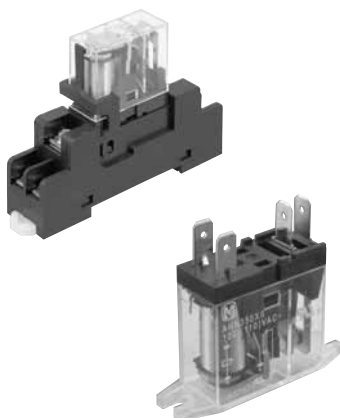




**Relay for control panel of  
1c 10A, 2c 5A and 1a 16A**

## HN RELAYS (AHN)



**RoHS compliant**

### FEATURES

- 1. Slim and compact size**  
20% smaller (width and height) than existing model\* (with the condition of screw terminal socket for DIN rail)  
\*Compared with our HC/HJ relay.
- 2. High-capacity**  
Max. switching current:  
16 A (for 1 Form C type at AC load)
- 3. Slim screw terminal sockets and PC board terminal sockets are available**

### TYPICAL APPLICATIONS

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

### ORDERING INFORMATION

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>HN relays</b></p> <p>Contact arrangement<br/>1: 1 Form C<br/>2: 2 Form C<br/>3: 1 Form A (TM type only)</p> <p>Terminal arrangement<br/>1: AC plug-in type<br/>2: DC plug-in type<br/>5: AC TM type<br/>6: DC TM type</p> <p>Type classification<br/>0: Standard<br/>1: With LED indication<br/>2: With diode<br/>3: With diode and LED indication</p> <p>Nominal coil voltage<br/>05: 5 V, 06: 6 V, 12: 12 V, 24: 24 V, 48: 48 V<br/>X0: 100/110 V AC, 100 V DC<br/>X1: 110/120 V AC, 110 V DC<br/>Y0: 200/220 V AC<br/>Y2: 220/240 V AC</p> <p>Type<br/>N: 2 Form C type<br/>Nil: 1 Form C type, 1 Form A type</p> | <p><b>AHN</b> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/></p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|

Notes: 1. Certified by UL/C-UL and VDE  
(Please consult us for VDE approved TM type.)  
2. The LED indication color is green.

TYPES

1. Plug-in type

| Nominal coil voltage | 1 Form C | 2 Form C  |
|----------------------|----------|-----------|
|                      | Part No. | Part No.  |
| 5V DC                | AHN12005 | AHN22005N |
| 6V DC                | AHN12006 | AHN22006N |
| 12V DC               | AHN12012 | AHN22012N |
| 24V DC               | AHN12024 | AHN22024N |
| 48V DC               | AHN12048 | AHN22048N |
| 100V DC              | AHN120X0 | AHN220X0N |
| 110V DC              | AHN120X1 | AHN220X1N |
| 12V AC               | AHN11012 | AHN21012N |
| 24V AC               | AHN11024 | AHN21024N |
| 100/110V AC          | AHN110X0 | AHN210X0N |
| 110/120V AC          | AHN110X1 | AHN210X1N |
| 200/220V AC          | AHN110Y0 | AHN210Y0N |
| 220/240V AC          | AHN110Y2 | AHN210Y2N |

Standard packing: Carton: 50 pcs.; Case: 500 pcs.

2. Plug-in type (with LED indication)

| Nominal coil voltage | 1 Form C | 2 Form C  |
|----------------------|----------|-----------|
|                      | Part No. | Part No.  |
| 5V DC                | AHN12105 | AHN22105N |
| 6V DC                | AHN12106 | AHN22106N |
| 12V DC               | AHN12112 | AHN22112N |
| 24V DC               | AHN12124 | AHN22124N |
| 48V DC               | AHN12148 | AHN22148N |
| 100V DC              | AHN121X0 | AHN221X0N |
| 110V DC              | AHN121X1 | AHN221X1N |
| 12V AC               | AHN11112 | AHN21112N |
| 24V AC               | AHN11124 | AHN21124N |
| 100/110V AC          | AHN111X0 | AHN211X0N |
| 110/120V AC          | AHN111X1 | AHN211X1N |
| 200/220V AC          | AHN111Y0 | AHN211Y0N |
| 220/240V AC          | AHN111Y2 | AHN211Y2N |

Standard packing: Carton: 50 pcs.; Case: 500 pcs.

3. Plug-in type (with diode)

| Nominal coil voltage | 1 Form C | 2 Form C  |
|----------------------|----------|-----------|
|                      | Part No. | Part No.  |
| 5V DC                | AHN12205 | AHN22205N |
| 6V DC                | AHN12206 | AHN22206N |
| 12V DC               | AHN12212 | AHN22212N |
| 24V DC               | AHN12224 | AHN22224N |
| 48V DC               | AHN12248 | AHN22248N |
| 100V DC              | AHN122X0 | AHN222X0N |
| 110V DC              | AHN122X1 | AHN222X1N |

Standard packing: Carton: 50 pcs.; Case: 500 pcs.

4. Plug-in type (with diode and LED indication)

| Nominal coil voltage | 1 Form C | 2 Form C  |
|----------------------|----------|-----------|
|                      | Part No. | Part No.  |
| 5V DC                | AHN12305 | AHN22305N |
| 6V DC                | AHN12306 | AHN22306N |
| 12V DC               | AHN12312 | AHN22312N |
| 24V DC               | AHN12324 | AHN22324N |
| 48V DC               | AHN12348 | AHN22348N |
| 100V DC              | AHN123X0 | AHN223X0N |
| 110V DC              | AHN123X1 | AHN223X1N |

Standard packing: Carton: 50 pcs.; Case: 500 pcs.

5. TM type

| Nominal coil voltage | 1 Form A |
|----------------------|----------|
|                      | Part No. |
| 5V DC                | AHN36005 |
| 6V DC                | AHN36006 |
| 12V DC               | AHN36012 |
| 24V DC               | AHN36024 |
| 48V DC               | AHN36048 |
| 100V DC              | AHN360X0 |
| 110V DC              | AHN360X1 |
| 12V AC               | AHN35012 |
| 24V AC               | AHN35024 |
| 100/110V AC          | AHN350X0 |
| 110/120V AC          | AHN350X1 |
| 200/220V AC          | AHN350Y0 |
| 220/240V AC          | AHN350Y2 |

Standard packing: Carton: 50 pcs.; Case: 500 pcs.

## RATING

### 1. Coil data

#### 1) DC coils

| Nominal coil voltage | Pick-up voltage (at 20°C 68°F)            | Drop-out voltage (at 20°C 68°F)           | Nominal coil current [±20%] | Coil resistance (at 20°C 68°F) | Nominal operating power | Max. applied voltage (at 20°C 68°F) |
|----------------------|-------------------------------------------|-------------------------------------------|-----------------------------|--------------------------------|-------------------------|-------------------------------------|
| 5V DC                | 70%V or less of nominal voltage (Initial) | 15%V or more of nominal voltage (Initial) | 106.4mA                     | 47Ω [±10%]                     | 0.53W                   | 170%V of nominal voltage            |
| 6V DC                |                                           |                                           | 88.2mA                      | 68Ω [±10%]                     |                         |                                     |
| 12V DC               |                                           |                                           | 44.4mA                      | 270Ω [±10%]                    |                         |                                     |
| 24V DC               |                                           |                                           | 22.0mA                      | 1,090Ω [±10%]                  |                         |                                     |
| 48V DC               |                                           |                                           | 11.0mA                      | 4,350Ω [±10%]                  |                         |                                     |
| 100V DC              |                                           |                                           | 5.3mA                       | 18,870Ω [±10%]                 |                         |                                     |
| 110V DC              |                                           |                                           | 4.8mA                       | 22,830Ω [±10%]                 |                         |                                     |

#### 2) AC coils (50/60Hz)

| Nominal coil voltage | Pick-up voltage (at 20°C 68°F)            | Drop-out voltage (at 20°C 68°F)           | Nominal coil current [±20%] |            | Nominal operating power   |                           | Max. applied voltage (at 20°C 68°F) |
|----------------------|-------------------------------------------|-------------------------------------------|-----------------------------|------------|---------------------------|---------------------------|-------------------------------------|
|                      |                                           |                                           | 50Hz                        | 60Hz       | 50Hz                      | 60Hz                      |                                     |
| 12V AC               | 80%V or less of nominal voltage (Initial) | 30%V or more of nominal voltage (Initial) | 93mA                        | 75mA       | Approx.<br>1.1 to 1.4 V A | Approx.<br>0.9 to 1.2 V A | 140%V of nominal voltage            |
| 24V AC               |                                           |                                           | 46.5mA                      | 37.5mA     |                           |                           |                                     |
| 100/110V AC          |                                           |                                           | 11.0/13.0mA                 | 9.0/10.6mA |                           |                           |                                     |
| 110/120V AC          |                                           |                                           | 10.0/11.8mA                 | 8.2/9.7mA  |                           |                           |                                     |
| 200/220V AC          |                                           |                                           | 5.5/6.5mA                   | 4.5/5.3mA  |                           |                           |                                     |
| 220/240V AC          |                                           |                                           | 5.0/5.9mA                   | 4.1/4.8mA  |                           |                           |                                     |

## 2. Specifications (Plug-in Standard type and TM type)

| Characteristics            | Item                                                                                                  |                          | Specifications                                                                                                                  |                                                    |                                                  |
|----------------------------|-------------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|
| Contact                    | Arrangement                                                                                           |                          | 1 Form C                                                                                                                        | 2 Form C                                           | 1 Form A (TM type)                               |
|                            | Contact resistance (Initial)                                                                          |                          | Max. 100 mΩ<br>(By voltage drop 6 V DC 1A)                                                                                      | Max. 50 mΩ<br>(By voltage drop 6 V DC 1A)          | Max. 100 mΩ<br>(By voltage drop 6 V DC 1A)       |
|                            | Contact material                                                                                      |                          | AgSnO <sub>2</sub> type                                                                                                         | AgNi type                                          | AgSnO <sub>2</sub> type                          |
| Rating                     | Nominal switching capacity (resistive load)                                                           |                          | 10A 250V AC, 10A 30V DC                                                                                                         | 5A 250V AC, 5A 30V DC                              | 16A 250V AC, 16A 30V DC                          |
|                            | Max. switching power (resistive load)                                                                 |                          | 4,000VA, 300W                                                                                                                   | 1,250VA, 150W                                      | 4,000VA, 480W                                    |
|                            | Max. switching voltage                                                                                |                          | 250V AC, 30V DC                                                                                                                 |                                                    |                                                  |
|                            | Max. switching current                                                                                |                          | 16A (at AC load),<br>10A (at DC load)                                                                                           | 5A                                                 | 16A                                              |
|                            | Nominal operating power                                                                               |                          | 0.53W, 0.9VA                                                                                                                    |                                                    |                                                  |
|                            | Min. switching capacity (Reference value)*1                                                           |                          | 100mA 5V DC                                                                                                                     | 10mA 5V DC                                         | 100mA 5V DC                                      |
| Electrical characteristics | Insulation resistance (Initial)                                                                       |                          | Min. 1,000MΩ (at 500V DC) Measurement at same location as "Breakdown voltage" section.                                          |                                                    |                                                  |
|                            | Breakdown voltage (Initial)                                                                           | Between open contacts    | 1,000 Vrms for 1min. (Detection current: 10mA.)                                                                                 |                                                    |                                                  |
|                            |                                                                                                       | Between contact sets     | —                                                                                                                               | 3,000 Vrms for 1min.<br>(Detection current: 10mA.) | —                                                |
|                            |                                                                                                       | Between contact and coil | 5,000 Vrms for 1min. (Detection current: 10mA.)                                                                                 |                                                    |                                                  |
|                            | Temperature rise (coil) (at 70°C 158°F)                                                               |                          | Max. 60°C 140°F (By resistive method, nominal coil voltage)                                                                     |                                                    |                                                  |
|                            | Operate time (at 20°C 68°F)*2                                                                         |                          | Max. 15ms (Nominal coil voltage applied to the coil, excluding contact bounce time.)                                            |                                                    |                                                  |
| Mechanical characteristics | Release time (at 20°C 68°F)*2                                                                         |                          | Max. 5ms (Nominal coil voltage applied to the coil, excluding contact bounce time.) (without diode)/Max. 20ms (with diode)      |                                                    |                                                  |
|                            | Shock resistance                                                                                      | Functional               | Min. 100 m/s <sup>2</sup> (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.)                                          |                                                    |                                                  |
|                            |                                                                                                       | Destructive              | Min. 1,000 m/s <sup>2</sup> (Half-wave pulse of sine wave: 6 ms.)                                                               |                                                    |                                                  |
|                            | Vibration resistance                                                                                  | Functional               | 10 to 55 Hz at double amplitude of 1.5 mm (Detection time: 10μs.)                                                               |                                                    |                                                  |
|                            |                                                                                                       | Destructive              | 10 to 55 Hz at double amplitude of 1.5 mm                                                                                       |                                                    |                                                  |
| Expected life              | Mechanical                                                                                            |                          | AC: Min. 10 <sup>7</sup> ; DC: Min. 2×10 <sup>7</sup> (at 300 times/min.)                                                       |                                                    |                                                  |
|                            | Electrical (at nominal switching capacity)                                                            |                          | Min. 10 <sup>5</sup> (at 20 times/min.)                                                                                         |                                                    | Min. 10 <sup>5</sup> (at 10 times/min.)          |
| Conditions                 | Conditions for operation, transport and storage*3<br>(Not freezing and condensing at low temperature) |                          | 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) |                                                    |                                                  |
|                            | Max. Operating speed                                                                                  |                          | 20 times/min. (at nominal switching capacity)                                                                                   |                                                    | 10 times/min.<br>(at nominal switching capacity) |
| Unit weight                |                                                                                                       |                          | Approx. 19 g .67 oz                                                                                                             | Approx. 17 g .60 oz                                | Approx. 19 g .67 oz                              |

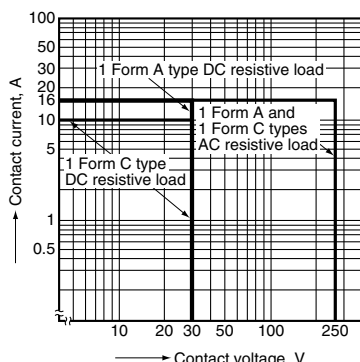
Notes: \*1. This value can change due to the switching frequency, environmental conditions and desired reliability level, therefore it is recommended to check this with the actual load.

\*2. For the AC coil types, the operate/release time will differ depending on the phase.

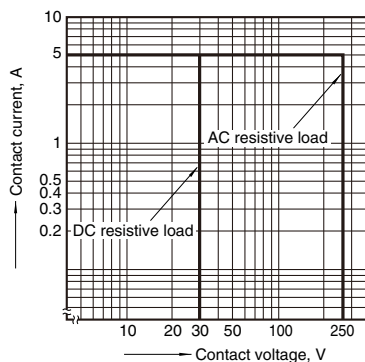
\*3. The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.

## REFERENCE DATA

1-(1). Max. switching capacity  
(1 Form C and 1 Form A)

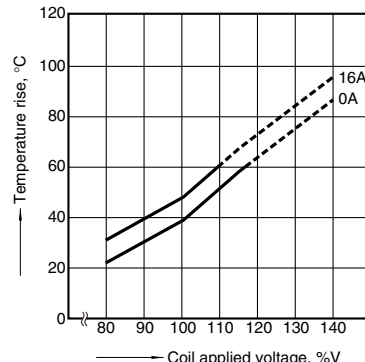


1-(2). Max. switching capacity (2 Form C)



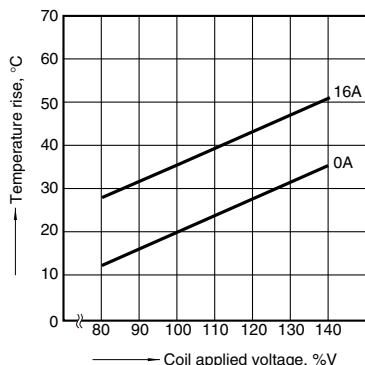
2-(1). Coil temperature rise (1 Form C/AC and 1 Form A/AC types)

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



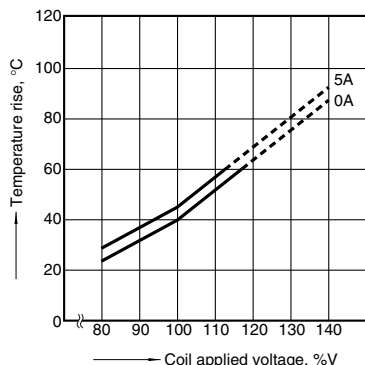
2-(2). Coil temperature rise (1 Form C/DC and 1 Form A/DC types)

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



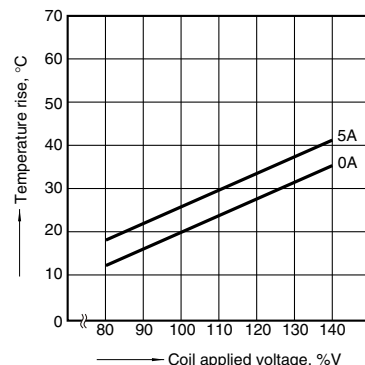
2-(3). Coil temperature rise (2 Form C/AC type)

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



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

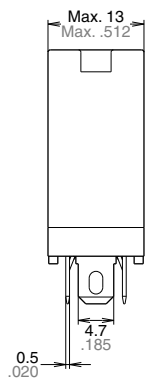
Measured portion: Inside the coil  
Ambient temperature: 70°C 158°F



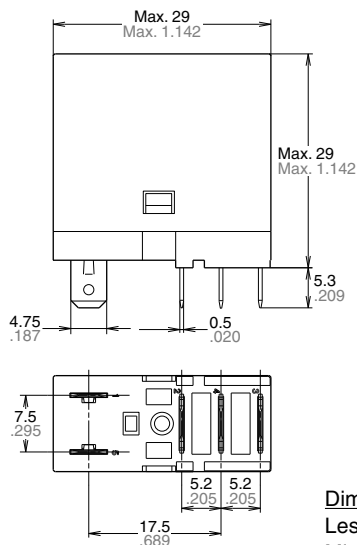
## DIMENSIONS (mm inch)

### 1. Plug-in type 1 Form C

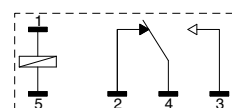
CAD Data



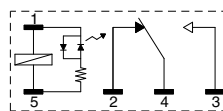
### External dimensions



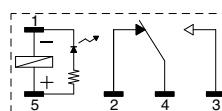
### Schematic (Bottom view) Standard type



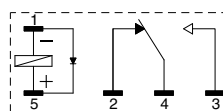
### With LED AC type



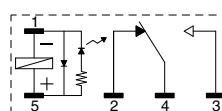
### With LED DC type



### With Diode type



### With Diode and LED type



### Dimension:

Less than 1mm .039inch:

Min. 1mm .039inch less than 3mm .118 inch:

Min. 3mm .118 inch:

### Tolerance

±0.1 ±.004

±0.2 ±.008

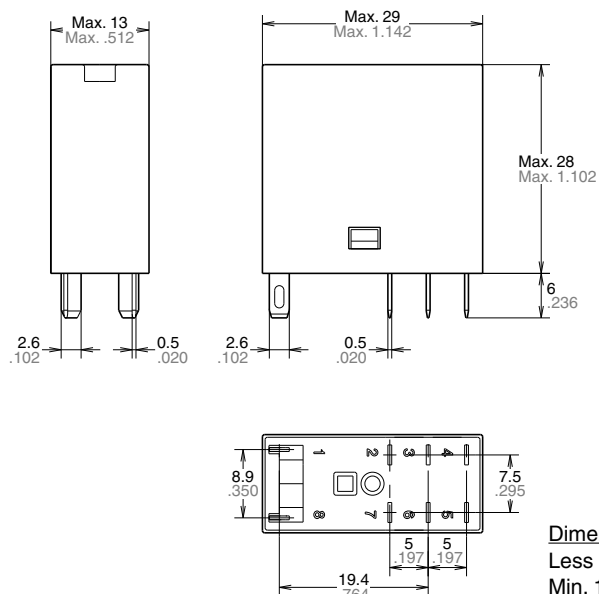
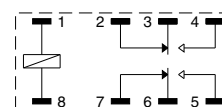
±0.3 ±.012

## 2. Plug-in type 2 Form C

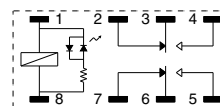
## CAD Data



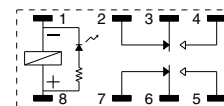
## External dimensions

Schematic (Bottom view)  
Standard type

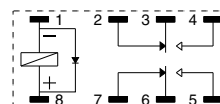
## With LED AC type



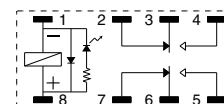
## With LED DC type



## With Diode type



## With Diode and LED type



## Dimension:

Less than 1mm .039inch:

Min. 1mm .039inch less than 3mm .118 inch:

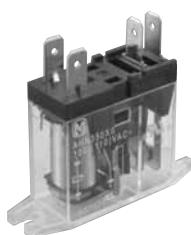
Min. 3mm .118 inch:

## Tolerance

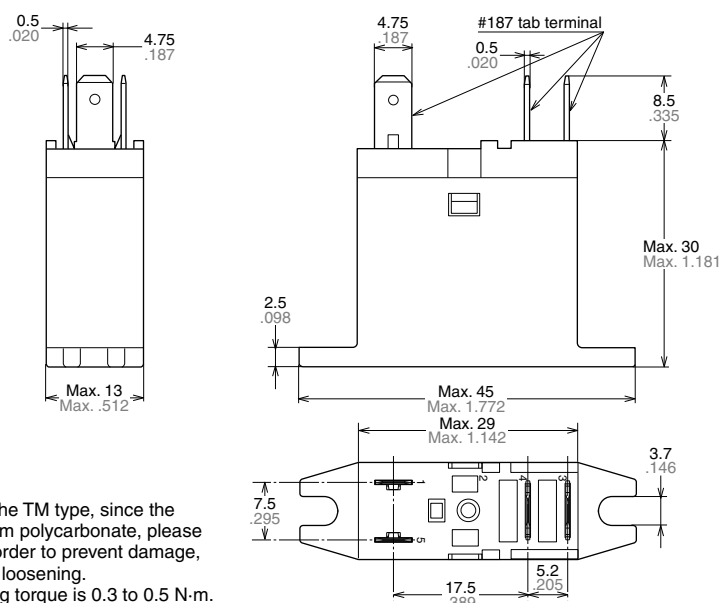
 $\pm 0.1 \pm .004$  $\pm 0.2 \pm .008$  $\pm 0.3 \pm .012$ 

## 3. TM type 1 Form A

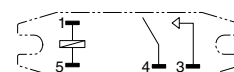
## CAD Data



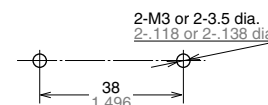
## External dimensions



## Schematic



## Mounting hole dimensions



- Notes: 1. When mounting the TM type, since the cover is made from polycarbonate, please use a washer in order to prevent damage, deformation, and loosening.  
2. Suitable tightening torque is 0.3 to 0.5 N·m.

## Dimension:

Less than 1mm .039inch:

Min. 1mm .039inch less than 3mm .118 inch:

Min. 3mm .118 inch:

## Tolerance

 $\pm 0.1 \pm .004$  $\pm 0.2 \pm .008$  $\pm 0.3 \pm .012$ 

## SAFETY STANDARDS

|                    | File No. | Certification authority: UL/C-UL | File No. | Certification authority: VDE                     |
|--------------------|----------|----------------------------------|----------|--------------------------------------------------|
| 1 Form C           | E43149*  | 10A 277V AC, 10A 30V DC, TV-5    | 40012003 | 10A 250V AC ( $\cos\phi=1.0$ ), 10A 30V DC (0ms) |
| 2 Form C           | E43149*  | 5A 277V AC, 5A 30V DC, TV-3      | 40012003 | 5A 250V AC ( $\cos\phi=1.0$ ), 5A 30V DC (0ms)   |
| 1 Form A (TM type) | E43149*  | 16A 277V AC, 16A 30V DC          | —        | **                                               |

\* CSA standard: Certified by C-UL

\*\* Please consult us.

## NOTES

**1. For cautions for use, please read “General Application Guidelines” on page B-1.**

**2. Coil applied voltage**

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.

**3. LED indications**

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

**4. Switching lifetime**

The switching lifetime is defined under the standard test condition specified in the JIS C 5442(\*2) standard (temperature  $15$  to  $35^{\circ}\text{C}$   $59$  to  $95^{\circ}\text{F}$ , humidity  $25$  to  $75\%$  R.H.). 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

**5. Direct mount type (TM type)**

If the current to the connection terminal will exceed  $10\text{ A}$ , we recommend connecting with solder. If you are going to use a tab terminal when the current will exceed  $10\text{ A}$ , make sure to verify the temperature rise on the receptacle side under actual conditions before using. Please be careful, because excessive stress on the TM terminal can cause fluctuations in characteristics and damage.

**6. Conditions for operation, transport and storage**

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

(1) Temperature:

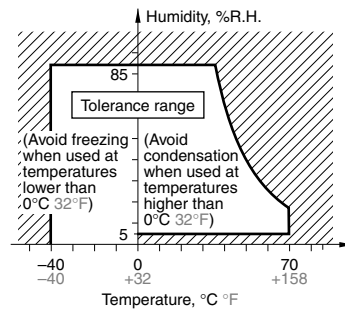
$-40$  to  $+70^{\circ}\text{C}$   $-40$  to  $+158^{\circ}\text{F}$

(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.

Temperature and humidity range for usage, transport, and storage



(3) Atmospheric pressure:  $86$  to  $106\text{ kPa}$

**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.

**7. Diode characteristics**

1) Reverse breakdown voltage:

Min.  $1,000\text{V}$  (with diode type)

Min.  $400\text{V}$  (with diode and LED indication type)

**8. Diode type**

Since the diode inside the relay coil are designed to absorb the counter emf, the element may be damaged if a large surge, etc., is applied to the diode.

If there is the possibility of a large surge voltage from the outside, please implement measures to absorb it.

**9. Please connect DC coil types with LED and built-in diode correctly by verifying the coil polarity (“+” and “-”). Connecting with reverse polarity will cause the LED not to light and damage the built-in diode due to its specification.**

**10. Installation**

If you will be installing adjacent to other relays, please keep a distance of at least  $5\text{ mm}$  from the relay.

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Please contact .....

**Panasonic Corporation**

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# Mouser Electronics

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## Panasonic:

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[AHN12212](#) [AHN12224](#) [AHN12324](#) [AHN21012](#) [AHN21024](#) [AHN210X0](#) [AHN210Y0](#) [AHN210Y2](#) [AHN21112](#)  
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