

Panasonic

ideas for life

Relay for control panel of
10A (2c/3c/4c)

HP RELAYS



RoHS compliant

FEATURES

1. High-capacity and long life

Mechanical life is more than 10 million operations and, with electrical life of more than 200,000 operations (resistive load 10 A; inductive load 7.5 A), the relay has excellent inductive load durability.

2. Easy mounting and wiring

The terminal arrangement is apparent at a glance and wiring is easy. Moreover, quick tab terminal is also possible.

3. Operation indicator option

Optional operation indicators are available for easy visual confirmation that relays are operating. They simplify maintenance.

4. Wide range of sockets and terminal sockets

To enable use with DIN rails, DIN terminal sockets are also available.

2. Machine tools

Control of positioning and directional change in turning machines, lathes, borers, etc.

3. Food processing packing machines

Automatic control of packing equipment for milk and seafood, bottling, canning, and packaging

4. Office equipment

Control of copiers, time recorders, etc.

5. Coin operate machines

Control of food, cigarette, and other vending machines

6. Measuring devices and equipment

For repeating installation of control signals and in power amplifiers

7. Generators, transformers and power receiving equipment.

Functional parts in protective equipment, functional assistance in automatic adjustment equipment, telemeters and other remote monitoring equipment

8. Control of conveyance equipment

Control panels for elevators, escalators, and other conveyance equipment, control of all kinds industrial transport equipment such as conveyors.

9. Amusement equipment

Control of equipment in amusement parks, etc., control of bowling alley equipment, control of fountains in public parks

TYPICAL APPLICATIONS

HP relays enjoy wide use in various applications, particularly in automation controls and remote controls.

Applications include:

1. Industrial machinery

For controlling positioning, pressure, and temperature in molding equipment, boilers, pumps, charging pressure equipment, measuring and evaluation equipment, textile machines, etc.

ORDERING INFORMATION

HP - - -

Contact arrangement

2: 2 Form C

3: 3 Form C

4: 4 Form C

Terminal arrangement

Nil: Plug-in terminal

TM: TM type (2 Form C only)

M: Direct mounting (3 Form C only)

Operation indication

Nil: Without indication

L: With indication

Nominal coil voltage

AC 24, 48, 100, 115, 200, 220, 240 V

DC 12, 24, 48, 100, 110 V

Contact material

F: 4 Form C, Silver alloy (cadmium-free)

Nil: 2 Form C, 3 Form C (Silver)

With LED indicator type

Nominal coil voltage: 24 V AC

12, 24, 48 V DC

With neon lamp type

Nominal coil voltage: 100, 115, 200, 220, 240 V AC

100, 110 V DC



Discontinued
Last time buy: August 31, 2012

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TYPES

1. Plug-in type

| Nominal coil voltage | 2 Form C | 3 Form C | 4 Form C |
|----------------------|------------|------------|--------------|
| | Part No. | Part No. | Part No. |
| 24V AC | HP2-AC24V | HP3-AC24V | HP4-AC24V-F |
| 48V AC | HP2-AC48V | HP3-AC48V | HP4-AC48V-F |
| 100V AC | HP2-AC100V | HP3-AC100V | HP4-AC100V-F |
| 115V AC | HP2-AC115V | HP3-AC115V | HP4-AC115V-F |
| 200V AC | HP2-AC200V | HP3-AC200V | HP4-AC200V-F |
| 220V AC | HP2-AC220V | HP3-AC220V | HP4-AC220V-F |
| 240V AC | HP2-AC240V | HP3-AC240V | HP4-AC240V-F |
| 12V DC | HP2-DC12V | HP3-DC12V | HP4-DC12V-F |
| 24V DC | HP2-DC24V | HP3-DC24V | HP4-DC24V-F |
| 48V DC | HP2-DC48V | HP3-DC48V | HP4-DC48V-F |
| 100V DC | HP2-DC100V | HP3-DC100V | HP4-DC100V-F |
| 110V DC | HP2-DC110V | HP3-DC110V | HP4-DC110V-F |

Standard packing (2 Form C): Carton: 20 pcs.; Case: 100 pcs.

Standard packing (3 Form C, 4 Form C): Carton: 10 pcs.; Case: 50 pcs.

2. Plug-in type (with operation indication)

| | Nominal coil voltage | 2 Form C | 3 Form C | 4 Form C |
|---------------------|----------------------|--------------|--------------|----------------|
| | | Part No. | Part No. | Part No. |
| With LED indication | 24V AC | HP2-L-AC24V | HP3-L-AC24V | HP4-L-AC24V-F |
| With neon lamp | 100V AC | HP2-L-AC100V | HP3-L-AC100V | HP4-L-AC100V-F |
| | 115V AC | HP2-L-AC115V | HP3-L-AC115V | HP4-L-AC115V-F |
| | 200V AC | HP2-L-AC200V | HP3-L-AC200V | HP4-L-AC200V-F |
| | 220V AC | HP2-L-AC220V | HP3-L-AC220V | HP4-L-AC220V-F |
| | 240V AC | HP2-L-AC240V | HP3-L-AC240V | HP4-L-AC240V-F |
| With LED indication | 12V DC | HP2-L-DC12V | HP3-L-DC12V | HP4-L-DC12V-F |
| | 24V DC | HP2-L-DC24V | HP3-L-DC24V | HP4-L-DC24V-F |
| | 48V DC | HP2-L-DC48V | HP3-L-DC48V | HP4-L-DC48V-F |
| With neon lamp | 100V DC | HP2-L-DC100V | HP3-L-DC100V | HP4-L-DC100V-F |
| | 110V DC | HP2-L-DC110V | HP3-L-DC110V | HP4-L-DC110V-F |

Standard packing (2 Form C): Carton: 20 pcs.; Case: 100 pcs.

Standard packing (3 Form C, 4 Form C): Carton: 10 pcs.; Case: 50 pcs.

3. TM type and Direct mount type

| Nominal coil voltage | 2 Form C (TM type) | 3 Form C (direct mount type) |
|----------------------|--------------------|------------------------------|
| | Part No. | Part No. |
| 24V AC | HP2-TM-AC24V | HP3-M-AC24V |
| 48V AC | HP2-TM-AC48V | HP3-M-AC48V |
| 100V AC | HP2-TM-AC100V | HP3-M-AC100V |
| 115V AC | HP2-TM-AC115V | HP3-M-AC115V |
| 200V AC | HP2-TM-AC200V | HP3-M-AC200V |
| 220V AC | HP2-TM-AC220V | HP3-M-AC220V |
| 240V AC | HP2-TM-AC240V | HP3-M-AC240V |
| 12V DC | HP2-TM-DC12V | HP3-M-DC12V |
| 24V DC | HP2-TM-DC24V | HP3-M-DC24V |
| 48V DC | HP2-TM-DC48V | HP3-M-DC48V |
| 100V DC | HP2-TM-DC100V | HP3-M-DC100V |
| 110V DC | HP2-TM-DC110V | HP3-M-DC110V |

Standard packing: Carton: 10 pcs.; Case: 50 pcs.

4. Direct mount type (with LED indication)

| | Nominal coil voltage | 3 Form C |
|----------------|----------------------|---------------|
| | | Part No. |
| With neon lamp | 100V AC | HP3-ML-AC100V |
| | 115V AC | HP3-ML-AC115V |
| | 200V AC | HP3-ML-AC200V |
| | 220V AC | HP3-ML-AC220V |
| | 240V AC | HP3-ML-AC240V |
| | 100V DC | HP3-ML-DC100V |
| | 110V DC | HP3-ML-DC110V |

Standard packing: Carton: 10 pcs.; Case: 50 pcs.

Notes: 1. Standard packaging is handled in units of inner cartons. Please specify if you require inner cartons to be boxed.

2. Sockets, terminal sockets and installation brackets are not included. Please order these separately.

3. For products compliant with international standards, please refer to the standards chart.

* For sockets and terminal sockets, see page 117.



Discontinued
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RATING

1. Coil data

1) AC coils

| Contact arrangement | Nominal coil voltage | Nominal operating current (mA) | | Nominal operating power (VA) | | Inductance (H) | | Pick-up voltage (at 20°C 68°F) | Drop-out voltage (at 20°C 68°F) | Max. applied voltage (at 20°C 68°F) |
|---------------------|----------------------|--------------------------------|--------|------------------------------|-------|----------------|-------|---|---|-------------------------------------|
| | | 50Hz | 60Hz | 50Hz | 60Hz | 50Hz | 60Hz | | | |
| 2 Form C | 24V AC | 94mA | 78mA | 2.25VA | 1.9VA | 0.753 | 0.776 | 80%V or less of nominal voltage (Initial) | 30%V or more of nominal voltage (Initial) | 110%V of nominal voltage |
| | 48V AC | 46.5mA | 39mA | 2.23VA | 1.9VA | 3.055 | 3.106 | | | |
| | 100V AC | 25.3mA | 21mA | 2.36VA | 2.1VA | 12.60 | 12.03 | | | |
| | 115V AC | 23.1mA | 18mA | 2.31VA | 2.1VA | 16.70 | 15.83 | | | |
| | 200V AC | 12.4mA | 11mA | 2.48VA | 2.2VA | 48.03 | 45.81 | | | |
| | 240V AC | 10.6mA | 9.5mA | 2.34VA | 2.1VA | 61.28 | 57.90 | | | |
| 3 Form C | 24V AC | 148.7mA | 130mA | 3.56VA | 3.1VA | 0.0494 | 0.475 | 80%V or less of nominal voltage (Initial) | 30%V or more of nominal voltage (Initial) | 110%V of nominal voltage |
| | 48V AC | 74.2mA | 65mA | 3.56VA | 3.1VA | 1.976 | 1.899 | | | |
| | 100V AC | 36.4mA | 32mA | 3.64VA | 3.2VA | 8.500 | 8.038 | | | |
| | 115V AC | 32.5mA | 28.5mA | 3.74VA | 3.3VA | 10.79 | 10.36 | | | |
| | 200V AC | 18.2mA | 16mA | 3.65VA | 3.2VA | 33.53 | 32.10 | | | |
| | 240V AC | 16.0mA | 14.2mA | 3.54VA | 3.1VA | 41.35 | 39.32 | | | |
| 4 Form C | 24V AC | 229mA | 200mA | 5.49VA | 4.8VA | 0.320 | 0.309 | 80%V or less of nominal voltage (Initial) | 30%V or more of nominal voltage (Initial) | 110%V of nominal voltage |
| | 48V AC | 108mA | 95mA | 5.18VA | 4.6VA | 1.348 | 1.292 | | | |
| | 100V AC | 57.3mA | 50mA | 5.73VA | 5.0VA | 5.348 | 5.156 | | | |
| | 115V AC | 47.6mA | 42mA | 5.47VA | 4.8VA | 7.264 | 6.953 | | | |
| | 200V AC | 28.5mA | 25mA | 5.69VA | 5.0VA | 21.27 | 20.45 | | | |
| | 240V AC | 23.8mA | 21mA | 5.24VA | 4.6VA | 27.75 | 26.57 | | | |
| | 240V AC | 23.3mA | 20.5mA | 5.58VA | 4.9VA | 30.98 | 29.75 | | | |

2) DC coils (20°C 68°F)

| Contact arrangement | Nominal coil voltage | Nominal current (mA) | Nominal operating power (W) | Coil resistance (Ω) | Pick-up voltage (at 20°C 68°F) | Drop-out voltage (at 20°C 68°F) | Max. applied voltage (at 20°C 68°F) |
|---------------------|----------------------|----------------------|-----------------------------|---------------------|---|---|-------------------------------------|
| 2 Form C | 12V DC | 109mA | 1.3W | 110Ω | 80%V or less of nominal voltage (Initial) | 15%V or more of nominal voltage (Initial) | 110%V of nominal voltage |
| | 24V DC | 54.5mA | 1.3W | 440Ω | | | |
| | 48V DC | 26.7mA | 1.3W | 1,800Ω | | | |
| | 100V DC | 14.9mA | 1.5W | 6,700Ω | | | |
| | 110V DC | 15.0mA | 1.7W | 7,300Ω | | | |
| 3 Form C | 12V DC | 120mA | 1.4W | 100Ω | 80%V or less of nominal voltage (Initial) | 15%V or more of nominal voltage (Initial) | 110%V of nominal voltage |
| | 24V DC | 60mA | 1.4W | 400Ω | | | |
| | 48V DC | 31mA | 1.5W | 1,560Ω | | | |
| | 100V DC | 15.6mA | 1.6W | 6,400Ω | | | |
| | 110V DC | 14.9mA | 1.6W | 7,450Ω | | | |
| 4 Form C | 12V DC | 127mA | 1.5W | 95Ω | 80%V or less of nominal voltage (Initial) | 15%V or more of nominal voltage (Initial) | 110%V of nominal voltage |
| | 24V DC | 63mA | 1.5W | 380Ω | | | |
| | 48V DC | 32.0mA | 1.5W | 1,500Ω | | | |
| | 100V DC | 16.3mA | 1.6W | 5,950Ω | | | |
| | 110V DC | 15.7mA | 1.7W | 7,000Ω | | | |

Notes: 1. The nominal current area is ±15% (60Hz) [AC coils], ±10% (20°C) [DC coils]

2. The coil resistance for DC operation is the value measured when the coil temperature is 20°C 68°F. Compensate ±0.4% for every ±1°C change in temperature.

3. The relay operates in a range of 80% to 110% V of the nominal coil voltage, but ideally, in consideration of temporary voltage fluctuations, it should be operated at the nominal coil voltage. In particular, for AC operation, if the impressed voltage drops to 80% V or more below the nominal coil voltage, humming will occur and a large current will flow leading possibly to coil burnout.

4. For use with 200 V DC, connect a 6.7kΩ (10W) resistor, in series, to the 100 V DC relay [3 Form C type is .64kΩ (5W); 4 Form C type is .62kΩ (10W)].

5. As a general rule, only a pure DC voltage should be used for the coil drive. However, a DC power supply that contains ripples has characteristics that differ from pure DC. Therefore, please verify characteristics (operate voltage, release voltage, humming) using the actual circuit that will be used.



Discontinued
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2. Specifications

| Characteristics | Item | Specifications | |
|----------------------------|---|---|--|
| Contact | Arrangement | 2 Form C, 3 Form C, 4 Form C | |
| | Contact resistance (Initial) | Max. 15 mΩ (By voltage drop 6 V DC 1A) | |
| | Contact material | 2 Form C, 3 Form C 4 Form C Ag Ag alloy (cd free) | |
| Rating | Nominal switching capacity | 10A 250V AC (resistive load) | |
| | Min. switching capacity (Reference value)*1 | 100mA 5V DC | |
| Electrical characteristics | Insulation resistance (Initial) | Min. 100MΩ (at 500V DC) Measurement at same location as "Breakdown voltage" section. | |
| | Breakdown voltage (Initial) | Between open contacts | 1,000 Vrms for 1min (2 Form C, 4 Form C). 2,000 Vrms for 1min (3 Form C) (Detection current: 10mA.) |
| | | Between contact sets | 1,500 Vrms for 1min (2 Form C, 4 Form C). 2,000 Vrms for 1min (3 Form C) (Detection current: 10mA.) |
| | | Between contact and coil | 1,500 Vrms for 1min (2 Form C, 4 Form C). 2,000 Vrms for 1min (3 Form C) (Detection current: 10mA.) |
| | Temperature rise (coil) | Max. 65°C 149°F (By temperature method, at 40°C, nominal current) | |
| | Operate time*2 | Max. 25ms (2 Form C), Max.30ms (3 Form C, 4 Form C) (Nominal coil voltage applied to the coil, excluding contact bounce time.) | |
| | Release time*2 | Max. 25ms (2 Form C), Max.30ms (3 Form C, 4 Form C) (Nominal coil voltage applied to the coil, excluding contact bounce time.) (without diode) | |
| Mechanical characteristics | Shock resistance | Functional | Min. 98 m/s ² (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.) |
| | | Destructive | Min. 980 m/s ² (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 2 mm |
| Expected life | Mechanical | Min. 10 ⁷ | |
| Conditions | Conditions for operation, transport and storage*3 | Ambient temperature: -50°C to +40°C -58°F to +104°F Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) | |
| | Max. Operating speed | 20 times/min. (at max. rating) | |
| Unit weight | | 2 Form C: approx. 60g 2.12oz, 3 Form C: approx. 100g 3.53oz, 4 Form C: approx. 125g 4.41oz | |

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.

3. Electrical life

1) AC load

| Voltage | 125V AC | | 250V AC | | Expected life |
|---------|-----------------------------|-------------------------------|-----------------------------|-------------------------------|------------------------|
| | Resistive load (A) (cosφ=1) | Inductive load (A) (cosφ=0.4) | Resistive load (A) (cosφ=1) | Inductive load (A) (cosφ=0.4) | |
| Current | — | — | 10 | 7.5 | Min. 2×10 ⁵ |
| | 10 | 7.5 | 7.5 | 5 | Min. 5×10 ⁵ |
| | 5 | 3 | 3 | 2 | Min. 10 ⁶ |
| | 1 | 0.7 | 0.6 | 0.4 | Min. 2×10 ⁶ |

Note: When the electromagnet or exciting coil (Solenoid, etc.) is the load, the value of motor or lamp load is applicable.

2) DC load

| Voltage | 24V DC | | 125V DC | | Expected life |
|---------|--------------------|--------------------|--------------------|--------------------|------------------------|
| | Resistive load (A) | Inductive load (A) | Resistive load (A) | Inductive load (A) | |
| Current | — | 7 | — | — | Min. 2×10 ⁵ |
| | 7.5 | 5 | 0.5 | 0.4 | Min. 5×10 ⁵ |
| | 5 | 3 | 0.3 | 0.2 | Min. 10 ⁶ |
| | 1 | 0.6 | 0.1 | 0.06 | Min. 2×10 ⁶ |

Notes: 1. For DC inductive loads, use an arc suppressing circuit.

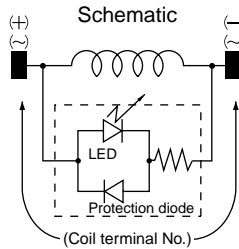
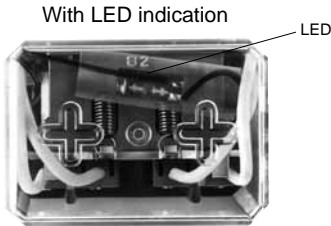
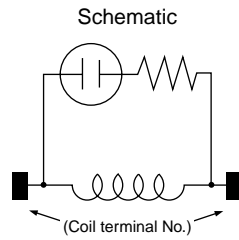
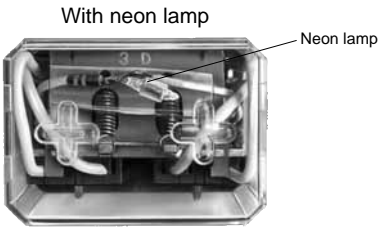
2. Cautions at DC load use

When used under a DC load operating at high repetition rate with considerable arcing, corrosion of the contacts and/or the contact blades is likely to occur.



4. Life of LED and neon lamp (with operation indication)

| | | |
|---------------------|----------------------------------|----------------------------------|
| | Continuous | Use rating (ON time) 50% |
| With neon lamp | 25,000 hours (approx. 3 years) | Approx. 6 years |
| With LED indication | 50,000 hours (approx. 5.5 years) | 100,000 hours (approx. 11 years) |

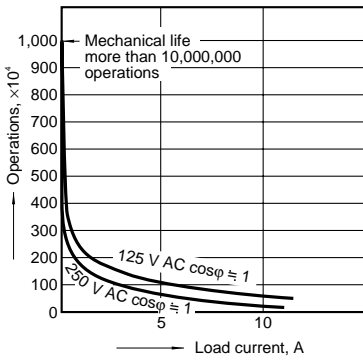


Coil terminal No. and polarity (DC type)

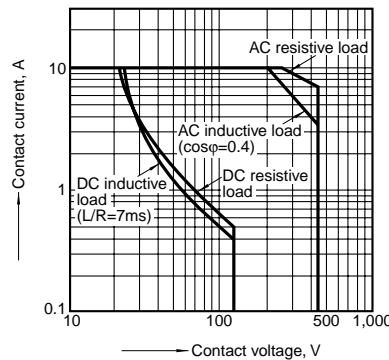
| | Polarity | 2 Form C | 3 Form C | 4 Form C |
|--------------|----------|----------|----------|----------|
| Terminal No. | (+) | 7 | 10 | 10 |
| | (-) | 2 | 2 | 1 |

REFERENCE DATA

1. Life curve



2. Max. switching capacity



DIMENSIONS (mm inch)

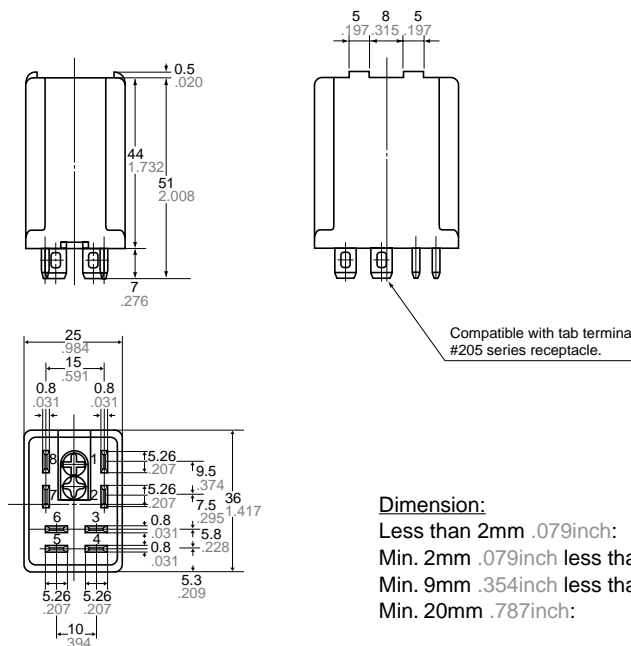
The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://industrial.panasonic.com/ac/e>

Plug-in type (2 Form C)

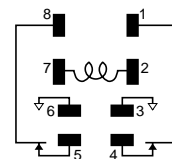
CAD Data



External dimensions



Schematic (Bottom view)



Dimension:

| | |
|--|------------|
| Less than 2mm .079inch: | ±0.2 ±.008 |
| Min. 2mm .079inch less than 9mm .354inch: | ±0.5 ±.020 |
| Min. 9mm .354inch less than 20mm .787inch: | ±1 ±.039 |
| Min. 20mm .787inch: | ±1.5 ±.059 |

Tolerance



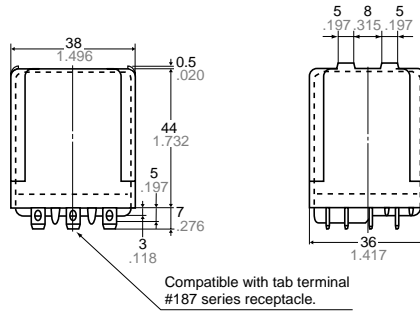
Discontinued
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Plug-in type (3 Form C)

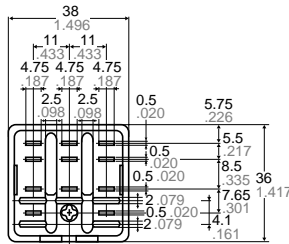
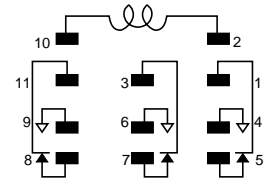
CAD Data



External dimensions



Schematic (Bottom view)



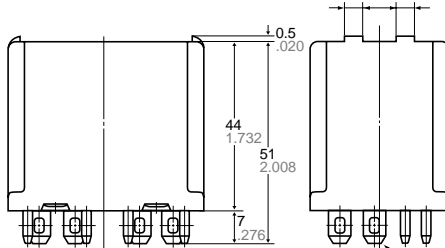
| Dimension: | Tolerance |
|--|--------------------|
| Less than 2mm .079inch: | $\pm 0.2 \pm 0.08$ |
| Min. 2mm .079inch less than 9mm .354inch: | $\pm 0.5 \pm 0.20$ |
| Min. 9mm .354inch less than 20mm .787inch: | $\pm 1 \pm 0.39$ |
| Min. 20mm .787inch: | $\pm 1.5 \pm 0.59$ |

Plug-in type (4 Form C)

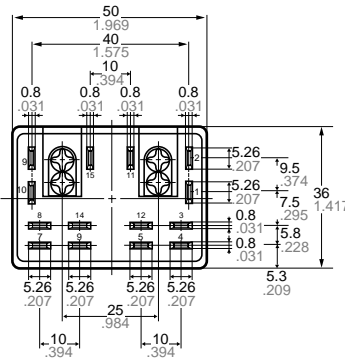
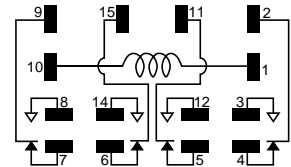
CAD Data



External dimensions



Schematic (Bottom view)



| Dimension: | Tolerance |
|--|--------------------|
| Less than 2mm .079inch: | $\pm 0.2 \pm 0.08$ |
| Min. 2mm .079inch less than 9mm .354inch: | $\pm 0.5 \pm 0.20$ |
| Min. 9mm .354inch less than 20mm .787inch: | $\pm 1 \pm 0.39$ |
| Min. 20mm .787inch: | $\pm 1.5 \pm 0.59$ |



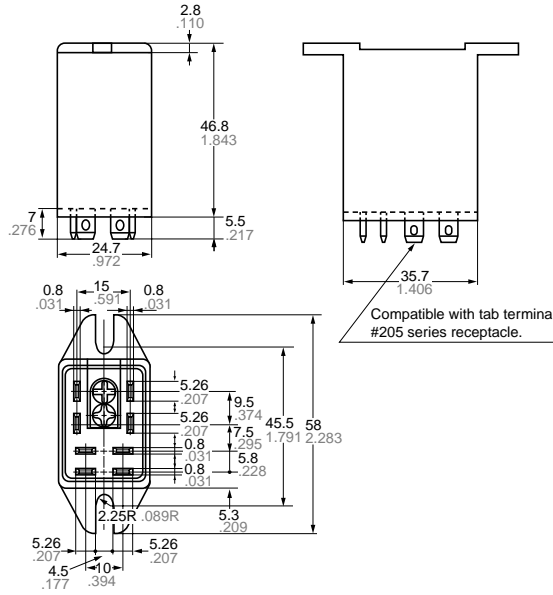
**TM type
(2 Form C)**

CAD Data

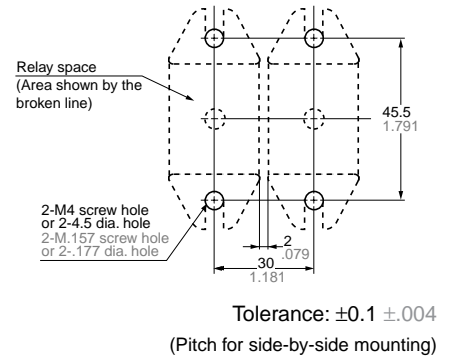


| Dimension: | Tolerance |
|--------------------------|--------------------|
| Less than 2mm .079inch: | $\pm 0.2 \pm .008$ |
| Min. 2mm .079inch | |
| less than 9mm .354inch: | $\pm 0.5 \pm .020$ |
| Min. 9mm .354inch | |
| less than 20mm .787inch: | $\pm 1 \pm .039$ |
| Min. 20mm .787inch: | $\pm 1.5 \pm .059$ |

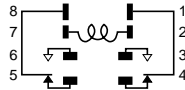
External dimensions



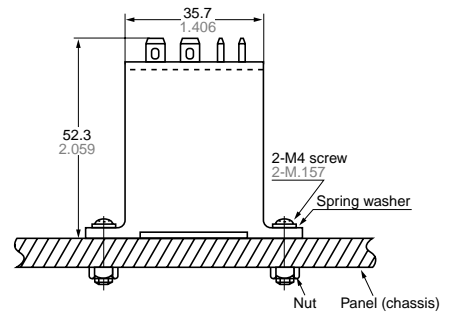
Mounting hole diagram



Schematic (Bottom view)



Installed relay



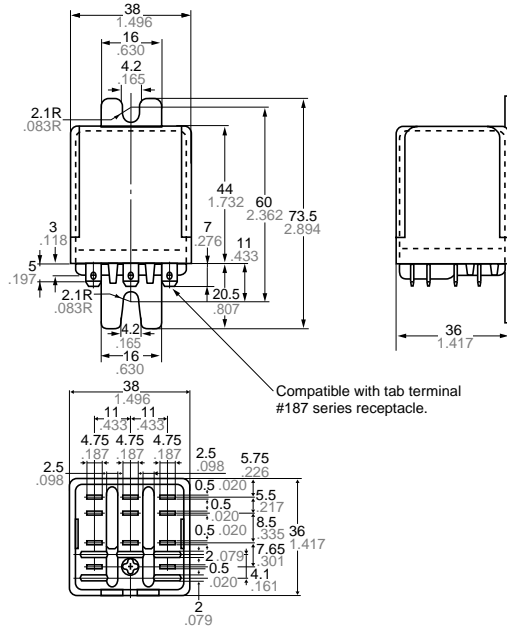
**Direct mounting type
(3 Form C)**

CAD Data

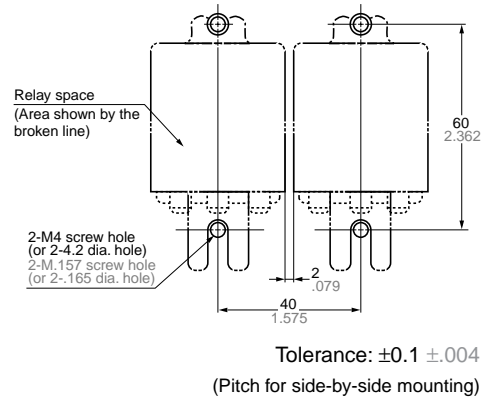


| Dimension: | Tolerance |
|--------------------------|--------------------|
| Less than 2mm .079inch: | $\pm 0.2 \pm .008$ |
| Min. 2mm .079inch | |
| less than 9mm .354inch: | $\pm 0.5 \pm .020$ |
| Min. 9mm .354inch | |
| less than 20mm .787inch: | $\pm 1 \pm .039$ |
| Min. 20mm .787inch: | $\pm 1.5 \pm .059$ |

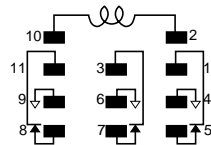
External dimensions



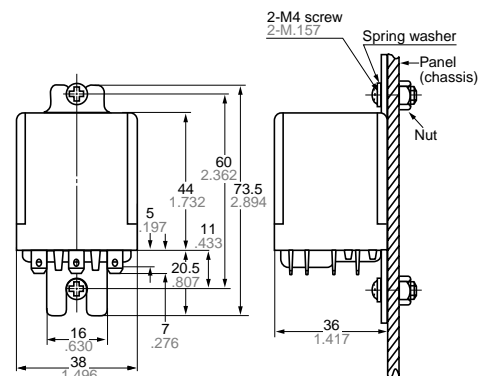
Mounting hole diagram



Schematic (Bottom view)



Installed relay



SAFETY STANDARDS

| UL/C-UL (Recognized) | | CSA (Certified) | |
|----------------------|---|-----------------|---|
| File No. | Contact rating | File No. | Contact rating |
| E43028 | 10A 250V AC, 1/2HP 125, 250V AC, 10A 30V DC | LR26550 etc. | 10A 250V AC, 1/2HP 125, 250V AC, 10A 30V DC |

For Cautions for Use.