 1 Form A           | 1 Form C   |
|                      | Part No.      | Part No.  | Part No.           | Part No.   |
| 5V DC                | JQ1a-5V-F     | JQ1-5V-F  | JQ1aP-5V-F         | JQ1P-5V-F  |
| 6V DC                | JQ1a-6V-F     | JQ1-6V-F  | JQ1aP-6V-F         | JQ1P-6V-F  |
| 9V DC                | JQ1a-9V-F     | JQ1-9V-F  | JQ1aP-9V-F         | JQ1P-9V-F  |
| 12V DC               | JQ1a-12V-F    | JQ1-12V-F | JQ1aP-12V-F        | JQ1P-12V-F |
| 18V DC               | JQ1a-18V-F    | JQ1-18V-F | JQ1aP-18V-F        | JQ1P-18V-F |
| 24V DC               | JQ1a-24V-F    | JQ1-24V-F | JQ1aP-24V-F        | JQ1P-24V-F |
| 48V DC               | —             | JQ1-48V-F | —                  | JQ1P-48V-F |

Standard packing: Carton 100 pcs., Case 500 pcs.

# RATING

## 1. Coil data

| Contact arrangement | 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 (at 20°C 68°F) | Max. applied voltage                                                                      |  |
|---------------------|----------------------|------------------------------------------------------------------|------------------------------------------|-------------------------------------------------|---------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------|--|
| 1 Form A            | 5V DC                | Standard type:<br>75%V or less of nominal voltage (Initial)      | 5%V or more of nominal voltage (Initial) | 40.0mA                                          | 125 Ω                                 | 200mW                                  | 180% of nominal voltage (at 20°C 68°F)                                                    |  |
|                     | 6V DC                |                                                                  |                                          | 33.3mA                                          | 180 Ω                                 |                                        |                                                                                           |  |
|                     | 9V DC                |                                                                  |                                          | 22.2mA                                          | 405 Ω                                 |                                        | 130% of nominal voltage (at 70°C 158°F)<br>[When using relays at 85°C 185°F, see Notes*4] |  |
|                     | 12V DC               | High capacity type:<br>80%V or less of nominal voltage (Initial) |                                          | 16.7mA                                          | 720 Ω                                 |                                        |                                                                                           |  |
|                     | 18V DC               |                                                                  |                                          | 11.1mA                                          | 1,620 Ω                               |                                        |                                                                                           |  |
|                     | 24V DC               |                                                                  |                                          | 8.3mA                                           | 2,880 Ω                               |                                        |                                                                                           |  |
| 1 Form C            | 5V DC                | Standard type:<br>75%V or less of nominal voltage (Initial)      | 5%V or more of nominal voltage (Initial) | 80 mA                                           | 62.5Ω                                 | 400mW                                  | 150% of nominal voltage (at 20°C 68°F)                                                    |  |
|                     | 6V DC                |                                                                  |                                          | 66.7mA                                          | 90 Ω                                  |                                        |                                                                                           |  |
|                     | 9V DC                |                                                                  |                                          | 44.4mA                                          | 202.5Ω                                |                                        | 110% of nominal voltage (at 70°C 158°F)<br>[When using relays at 85°C 185°F, see Notes*4] |  |
|                     | 12V DC               | High capacity type:<br>80%V or less of nominal voltage (Initial) |                                          | 33.3mA                                          | 360 Ω                                 |                                        |                                                                                           |  |
|                     | 18V DC               |                                                                  |                                          | 22.2mA                                          | 810 Ω                                 |                                        |                                                                                           |  |
|                     | 24V DC               |                                                                  |                                          | 16.7mA                                          | 1,440 Ω                               |                                        |                                                                                           |  |
|                     | 48V DC               |                                                                  |                                          | 8.3mA                                           | 5,760 Ω                               |                                        |                                                                                           |  |

## 2. Specifications

| Characteristics            | Item                                                              |                          | Specifications                                                                                                                                                                                                 |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
|----------------------------|-------------------------------------------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
|                            |                                                                   |                          | Standard type                                                                                                                                                                                                  |                                                                                                                            | High capacity type                                                                                                               |                                                                                                                             |
| Contact                    | Arrangement                                                       |                          | 1 Form A                                                                                                                                                                                                       | 1 Form C                                                                                                                   | 1 Form A                                                                                                                         | 1 Form C                                                                                                                    |
|                            | Contact resistance (Initial)                                      |                          | Max. 100mΩ (By voltage drop 6 V DC 1 A)                                                                                                                                                                        |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
|                            | Contact material                                                  |                          | AgSnO <sub>2</sub> type                                                                                                                                                                                        |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
| Rating                     | Nominal switching capacity (resistive load)                       |                          | 5 A 125 V AC,<br>2 A 250 V AC,<br>5 A 30 V DC                                                                                                                                                                  | N.O. side:<br>5 A 125 V AC,<br>2 A 250 V AC,<br>3 A 30 V AC<br>N.C. side:<br>2 A 125 V AC,<br>1 A 250 V AC,<br>1 A 30 V DC | 10 A 125 V AC,<br>5 A 250 V AC,<br>5 A 30 V DC                                                                                   | N.O. side:<br>10 A 125 V AC,<br>5 A 250 V AC,<br>5 A 30 V AC<br>N.C. side:<br>3 A 125 V AC,<br>2 A 250 V AC,<br>1 A 30 V DC |
|                            | Max. switching power (resistive load)                             |                          | 625 VA, 150 W                                                                                                                                                                                                  | N.O. side:<br>625 VA, 90 W<br>N.C. side:<br>250 VA, 30 W                                                                   | 1,250 V AC, 150 W                                                                                                                | N.O. side:<br>1,250 VA, 150 W<br>N.C. side:<br>500 V AC, 30 W                                                               |
|                            | Max. switching voltage                                            |                          | 250 V AC, 110 V DC (0.3A)                                                                                                                                                                                      |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
|                            | Max. switching current                                            |                          | N.O.: 5 A, N.C.: 2 A                                                                                                                                                                                           |                                                                                                                            | N.O.: 10 A, N.C.: 3 A                                                                                                            |                                                                                                                             |
|                            | Nominal operating power                                           |                          | 200 mW                                                                                                                                                                                                         | 400 mW                                                                                                                     | 200 mW                                                                                                                           | 400 mW                                                                                                                      |
|                            | Min. switching capacity (reference value)*1                       |                          | 100 mA, 5 V DC                                                                                                                                                                                                 |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
|                            | Insulation resistance (Initial)                                   |                          | Min. 1,000 MΩ (at 500 V DC) Measurement at same location as "Breakdown voltage" section.                                                                                                                       |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
| Electrical characteristics | Breakdown voltage (Initial)                                       | Between open contacts    | 1,000 Vrms for 1 min.                                                                                                                                                                                          | 750 Vrms for 1 min.                                                                                                        | 1,000 Vrms for 1 min.                                                                                                            | 750 Vrms for 1 min.                                                                                                         |
|                            |                                                                   | Between contact and coil | 4,000 Vrms for 1 min. (Detection current: 10 mA)                                                                                                                                                               |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
|                            | Temperature rise (coil)                                           |                          | Max. 45°C 113°F<br>(By resistive method, nominal coil voltage applied to the coil; contact carrying current: 5A, at 70°C 158°F)                                                                                |                                                                                                                            | Max. 45°C 113°F<br>(By resistive method, nominal coil voltage applied to the coil; contact carrying current: 10A, at 70°C 158°F) |                                                                                                                             |
|                            | Surge breakdown voltage*2<br>(Between contact and coil) (Initial) |                          | 8,000 V                                                                                                                                                                                                        |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
|                            | Operate time (at nominal voltage) (at 20°C 68°F) (Initial)        |                          | Max. 20 ms (excluding contact bounce time.)                                                                                                                                                                    |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
|                            | Release time (at nominal voltage) (at 20°C 68°F) (Initial)        |                          | Max. 10 ms (excluding contact bounce time) (Without diode)                                                                                                                                                     |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
|                            | Mechanical characteristics                                        | Shock resistance         | Functional                                                                                                                                                                                                     | 294 m/s <sup>2</sup> (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.)                                          |                                                                                                                                  |                                                                                                                             |
| Destructive                |                                                                   |                          | 980 m/s <sup>2</sup> (Half-wave pulse of sine wave: 6 ms.)                                                                                                                                                     |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
| Vibration resistance       |                                                                   | Functional               | 10 to 55 Hz at double amplitude of 1.6 mm (Detection time: 10μs.)                                                                                                                                              |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
|                            |                                                                   | Destructive              | 10 to 55 Hz at double amplitude of 2.0 mm                                                                                                                                                                      |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
| Expected life              | Mechanical (at 180 times/min.)                                    |                          | Min. 10 <sup>7</sup>                                                                                                                                                                                           |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
| Conditions                 | Conditions for operation, transport and storage*3                 |                          | Ambient temperature: −40°C to +70°C −40°F to +158°F (class E insulation),<br>−40°C to +85°C −40°F to +185°F*4 (class B insulation)<br>Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
|                            | Max. operating speed                                              |                          | 20 times/min. (at nominal switching capacity)                                                                                                                                                                  |                                                                                                                            |                                                                                                                                  |                                                                                                                             |
| Unit weight                |                                                                   |                          | Approx. 7 g .25 oz                                                                                                                                                                                             |                                                                                                                            |                                                                                                                                  |                                                                                                                             |

\* Specifications will vary with foreign standards certification ratings.

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. Wave is standard shock voltage of ±1.2×50μs according to JEC-212-1981

\*3. 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.

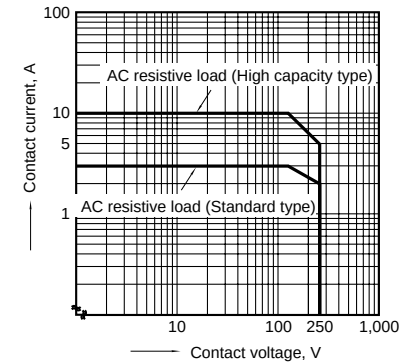
\*4. When using relays in a high ambient temperature, consider the pick-up voltage rise due to the high temperature (a rise of approx. 0.4% V for each 1°C 33.8°F with 20°C 68°F as a reference) and use a coil impressed voltage that is within the maximum applied voltage range.

3. Expected electrical life

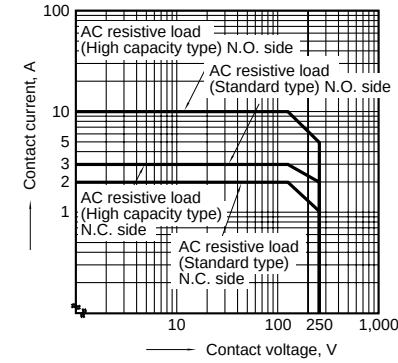
| Type               |          |      | Switching capacity                                          | No. of operations                                                              |
|--------------------|----------|------|-------------------------------------------------------------|--------------------------------------------------------------------------------|
| Standard type      | 1 Form A |      | 5 A 125 V AC<br>3 A 125 V AC<br>2 A 250 V AC<br>5 A 30 V DC | 5×10 <sup>4</sup><br>2×10 <sup>5</sup><br>2×10 <sup>5</sup><br>10 <sup>5</sup> |
|                    | 1 Form C | N.O. | 5 A 125 V AC<br>3 A 125 V AC<br>2 A 250 V AC<br>3 A 30 V DC | 5×10 <sup>4</sup><br>2×10 <sup>5</sup><br>2×10 <sup>5</sup><br>10 <sup>5</sup> |
|                    |          | N.C. | 2 A 125 V AC<br>1 A 250 V AC<br>1 A 30 V DC                 | 2×10 <sup>5</sup><br>2×10 <sup>5</sup><br>10 <sup>5</sup>                      |
|                    | 1 Form A |      | 10 A 125 V AC<br>5 A 250 V AC<br>5 A 30 V DC                | 5×10 <sup>4</sup><br>5×10 <sup>4</sup><br>10 <sup>5</sup>                      |
| High capacity type | 1 Form C | N.O. | 10 A 125 V AC<br>5 A 250 V AC<br>5 A 30 V DC                | 5×10 <sup>4</sup><br>5×10 <sup>4</sup><br>10 <sup>5</sup>                      |
|                    |          | N.C. | 3 A 125 V AC<br>2 A 250 V AC<br>1 A 30 V DC                 | 2×10 <sup>5</sup><br>2×10 <sup>5</sup><br>10 <sup>5</sup>                      |

REFERENCE DATA

1.-(1) Max. switching capacity (1 Form A type)



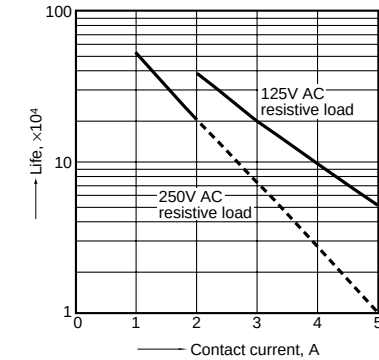
1.-(2) Max. switching capacity (1 Form C type)



Standard type

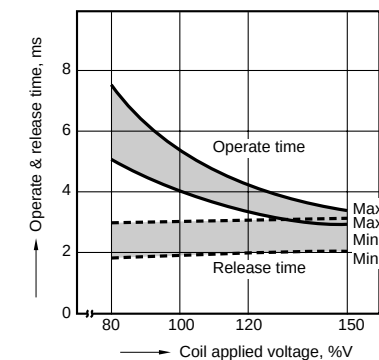
2. Life curve

Ambient temperature: room temperature



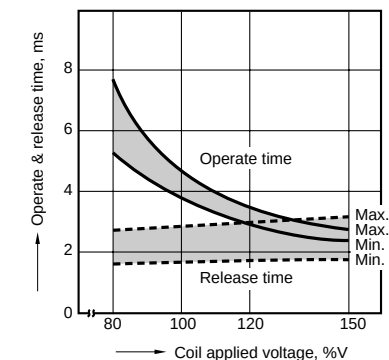
3.-(1) Operate & release time (1 Form A type)

Tested sample: JQ1a-12V-F, 25 pcs.



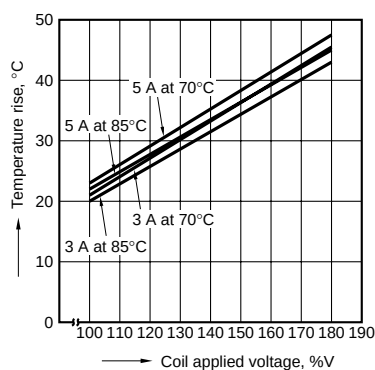
3.-(2) Operate & release time (1 Form C type)

Tested sample: JQ1-24V-F, 25 pcs.



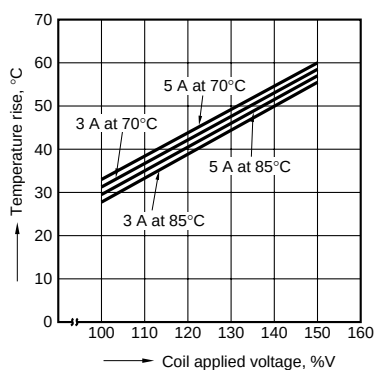
## 4.-(1) Coil temperature rise (1 Form A type)

Contact carrying current: 3 A, 5 A  
Measured portion: Inside the coil



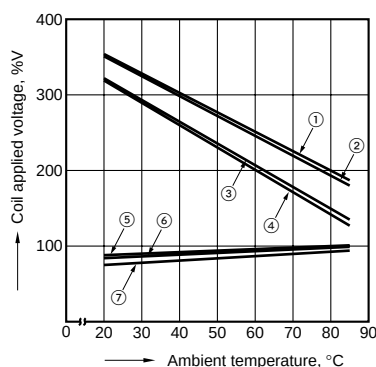
## 4.-(2) Coil temperature rise (1 Form C type)

Contact carrying current: 3 A, 5 A  
Measured portion: Inside the coil



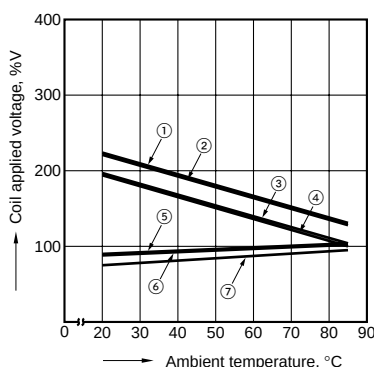
## 5.-(1) Ambient temperature characteristics (1 Form A type)

Tested sample: JQ1a-24V-F  
Contact carrying current: 3 A, 5 A



## 5.-(2) Ambient temperature characteristics (1 Form C type)

Tested sample: JQ1-24V-F  
Contact carrying current: 3 A, 5 A

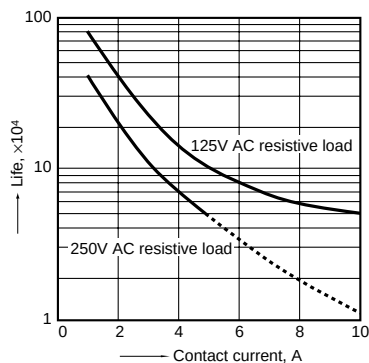


- ① Allowable ambient temperature against % coil voltage (max. inside the coil temperature set as 130°C 266°F) (Carrying current: 3 A)
- ② Allowable ambient temperature against % coil voltage (max. inside the coil temperature set as 130°C 266°F) (Carrying current: 5 A)
- ③ Allowable ambient temperature against % coil voltage (max. inside the coil temperature set as 115°C 239°F) (Carrying current: 3 A)
- ④ Allowable ambient temperature against % coil voltage (max. inside the coil temperature set as 115°C 239°F) (Carrying current: 5 A)
- ⑤ Pick-up voltage with a hot-start condition of 100%V on the coil (Carrying current: 5 A)
- ⑥ Pick-up voltage with a hot-start condition of 100%V on the coil (Carrying current: 3 A)
- ⑦ Pick-up voltage

## High capacity type

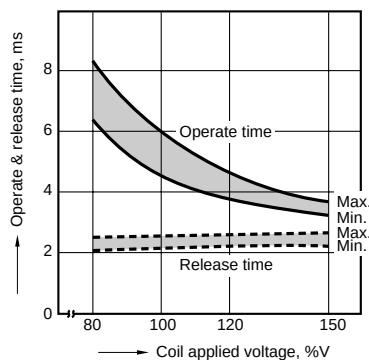
## 1. Life curve

Ambient temperature: room temperature



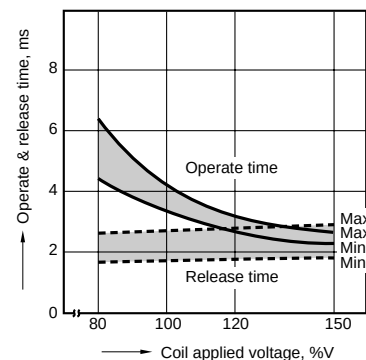
## 2.-(1) Operate &amp; release time (1 Form A type)

Tested sample: JQ1aP-12V-F, 25 pcs.



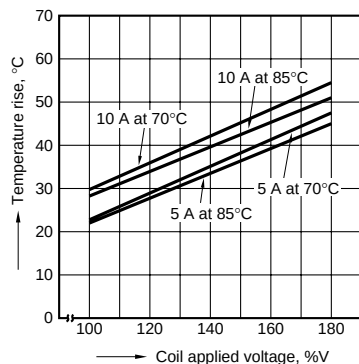
## 2.-(2) Operate &amp; release time (1 Form C type)

Tested sample: JQ1P-12V-F, 25 pcs.



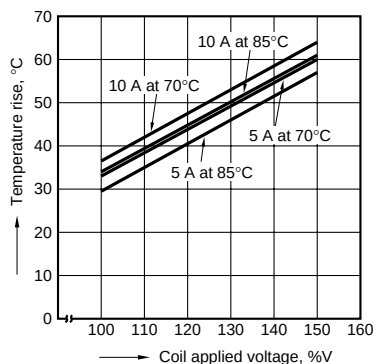
## 3.-(1) Coil temperature rise (1 Form A type)

Contact carrying current: 5 A, 10 A  
Measured portion: Inside the coil



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

Contact carrying current: 5 A, 10 A  
Measured portion: Inside the coil

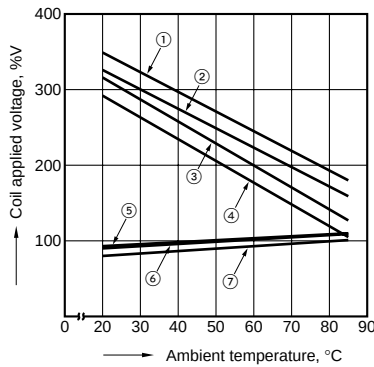


## 4.-(1) Ambient temperature characteristics

(1 Form A type)

Tested sample: JQ1aP-24V-F

Contact carrying current: 5 A, 10 A

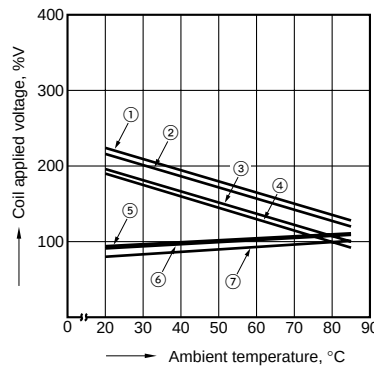


## 4.-(2) Ambient temperature characteristics

(1 Form C type)

Tested sample: JQ1P-24V-F

Contact carrying current: 5 A, 10 A



- ① Allowable ambient temperature against % coil voltage (max. inside the coil temperature set as 130°C 266°F) (Carrying current: 5 A)
- ② Allowable ambient temperature against % coil voltage (max. inside the coil temperature set as 130°C 266°F) (Carrying current: 10 A)
- ③ Allowable ambient temperature against % coil voltage (max. inside the coil temperature set as 115°C 239°F) (Carrying current: 5 A)
- ④ Allowable ambient temperature against % coil voltage (max. inside the coil temperature set as 115°C 239°F) (Carrying current: 10 A)
- ⑤ Pick-up voltage with a hot-start condition of 100%V on the coil (Carrying current: 10 A)
- ⑥ Pick-up voltage with a hot-start condition of 100%V on the coil (Carrying current: 5 A)
- ⑦ Pick-up voltage

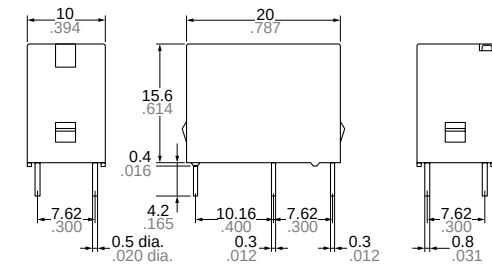
## DIMENSIONS (mm inch)

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

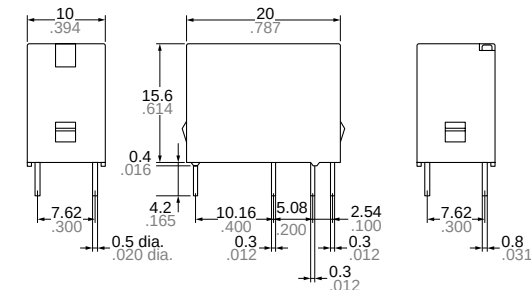
## CAD Data

## External dimensions

## 1 Form A

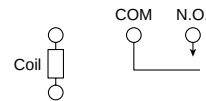


## 1 Form C

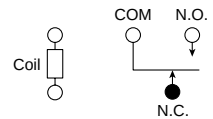


## Schematic (Bottom view)

## 1 Form A

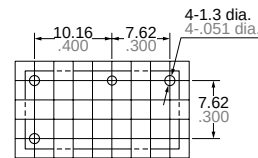


## 1 Form C

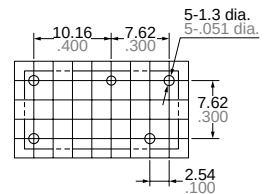


## PC board pattern (Bottom view)

## 1 Form A



## 1FormC

Tolerance:  $\pm 0.1 \pm .004$ 

## Dimension:

Less than 1mm .039inch:

Min. 1mm .039inch less than 5mm .197 inch:  $\pm 0.3 \pm .012$ 

Min. 5mm .197 inch:

## General tolerance

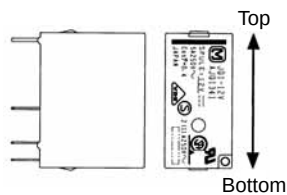
 $\pm 0.2 \pm .008$  $\pm 0.3 \pm .012$  $\pm 0.4 \pm .016$

## SAFETY STANDARDS

| Item                                 | UL/C-UL (Recognized) |                                                                                          | CSA (Certified) |                                                                                          | VDE (Certified) |                                                                                     | TÜV (Certified)      |                                                   | SEMKO (Certified) |                                             |
|--------------------------------------|----------------------|------------------------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------|----------------------|---------------------------------------------------|-------------------|---------------------------------------------|
|                                      | File No.             | Contact rating                                                                           | File No.        | Contact rating                                                                           | File No.        | Contact rating                                                                      | File No.             | Rating                                            | File No.          | Contact rating                              |
| Standard type<br>(5A) 1 Form A       | E43028               | 5A 125V AC<br>5A 277V AC<br>5A 30V DC<br>0.3A 110V DC<br>1/10HP 125V AC<br>1/6HP 277V AC | LR26550         | 5A 125V AC<br>5A 277V AC<br>5A 30V DC<br>0.3A 110V DC<br>1/10HP 125V AC<br>1/6HP 277V AC | 40011435        | 5A 250V AC ( $\cos\phi=0.4$ )                                                       | B 11 04<br>13461 296 | 5A 250V AC ( $\cos\phi=0.4$ )<br>5A 30V DC (0ms)  | 817138            | 3(2)A 125V AC<br>2(1)A 250V AC<br>5A 30V DC |
| Standard type<br>(5A) 1 Form C       | E43028               | 5A 125V AC<br>5A 277V AC<br>5A 30V DC<br>0.3A 110V DC<br>1/10HP 125V AC<br>1/6HP 277V AC | LR26550         | 5A 125V AC<br>5A 277V AC<br>5A 30V DC<br>0.3A 110V DC<br>1/10HP 125V AC<br>1/6HP 277V AC | 40011435        | 5A 250V AC ( $\cos\phi=0.4$ )<br>(N.O.)<br>3A 250V AC ( $\cos\phi=0.4$ )<br>(N.C.)  | B 11 04<br>13461 296 | 5A 250V AC ( $\cos\phi=0.4$ )<br>5A 30V DC (0ms)  | 817138            | 3(2)A 125V AC<br>2(1)A 250V AC<br>5A 30V DC |
| High capacity type<br>(10A) 1 Form A | E43028               | 10A 125V AC<br>8A 277V AC<br>5A 30V DC<br>0.3A 110V DC<br>1/6HP 125V AC<br>1/6HP 277V AC | LR26550         | 10A 125V AC<br>8A 277V AC<br>5A 30V DC<br>0.3A 110V DC<br>1/6HP 125V AC<br>1/6HP 277V AC | 40011435        | 10A 250V AC ( $\cos\phi=0.4$ )                                                      | B 11 04<br>13461 296 | 10A 250V AC ( $\cos\phi=0.4$ )<br>5A 30V DC (0ms) | 817138            | 5(3)A 250V AC<br>5A 30V DC                  |
| High capacity type<br>(10A) 1 Form C | E43028               | 10A 125V AC<br>8A 277V AC<br>5A 30V DC<br>0.3A 110V DC<br>1/6HP 125V AC<br>1/6HP 277V AC | LR26550         | 10A 125V AC<br>8A 277V AC<br>5A 30V DC<br>0.3A 110V DC<br>1/6HP 125V AC<br>1/6HP 277V AC | 40011435        | (N.O.)<br>10A 250V AC ( $\cos\phi=0.4$ )<br>(N.C.)<br>3A 250V AC ( $\cos\phi=0.4$ ) | B 11 04<br>13461 296 | 10A 250V AC ( $\cos\phi=0.4$ )<br>5A 30V DC (0ms) | 817138            | 5(3)A 250V AC<br>5A 30V DC                  |

## NOTES

Note about relay installation orientation



When installing with the relay terminals parallel to the ground, the contact terminals at the bottom and the coil terminals at the top, component friction will occur after numerous switching actions or due to vibration in the non-excitation state.

Since this may cause the relay to stop functioning when the pick-up voltage increases even if the nominal voltage is applied, please do not install using this orientation.

## For Cautions for Use.

# Mouser Electronics

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