Panasonic
ideas for life

**TV-15, 30 AMP (1 Form A) Power Relay**

# HE RELAYS

1 Form A Plug-in type

**Compliance with RoHS Directive**

## FEATURES

**1. Excellent resistance to contact welding**
Owing to the pre-tension and kick-off mechanism, the 1 Form A passes TV-15 and the 2 Form A passes TV-10.

**2. High-capacity and long life**

| Contact arrangement | 1 Form A type | 2 Form A type |
|---|---|---|
| Contact capacity | 30A | 20A |
| Electrical life (at 20 cpm) | $2\times10^5$ | |
| Mechanical life (at 180 cpm) | DC type: $10^7$, AC type: $5\times10^6$ | |

**3. Excellent surge resistance**
Between contacts and coil, the surge voltage is more than 10,000 V (when surge waveform accords with JEC-212-1981).

**4. Compatible with all major safety standards**
UL, CSA, VDE and TÜV certified

## TYPICAL APPLICATIONS

**1. Office equipment**
Copiers, package air conditioners, automatic vending machines.

**2. Industrial equipment**
Machine tools, molding equipment, wrapping machines, food processing equipment, etc.

**3. Home appliances**
Air conditioners, microwave ovens, televisions, stereo systems, water heaters and air heating equipment.

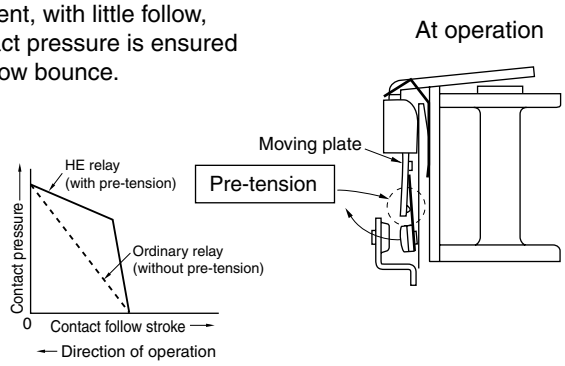
| Type | | Single side stable type | |
|---|---|---|---|
| | | HE 1 Form A, 2 Form A | |
| Insulation gap | | Min. 8 mm | |
| Distance between contacts* | | 1 Form A and 2 Form A: Min. 3 mm | PC board type: Min. 2.5 mm |
| Breakdown voltage | Between open contacts | 2, 000 Vrms for 1 min. | |
| | Between contact and coil | 5, 000 Vrms for 1 min. | |

## CLASSIFICATION

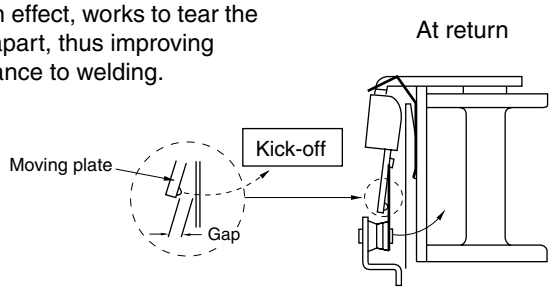
| Type | PC board | Plug-in | | TM | | Screw terminal | |
|---|---|---|---|---|---|---|---|
| Operating funciton | Single side stable | | | | | | |
| Contact arrangement | 1 Form A | 1 Form A | 2 Form A | 1 Form A | 2 Form A | 1 Form A | 2 Form A |

## PRE-TENSION AND KICK-OFF MECHANISM

**1. Pre-tension mechanism**
Before operation, the moving spring is pre-tensioned by being held down by a moving plate. As a result, at the ON moment, with little follow, contact pressure is ensured with low bounce.

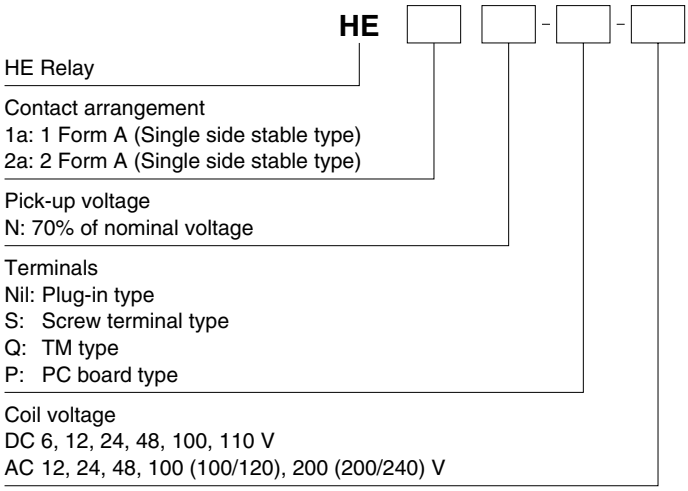



**2. Kick-off mechanism**
Even when contact welding has occurred, at the moment of return, the moving plate taps the moving spring (kick-off) and, in effect, works to tear the weld apart, thus improving resistance to welding.




| | 1 Form A | 2 Form A |
|---|---|---|
| Electrical life | 30 A 277 V AC, $10^5$<br>30 A 250 V AC, $20^5$ | 25 A 277 V AC, $10^5$<br>20 A 250 V AC, $20^5$ |
| TV rating | TV-15 | TV-10 |

## ORDERING INFORMATION




## TYPES

### 1. PC board type (1 Form A, DC coil) (Single side stable)

| Coil voltage | 1 Form A | Packing quantity | |
|---|---|---|---|
| | Part No. | Carton | Case |
| 6V DC | HE1aN-P-DC6V | 25 pcs. | 100 pcs. |
| 12V DC | HE1aN-P-DC12V | | |
| 24V DC | HE1aN-P-DC24V | | |
| 48V DC | HE1aN-P-DC48V | | |
| 100V DC | HE1aN-P-DC100V | | |
| 110V DC | HE1aN-P-DC110V | | |

### 2. Plug-in type (Single side stable)

| Type | Coil voltage | 1 Form A | 2 Form A | Packing quantity | |
|---|---|---|---|---|---|
| | | Part No. | Part No. | Carton | Case |
| DC type | 6V DC | HE1aN-DC6V | HE2aN-DC6V | 20 pcs. | 100 pcs. |
| | 12V DC | HE1aN-DC12V | HE2aN-DC12V | | |
| | 24V DC | HE1aN-DC24V | HE2aN-DC24V | | |
| | 48V DC | HE1aN-DC48V | HE2aN-DC48V | | |
| | 100V DC | HE1aN-DC100V | HE2aN-DC100V | | |
| | 110V DC | HE1aN-DC110V | HE2aN-DC110V | | |
| AC type | 12V AC | HE1aN-AC12V | HE2aN-AC12V | 20 pcs. | 100 pcs. |
| | 24V AC | HE1aN-AC24V | HE2aN-AC24V | | |
| | 48V AC | HE1aN-AC48V | HE2aN-AC48V | | |
| | 100/120V AC | HE1aN-AC100V | HE2aN-AC100V | | |
| | 200/240V AC | HE1aN-AC200V | HE2aN-AC200V | | |

### 3. TM type (Single side stable)

| Type | Coil voltage | 1 Form A | 2 Form A | Packing quantity | |
|---|---|---|---|---|---|
| | | Part No. | Part No. | Carton | Case |
| DC type | 6V DC | HE1aN-Q-DC6V | HE2aN-Q-DC6V | 20 pcs. | 100 pcs. |
| | 12V DC | HE1aN-Q-DC12V | HE2aN-Q-DC12V | | |
| | 24V DC | HE1aN-Q-DC24V | HE2aN-Q-DC24V | | |
| | 48V DC | HE1aN-Q-DC48V | HE2aN-Q-DC48V | | |
| | 100V DC | HE1aN-Q-DC100V | HE2aN-Q-DC100V | | |
| | 110V DC | HE1aN-Q-DC110V | HE2aN-Q-DC110V | | |
| AC type | 12V AC | HE1aN-Q-AC12V | HE2aN-Q-AC12V | 20 pcs. | 100 pcs. |
| | 24V AC | HE1aN-Q-AC24V | HE2aN-Q-AC24V | | |
| | 48V AC | HE1aN-Q-AC48V | HE2aN-Q-AC48V | | |
| | 100/120V AC | HE1aN-Q-AC100V | HE2aN-Q-AC100V | | |
| | 200/240V AC | HE1aN-Q-AC200V | HE2aN-Q-AC200V | | |

### 4. Screw terminal type (Single side stable)

| Type | Coil voltage | 1 Form A | 2 Form A | Packing quantity | |
|---|---|---|---|---|---|
| | | Part No. | Part No. | Carton | Case |
| DC type | 6V DC | HE1aN-S-DC6V | HE2aN-S-DC6V | 10 pcs. | 50 pcs. |
| | 12V DC | HE1aN-S-DC12V | HE2aN-S-DC12V | | |
| | 24V DC | HE1aN-S-DC24V | HE2aN-S-DC24V | | |
| | 48V DC | HE1aN-S-DC48V | HE2aN-S-DC48V | | |
| | 100V DC | HE1aN-S-DC100V | HE2aN-S-DC100V | | |
| | 110V DC | HE1aN-S-DC110V | HE2aN-S-DC110V | | |
| AC type | 12V AC | HE1aN-S-AC12V | HE2aN-S-AC12V | 10 pcs. | 50 pcs. |
| | 24V AC | HE1aN-S-AC24V | HE2aN-S-AC24V | | |
| | 48V AC | HE1aN-S-AC48V | HE2aN-S-AC48V | | |
| | 100/120V AC | HE1aN-S-AC100V | HE2aN-S-AC100V | | |
| | 200/240V AC | HE1aN-S-AC200V | HE2aN-S-AC200V | | |

Note: The TM type of the screw terminals are also available.

# RATING

### 1. Coil data

1) AC coils

| 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) | Nominal operating power | Max. allowable voltage (at 20°C 68°F) |
|---|---|---|---|---|---|
| 12V AC | 70%V or less of nominal voltage (Initial) | 15%V or more of nominal voltage (Initial) | 138mA | 1.7VA | 110%V of nominal voltage |
| 24V AC | | | 74mA | 1.8VA | |
| 48V AC | | | 39mA | 1.9VA | |
| 100/120V AC | | | 18.7 to 2.1mA | 1.9 to 2.7VA | |
| 200/240V AC | | | 9.1 to 10.8mA | 1.8 to 2.6VA | |

2) DC coils

| Coil voltage | Pick-up voltage (at 20°C 68°F) | Drop-out voltage (at 20°C 68°F) | Nominal operating current [±10%] (at 20°C 68°F) | Coil resistance [±10%] (at 20°C 68°F) | Nominal operating power | Max. allowable voltage (at 55°C 131°F) |
|---|---|---|---|---|---|---|
| 6V DC | 70%V or less of nominal voltage (Initial) | 10%V or more of nominal voltage (Initial) | 320mA | 18.8Ω | 1.92W | 110%V of nominal voltage |
| 12V DC | | | 160mA | 75Ω | 1.92W | |
| 24V DC | | | 80mA | 300Ω | 1.92W | |
| 48V DC | | | 40mA | 1,200Ω | 1.92W | |
| 100V DC | | | 19mA | 5,200Ω | 1.92W | |
| 110V DC | | | 18mA | 6,300Ω | 1.92W | |

## 2. Specifications

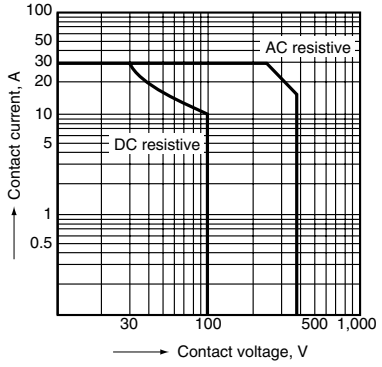
| Characteristics | Item | | Specifications | |
|---|---|---|---|---|
| Contact | Arrangement | | 1 Form A | 2 Form A |
| | Initial contact resistance, max | | Max. 100 mΩ (By voltage drop 6 V DC 1A) | |
| | Contact material | | $AgSnO_2$ type | |
| Rating | Nominal switching capacity (resistive load) | | 30A 277V AC | 25A 277V AC |
| | Max. switching power | | 8,310VA | 6,925VA |
| | Max. switching voltage | | 277V AC, 30V DC | |
| | Max. switching current | | 30A | 25A |
| | Nominal operating power | | DC: 1.92W, AC: 1.7 to 2.7VA | |
| | Min. switching capacity (Reference value)*1 | | 100mA 5V DC | |
| Electrical characteristics | Insulation resistance (Initial) | | Min. 1,000MΩ (at 500V DC)<br>Measurement at same location as “Initial breakdown voltage” section. | |
| | Breakdown voltage (Initial) | Between open contacts | 2,000 Vrms for 1min (Detection current: 10mA.) | |
| | | Between contact sets | — | 4,000 Vrms for 1min (Detection current: 10mA.) |
| | | Between contact and coil | 5,000 Vrms for 1min (Detection current: 10mA.) | |
| | Surge breakdown voltage*2 (between contact and coil) | | Min. 10,000V (initial) | |
| | Temperature rise | | DC: Max. 60°C (at 55°C) (By resistive method), AC: Max. 65°C (at 55°C) (By resistive method) | |
| | Operate time (at nominal voltage) | | Max. 30ms (excluding contact bounce time) | |
| | Release time (at nominal voltage) | | DC: Max.10ms (excluding contact bounce time, without diode),<br>AC: Max. 30ms (excluding contact bounce time) | |
| Mechanical characteristics | Shock resistance | Functional | Min. 98 m/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.) | |
| | | Destructive | Min. 980 m/s² (Half-wave pulse of sine wave: 6 ms.) | |
| | Vibration resistance | Functional | 10 to 55 Hz at double amplitude of 1 mm (Detection time: 10μs.) | |
| | | Destructive | 10 to 55 Hz at double amplitude of 1.5 mm | |
| Expected life | Mechanical | | DC: Min. $10^7$ (at 180 cpm), AC: Min. $5\times10^6$ (at 180 cpm) | |
| | Electrical (resistive load) (at 20 cpm) | | Min. $10^5$ (30A 277V AC)<br>Min. $2\times10^5$ (30A 250V AC) | Min. $10^5$ (25A 277V AC)<br>Min. $2\times10^5$ (20A 250V AC) |
| Conditions | Conditions for operation, transport and storage*3 | | Ambient temperature: –50°C to +55°C –58°F to +131°F<br>Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature),<br>Air pressure: 86 to 106kPa | |
| | Conditions for operation, transport and storage*3 | | 20 cpm (at max. rating) | |
| Unit weight | | | PC board type: approx. 80g 2.82oz, Plug-in type/TM type: approx. 90g 3.17oz,<br>Screw terminal type: approx. 120g 4.23oz | |

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 Refer to 6. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT.

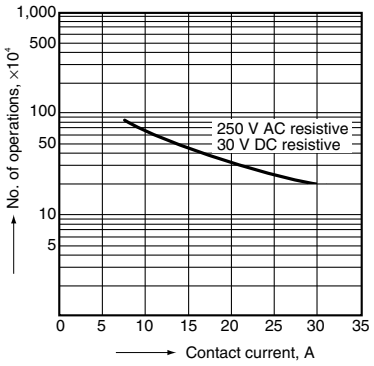
# REFERENCE DATA

### 1 Form A Type

1. Maximum switching power

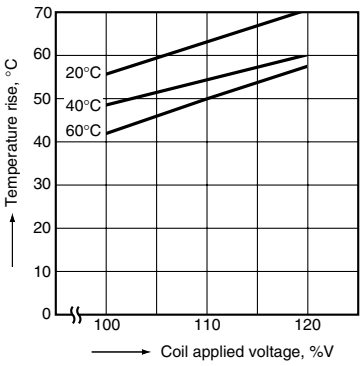



2. Life curve

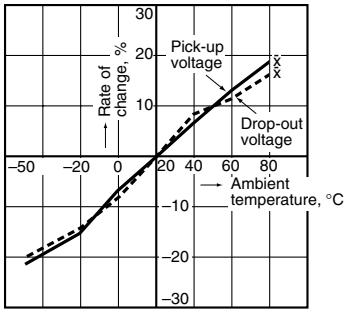



3. Coil temperature rise (DC type)

Measured portion: Inside the coil
Contact current: 30 A

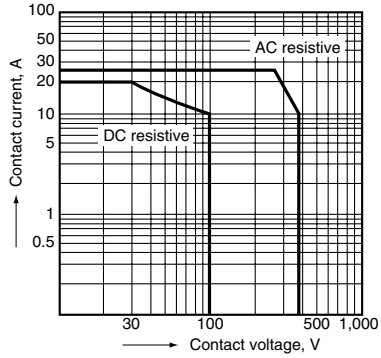


4. Ambient temperature characteristics
Tested sample: HE1aN-AC120V, 6 pcs.

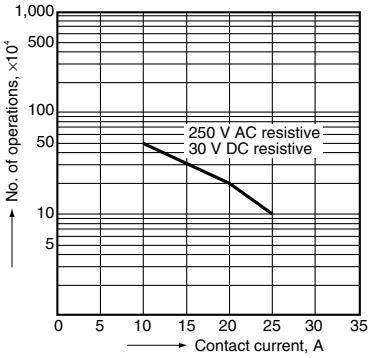



## 2 Form A Type

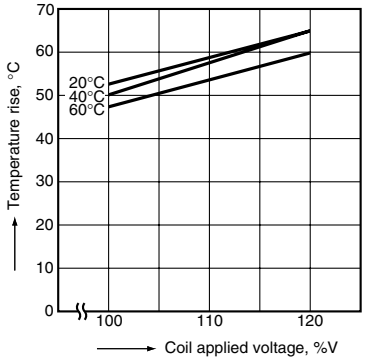
1. Maximum switching power



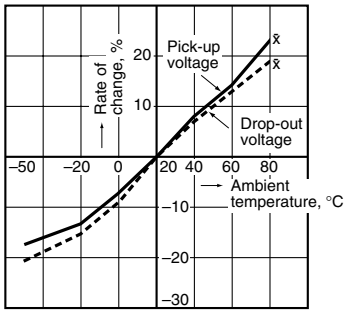

2. Life curve




3. Coil temperature rise (DC type)
Measured portion: Inside the coil
Contact current: 30 A




4. Ambient temperature characteristics
Tested sample: HE2aN-AC120V, 6 pcs.

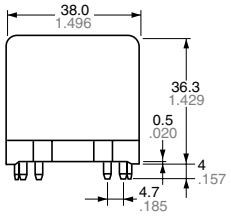


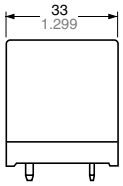

# DIMENSIONS (Unit: mm inch)

**1. PC board type**

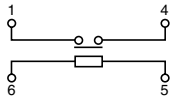
1 Form A

External dimensions
Single side stable type

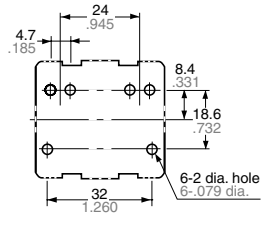



Schematic (Bottom view)
Single side stable type




PC board pattern (Bottom view)



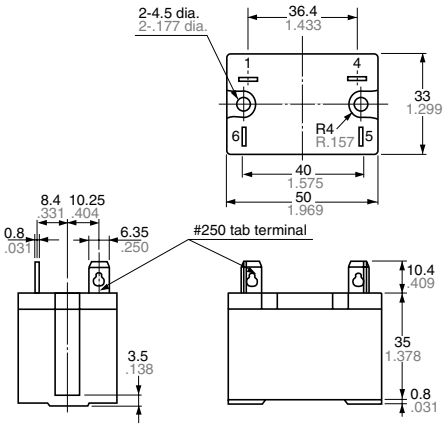

General tolerance: ±0.3 ±.012

Tolerance: ±0.1 ±.004

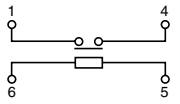
## 2. Plug-in type

1 Form A

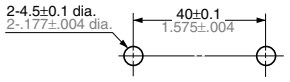
External dimensions
Single side stable type




Schematic (Bottom view)
Single side stable type




Panel cutout

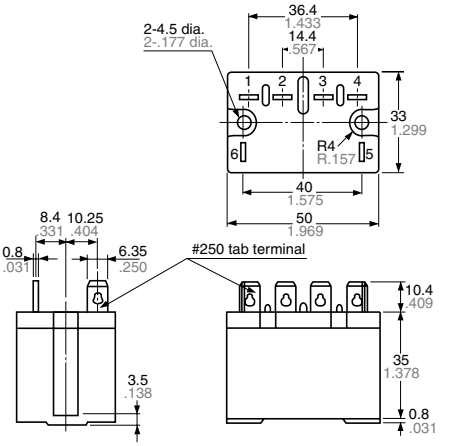



Tolerance: ±0.1 ±.004

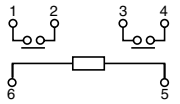
General tolerance: ±0.3 ±.012

2 Form A

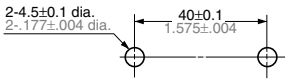
External dimensions
Single side stable type




Schematic (Bottom view)
Single side stable type




Panel cutout



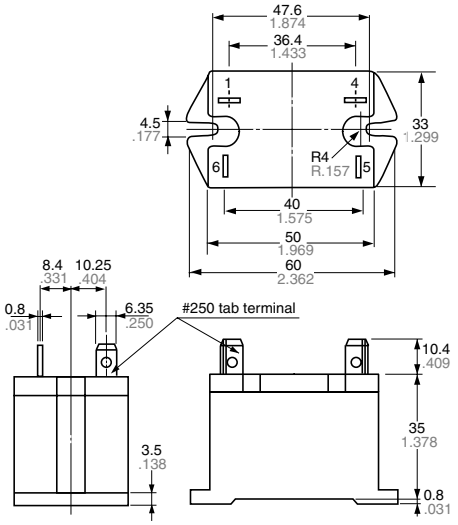

Tolerance: ±0.1 ±.004

General tolerance: ±0.3 ±.012

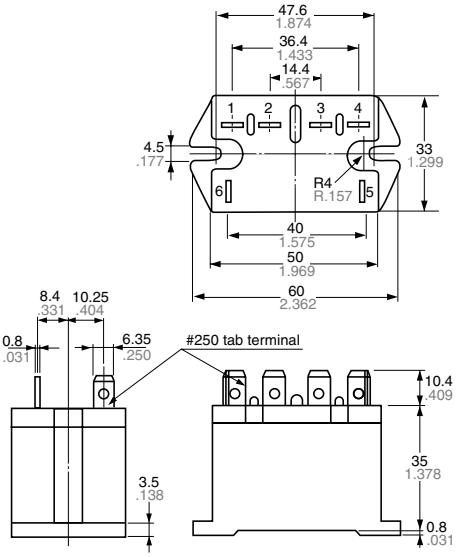
## 3. TM type

External dimensions
Single side stable type

1 Form A

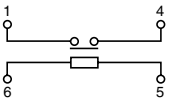



2 Form A

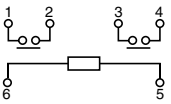



Schematic (Bottom view)
Single side stable type

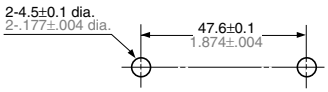
1 Form A




2 Form A




Panel cutout




Tolerance: ±0.1 ±.004

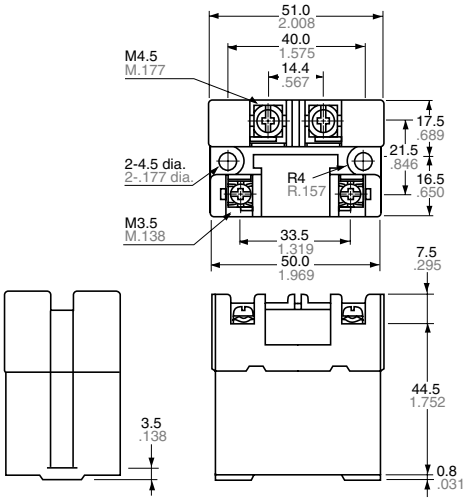
General tolerance: ±0.3 ±.012

**4. Screw terminal type**

1 Form A

External dimensions

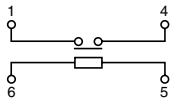
Single side stable type



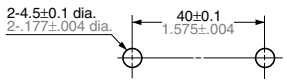

General tolerance: ±0.3 ±.012

Schematic (Bottom view)

Single side stable type




Panel cutout

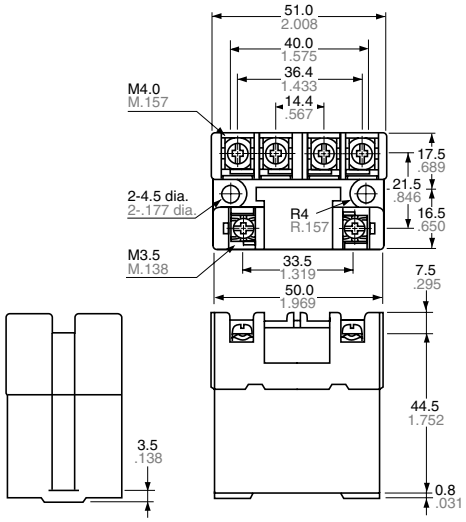



Tolerance: ±0.1 ±.004

2 Form A

External dimensions

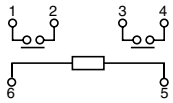
Single side stable type



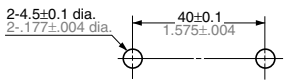

General tolerance: ±0.3 ±.012

Schematic (Bottom view)

Single side stable type



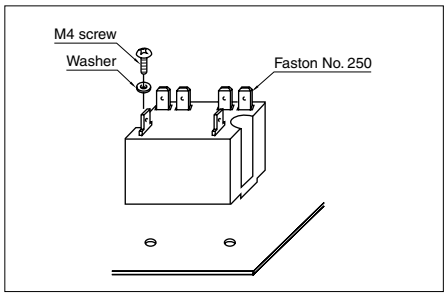

Panel cutout



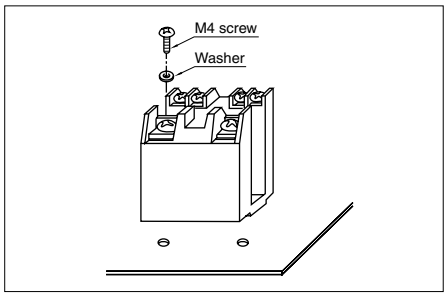

Tolerance: ±0.1 ±.004

# MOUNTING METHOD

**1. Plug-in type**




**2. Screw terminal type**




**3. Allowable installation wiring size for screw terminal types and terminal sockets**

Due to the UP terminals, it is possible to either directly connect the wires or use crimped terminal.

## NOTES

1. The dust cover should not be removed since doing so may alter the characteristics.
2. Avoid use under severe environmental conditions, such as high humidity, organic gas or in dust, oily locations and locations subjected to extremely frequent shock or vibrations.
3. When mounting, use spring washers. Optimum fastening torque ranges from 49 to 68.6 N·m (5 to 7 kgf·cm).
4. Firmly insert the receptacles so that there is no slack or looseness. To remove a receptacle, 19.6 to 39.2 N (2 to 4 kg) of pulling strength is required. Do not remove more than one receptacle at one time. Always remove one receptacle at a time and pull it straight outwards.
5. When using the AC type, the operate time due to the in-rush phase is 20 ms or more. Therefore, it is necessary for you to verify the characteristics for your actual circuit.
6. When using the push-on blocks for the screw terminal type, use crimped terminals and tighten the screw-down terminals to the torque below.
M4.5 screw:
147 to 166.6 N·cm (15 to 17 kgf·cm)
M4 screw:
117.6 to 137 N·cm (12 to 14 kgf·cm)
M3.5 screw:
78.4 to 98 N·cm (8 to 10 kgf·cm)

## For Cautions for Use, see Relay Technical Information.