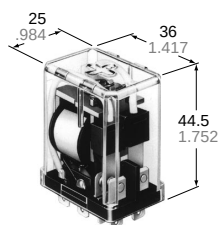


# NAIS

## 10 AMP POWER RELAY

# HP-RELAYS



mm inch

## FEATURES

- Interchangeable with existing models
- Long life and high reliability
- High contact capacity up to 10 A 250 V AC
- Available with plug-in/solder and quick-connect terminals

## SPECIFICATIONS (at 20°C 68°F)

### Contacts

| Arrangement                                                      |                            | 2 Form C                  | 3 Form C | 4 Form C     |
|------------------------------------------------------------------|----------------------------|---------------------------|----------|--------------|
| Initial contact resistance, max.<br>(By voltage drop 6 V DC 1 A) |                            | 15 mΩ                     |          |              |
| Contact material                                                 |                            | Silver                    |          | Silver alloy |
| Rating                                                           | Nominal switching capacity | 10 A 250 V AC (resistive) |          |              |

### Remarks

\* Specifications will vary with foreign standards certification ratings.

\*1 Measurement at same location as "initial breakdown voltage" section

\*2 Detection current; 10 mA

\*3 Excluding contact bounce time

\*4 Half-wave pulse of sine wave: 11ms; detection time: 10μs

\*5 Half-wave pulse of sine wave: 6ms

\*6 Detection time: 10μs

\*7 Refer to 5. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT (Page 61).

### Characteristics (at 60 Hz, 20°C 68°F)

|                                                                                                    |                          | 2 Form C                                                            | 3 Form C                | 4 Form C                |
|----------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------|-------------------------|-------------------------|
| Maximum operating speed                                                                            |                          | 20 cpm                                                              |                         |                         |
| Initial insulation resistance*1                                                                    |                          | more than 100 MΩ at 500 V DC                                        |                         |                         |
| Breakdown voltage*2                                                                                | Between open contacts    | 1,000 Vrms                                                          | 2,000 Vrms              | 1,000 Vrms              |
|                                                                                                    | Between contact sets     | 1,500 Vrms                                                          | 2,000 Vrms              | 1,500 Vrms              |
|                                                                                                    | Between contact and coil | 1,500 Vrms                                                          | 2,000 Vrms              | 1,500 Vrms              |
| Operate time*3 (at nominal voltage)                                                                |                          | Approx. 15 ms                                                       | Approx. 25 ms           |                         |
| Release time (without diode)*3 (at nominal voltage)                                                |                          | Approx. 15 ms                                                       | Approx. 25 ms           |                         |
| Temperature rise                                                                                   |                          | Max. 65°C                                                           |                         |                         |
| Shock resistance                                                                                   | Functional*4             | 98 m/s <sup>2</sup> {10 G}                                          |                         |                         |
|                                                                                                    | Destructive*5            | 980 m/s <sup>2</sup> {100 G}                                        |                         |                         |
| Vibration resistance                                                                               | Functional*6             | 58.8 m/s <sup>2</sup> {6 G}, 10 to 55 Hz at 1 mm double amplitude   |                         |                         |
|                                                                                                    | Destructive              | 117.6 m/s <sup>2</sup> {12 G}, 10 to 55 Hz at 2 mm double amplitude |                         |                         |
| Conditions for operation, transport and storage*7 (Not freezing and condensing at low temperature) | Ambient temp.            | -50°C to +40°C<br>-58°F to +104°F                                   |                         |                         |
|                                                                                                    | Humidity                 | 5 to 85% R.H.                                                       |                         |                         |
| Unit weight                                                                                        |                          | Approx. 60g<br>2.12 oz                                              | Approx. 100g<br>3.53 oz | Approx. 125g<br>4.41 oz |

## LIFE DATA

### Contact rating and expected life For AC load type

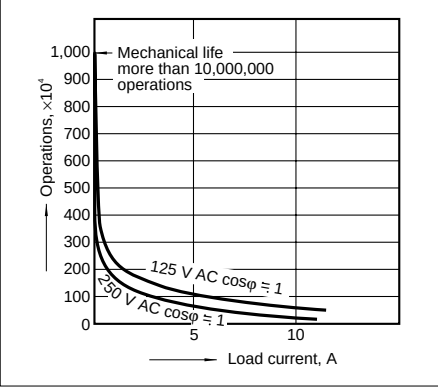
| Electrical life | Voltage | 125 V AC              |                         | 250 V AC              |                         | Expected life<br>(min. operations) |
|-----------------|---------|-----------------------|-------------------------|-----------------------|-------------------------|------------------------------------|
|                 | Load    | Resistive (cos φ ≅ 1) | Inductive (cos φ ≅ 0.4) | Resistive (cos φ ≅ 1) | Inductive (cos φ ≅ 0.4) |                                    |
|                 | Current | —                     | —                       | 10 A                  | 7.5 A                   | 2×10 <sup>5</sup>                  |
|                 |         | 10 A                  | 7.5 A                   | 7.5 A                 | 5 A                     | 5×10 <sup>5</sup>                  |
|                 |         | 5 A                   | 3 A                     | 3 A                   | 2 A                     | 1×10 <sup>6</sup>                  |
|                 |         | 1A                    | 0.7 A                   | 0.6 A                 | 0.4 A                   | 2×10 <sup>6</sup>                  |
| Mechanical life |         |                       |                         |                       | 1×10 <sup>7</sup>       |                                    |

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

Contact rating and expected life For DC load type

|                    | Voltage | 24 V DC               |                         | 125 V DC             |                         | Expected life<br>(min. operations) |
|--------------------|---------|-----------------------|-------------------------|----------------------|-------------------------|------------------------------------|
| Electrical<br>life | Load    | Resistive (cos φ ≐ 1) | Inductive (cos φ ≐ 0.4) | Resistive (cosφ ≐ 1) | Inductive (cos φ ≐ 0.4) |                                    |
|                    | Current | —                     | 7 A                     | —                    | —                       | 2×10 <sup>5</sup>                  |
|                    |         | 7.5 A                 | 5 A                     | 0.5 A                | 0.4 A                   | 5×10 <sup>5</sup>                  |
|                    |         | 5 A                   | 3 A                     | 0.3 A                | 0.2 A                   | 1×10 <sup>6</sup>                  |
|                    |         | 1A                    | 0.6 A                   | 0.1 A                | 0.06 A                  | 2×10 <sup>6</sup>                  |
| Mechanical life    |         |                       |                         |                      |                         | 1×10 <sup>7</sup>                  |

Life curve



- Notes:**
- 1. For DC inductive loads, use an arc suppressing circuit.
  - 2. 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. When using the relay under conditions of high temperature, humidity or high repetition rate, it is suggested that the relay cover be removed to facilitate extended operation.

TYPICAL APPLICATIONS

- HP relays enjoy wide use in various applications, particularly in automation controls and remote controls.  
Applications include:  
Industrial machinery
- Machine tool  
Food processing packing machines  
Office equipment  
Coin operate devices  
Home appliances
- Transportation  
Communication and measuring devices  
Amusement devices

ORDERING INFORMATION

Ex. HP 3 — M — AC240V

| Contact arrangement                       | Terminal                                                                                                                                             | Coil voltage                                                       |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| 2: 2 Form C<br>3: 3 Form C<br>4: 4 Form C | Nil: Standard plug-in terminal<br>M: Direct mounting (3 Form C only)<br>TM: Top mounting (2 Form C only)<br>L: Lamp wired, standard plug-in terminal | AC 6, 12, 24, 48,<br>115, 220, 240 V<br>DC 6, 12, 24, 48,<br>110 V |

- (Notes) 1. For UL/CSA or VDE recognized types, add suffix UL/CSA or VDE (HP2-TM type VDE application under way)  
2. Standard packing Carton: 50 pcs. Case: 200 pcs.  
3. UL/CSA approved type is standard.

TYPES AND COIL DATA

1. Standard plug-in terminal type (without lamp wired)

DC TYPES at 20°C 68°F

| Type     | Part No.   | Nominal coil voltage, V DC | Pick-up voltage, V DC (max.) | Drop-out voltage, V DC (min.) | Max. allowable voltage, V DC | Coil resistance, Ω (±10%) | Nominal coil current, mA | Nominal operating power, W |
|----------|------------|----------------------------|------------------------------|-------------------------------|------------------------------|---------------------------|--------------------------|----------------------------|
| 2 Form C | HP2-DC6V   | 6                          | 4.8                          | 0.9                           | 6.6                          | 25                        | 240                      | 1.5                        |
|          | HP2-DC12V  | 12                         | 9.6                          | 1.8                           | 13.2                         | 110                       | 109                      | 1.3                        |
|          | HP2-DC24V  | 24                         | 19.2                         | 3.6                           | 26.4                         | 440                       | 54.5                     | 1.3                        |
|          | HP2-DC48V  | 48                         | 38.4                         | 7.2                           | 52.8                         | 1,800                     | 26.7                     | 1.3                        |
|          | HP2-DC110V | 110                        | 88                           | 16.5                          | 121                          | 7,300                     | 15.0                     | 1.7                        |
| 3 Form C | HP3-DC6V   | 6                          | 4.8                          | 0.9                           | 6.6                          | 24                        | 250                      | 1.5                        |
|          | HP3-DC12V  | 12                         | 9.6                          | 1.8                           | 13.2                         | 100                       | 120                      | 1.4                        |
|          | HP3-DC24V  | 24                         | 19.2                         | 3.6                           | 26.4                         | 400                       | 60                       | 1.4                        |
|          | HP3-DC48V  | 48                         | 38.4                         | 7.2                           | 52.8                         | 1,560                     | 31                       | 1.5                        |
|          | HP3-DC110V | 110                        | 88                           | 16.5                          | 121                          | 7,450                     | 14.9                     | 1.6                        |
| 4 Form C | HP4-DC6V   | 6                          | 4.8                          | 0.9                           | 6.6                          | 22                        | 273                      | 1.6                        |
|          | HP4-DC12V  | 12                         | 9.6                          | 1.8                           | 13.2                         | 95                        | 127                      | 1.5                        |
|          | HP4-DC24V  | 24                         | 19.2                         | 3.6                           | 26.4                         | 380                       | 63                       | 1.5                        |
|          | HP4-DC48V  | 48                         | 38.4                         | 7.2                           | 52.8                         | 1,500                     | 32                       | 1.5                        |
|          | HP4-DC110V | 110                        | 88                           | 16.5                          | 121                          | 7,000                     | 15.7                     | 1.7                        |

## AC TYPE (50/60 Hz) at 60 Hz, 20°C 68°F

| Type     | Part No.   | Nominal coil voltage, V AC | Pick-up voltage, V AC (max.) | Drop-out voltage, V AC (min.) | Max. allowable voltage, V AC | Inductance, H | Nominal coil current, mA | Nominal operating power, VA |
|----------|------------|----------------------------|------------------------------|-------------------------------|------------------------------|---------------|--------------------------|-----------------------------|
| 2 Form C | HP2-AC6V   | 6                          | 4.8                          | 1.8                           | 6.6                          | 0.049         | 310                      | 1.9                         |
|          | HP2-AC12V  | 12                         | 9.6                          | 3.6                           | 13.2                         | 0.190         | 160                      | 1.9                         |
|          | HP2-AC24V  | 24                         | 19.2                         | 7.2                           | 26.4                         | 0.776         | 78                       | 1.9                         |
|          | HP2-AC48V  | 48                         | 38.4                         | 14.4                          | 52.8                         | 3.106         | 39                       | 1.9                         |
|          | HP2-AC115V | 115                        | 92                           | 34.5                          | 126.5                        | 15.83         | 18                       | 2.1                         |
|          | HP2-AC220V | 220                        | 176                          | 66                            | 242                          | 57.90         | 9.5                      | 2.1                         |
|          | HP2-AC240V | 240                        | 192                          | 72                            | 264                          | 66.26         | 9.0                      | 2.2                         |
| 3 Form C | HP3-AC6V   | 6                          | 4.8                          | 1.8                           | 6.6                          | 0.030         | 520                      | 3.1                         |
|          | HP3-AC12V  | 12                         | 9.6                          | 3.6                           | 13.2                         | 0.119         | 260                      | 3.1                         |
|          | HP3-AC24V  | 24                         | 19.2                         | 7.2                           | 26.4                         | 0.475         | 130                      | 3.1                         |
|          | HP3-AC48V  | 48                         | 38.4                         | 14.4                          | 52.8                         | 1.899         | 65                       | 3.1                         |
|          | HP3-AC115V | 115                        | 92                           | 34.5                          | 126.5                        | 10.36         | 28.5                     | 3.3                         |
|          | HP3-AC220V | 220                        | 176                          | 66                            | 242                          | 39.32         | 14.2                     | 3.1                         |
|          | HP3-AC240V | 240                        | 192                          | 72                            | 264                          | 44.05         | 13.9                     | 3.3                         |
| 4 Form C | HP4-AC6V   | 6                          | 4.8                          | 1.8                           | 6.6                          | 0.019         | 800                      | 4.8                         |
|          | HP4-AC12V  | 12                         | 9.6                          | 3.6                           | 13.2                         | 0.077         | 400                      | 4.8                         |
|          | HP4-AC24V  | 24                         | 19.2                         | 7.2                           | 26.4                         | 0.309         | 200                      | 4.8                         |
|          | HP4-AC48V  | 48                         | 38.4                         | 14.4                          | 52.8                         | 1.292         | 95                       | 4.6                         |
|          | HP4-AC115V | 115                        | 92                           | 34.5                          | 126.5                        | 6.953         | 42                       | 4.8                         |
|          | HP4-AC220V | 220                        | 176                          | 66                            | 242                          | 26.57         | 21                       | 4.6                         |
|          | HP4-AC240V | 240                        | 192                          | 72                            | 264                          | 29.75         | 20.5                     | 4.9                         |

## NOTES

1. The range of coil current for AC relays is  $\pm 15\%$  (60 Hz). For DC relays it is  $\pm 10\%$  at 20°C, 68°F.
2. The HP relay will operate in a range from 80% to 110% of the nominal coil voltage. It is, however, recommended that the relay be used in the range of 85% to 110% of the nominal coil voltage, with the temporary voltage variation taken into consideration.
3. When the operating voltage of AC re-

- lays drops below 80% of the nominal coil voltage, the relay will generate a considerable amount of heat which is not recommended for maximum efficiency.
4. The coil resistance of DC types is the measured value of the coil at a temperature of 20°C 68°F. If the coil temperature changes by  $\pm 1^\circ\text{C}$ , the measured value of the coil resistance should be increased or decreased by 0.4%.

5. For applications from 220 V to 240 V DC, connect a resistor in series with the relay coil. See chart for resistor values.

| Voltage  | 2 Form C                | 3 Form C                 | 4 Form C                |
|----------|-------------------------|--------------------------|-------------------------|
| 220 V DC | 7.3 k $\Omega$<br>(5 W) | 7.45 k $\Omega$<br>(5 W) | 7 k $\Omega$<br>(5 W)   |
| 240 V DC | 8.7 k $\Omega$<br>(5 W) | 8.8 k $\Omega$<br>(5 W)  | 8.3 k $\Omega$<br>(5 W) |

## 2. Standard plug-in terminal type (with lamp wired)

DC TYPES at 20°C 68°F

| Type     | Part No.  | Nominal coil voltage, V DC | Pick-up voltage, V DC (max.) | Drop-out voltage, V DC (min.) | Max. allowable voltage, V DC | Coil resistance, $\Omega$ ( $\pm 10\%$ ) | Nominal coil current, mA | Nominal operating power, W |
|----------|-----------|----------------------------|------------------------------|-------------------------------|------------------------------|------------------------------------------|--------------------------|----------------------------|
| 2 Form C | LED       | HP2-L-DC6V                 | 6                            | 4.8                           | 0.9                          | 6.6                                      | 25                       | 1.5                        |
|          |           | HP2-L-DC12V                | 12                           | 9.6                           | 1.8                          | 13.2                                     | 110                      | 1.3                        |
|          |           | HP2-L-DC24V                | 24                           | 19.2                          | 3.6                          | 26.4                                     | 440                      | 1.3                        |
|          |           | HP2-L-DC48V                | 48                           | 38.4                          | 7.2                          | 52.8                                     | 1,800                    | 1.3                        |
|          | Neon lamp | HP2-L-DC110V               | 110                          | 88                            | 16.5                         | 121                                      | 7,300                    | 1.7                        |
| 3 Form C | LED       | HP3-L-DC6V                 | 6                            | 4.8                           | 0.9                          | 6.6                                      | 24                       | 1.5                        |
|          |           | HP3-L-DC12V                | 12                           | 9.6                           | 1.8                          | 13.2                                     | 100                      | 1.4                        |
|          |           | HP3-L-DC24V                | 24                           | 19.2                          | 3.6                          | 26.4                                     | 400                      | 1.4                        |
|          |           | HP3-L-DC48V                | 48                           | 38.4                          | 7.2                          | 52.8                                     | 1,560                    | 1.5                        |
|          | Neon lamp | HP3-L-DC110V               | 110                          | 88                            | 16.5                         | 121                                      | 7,450                    | 1.6                        |
| 4 Form C | LED       | HP4-L-DC6V                 | 6                            | 4.8                           | 0.9                          | 6.6                                      | 22                       | 1.6                        |
|          |           | HP4-L-DC12V                | 12                           | 9.6                           | 1.8                          | 13.2                                     | 95                       | 1.5                        |
|          |           | HP4-L-DC24V                | 24                           | 19.2                          | 3.6                          | 26.4                                     | 380                      | 1.5                        |
|          |           | HP4-L-DC48V                | 48                           | 38.4                          | 7.2                          | 52.8                                     | 1,500                    | 1.5                        |
|          | Neon lamp | HP4-L-DC110V               | 110                          | 88                            | 16.5                         | 121                                      | 7,000                    | 1.7                        |

AC TYPE (50/60 Hz) at 60 Hz, 20°C 68°F

| Type     |           | Part No.     | Nominal coil voltage, V AC | Pick-up voltage, V AC (max.) | Drop-out voltage, V AC (min.) | Max. allowable voltage, V AC | Inductance, H | Nominal coil current, mA | Nominal operating power, VA |
|----------|-----------|--------------|----------------------------|------------------------------|-------------------------------|------------------------------|---------------|--------------------------|-----------------------------|
| 2 Form C | LED       | HP2-L-AC6V   | 6                          | 4.8                          | 1.8                           | 6.6                          | 0.049         | 310                      | 1.9                         |
|          |           | HP2-L-AC12V  | 12                         | 9.6                          | 3.6                           | 13.2                         | 0.190         | 160                      | 1.9                         |
|          |           | HP2-L-AC24V  | 24                         | 19.2                         | 7.2                           | 26.4                         | 0.776         | 78                       | 1.9                         |
|          | Neon lamp | HP2-L-AC115V | 115                        | 92                           | 34.5                          | 126.5                        | 15.83         | 18                       | 2.1                         |
|          |           | HP2-L-AC220V | 220                        | 176                          | 66                            | 242                          | 57.90         | 9.5                      | 2.1                         |
|          |           | HP2-L-AC240V | 240                        | 192                          | 72                            | 264                          | 66.26         | 9.0                      | 2.2                         |
| 3 Form C | LED       | HP3-L-AC6V   | 6                          | 4.8                          | 1.8                           | 6.6                          | 0.030         | 520                      | 3.1                         |
|          |           | HP3-L-AC12V  | 12                         | 9.6                          | 3.6                           | 13.2                         | 0.119         | 260                      | 3.1                         |
|          |           | HP3-L-AC24V  | 24                         | 19.2                         | 7.2                           | 26.4                         | 0.475         | 130                      | 3.1                         |
|          | Neon lamp | HP3-L-AC115V | 115                        | 92                           | 34.5                          | 126.5                        | 10.36         | 28.5                     | 3.3                         |
|          |           | HP3-L-AC220V | 220                        | 176                          | 66                            | 242                          | 39.32         | 14.2                     | 3.1                         |
|          |           | HP3-L-AC240V | 240                        | 192                          | 72                            | 264                          | 44.05         | 13.9                     | 3.3                         |
| 4 Form C | LED       | HP4-L-AC6V   | 6                          | 4.8                          | 1.8                           | 6.6                          | 0.019         | 800                      | 4.8                         |
|          |           | HP4-L-AC12V  | 12                         | 9.6                          | 3.6                           | 13.2                         | 0.077         | 400                      | 4.8                         |
|          |           | HP4-L-AC24V  | 24                         | 19.2                         | 7.2                           | 26.4                         | 0.309         | 200                      | 4.8                         |
|          | Neon lamp | HP4-L-AC115V | 115                        | 92                           | 34.5                          | 126.5                        | 6.953         | 42                       | 4.8                         |
|          |           | HP4-L-AC220V | 220                        | 176                          | 66                            | 242                          | 26.57         | 21                       | 4.6                         |
|          |           | HP4-L-AC240V | 240                        | 192                          | 72                            | 264                          | 29.75         | 20.5                     | 4.9                         |

3. Top Mounting (TM) and direct mounting (M) type  
DC TYPES at 20°C 68°F

| Type                                  |  | Part No.      | Nominal coil voltage, V DC | Pick-up voltage, V DC (max.) | Drop-out voltage, V DC (min.) | Max. allowable voltage, V DC | Coil resistance, Ω (±10%) | Nominal coil current, mA | Nominal operating power, W |
|---------------------------------------|--|---------------|----------------------------|------------------------------|-------------------------------|------------------------------|---------------------------|--------------------------|----------------------------|
| 2 Form C<br>Top Mounting Type (TM)    |  | HP2-TM-DC6V   | 6                          | 4.8                          | 0.9                           | 6.6                          | 25                        | 240                      | 1.5                        |
|                                       |  | HP2-TM-DC12V  | 12                         | 9.6                          | 1.8                           | 13.2                         | 110                       | 109                      | 1.3                        |
|                                       |  | HP2-TM-DC24V  | 24                         | 19.2                         | 3.6                           | 26.4                         | 440                       | 54.5                     | 1.3                        |
|                                       |  | HP2-TM-DC48V  | 48                         | 38.4                         | 7.2                           | 52.8                         | 1,800                     | 26.7                     | 1.3                        |
|                                       |  | HP2-TM-DC110V | 110                        | 88                           | 16.5                          | 121                          | 7,300                     | 15.0                     | 1.7                        |
| 3 Form C<br>Direct Mounting Type (TM) |  | HP3-M-DC6V    | 6                          | 4.8                          | 0.9                           | 6.6                          | 24                        | 250                      | 1.5                        |
|                                       |  | HP3-M-DC12V   | 12                         | 9.6                          | 1.8                           | 13.2                         | 100                       | 120                      | 1.4                        |
|                                       |  | HP3-M-DC24V   | 24                         | 19.2                         | 3.6                           | 26.4                         | 400                       | 60                       | 1.4                        |
|                                       |  | HP3-M-DC48V   | 48                         | 38.4                         | 7.2                           | 52.8                         | 1\$B!"(J560               | 31                       | 1.5                        |
|                                       |  | HP3-M-DC110V  | 110                        | 88                           | 16.5                          | 121                          | 7,450                     | 14.9                     | 1.6                        |

AC TYPE (50/60 Hz) at 60 Hz, 20°C 68°F

| Type                                 |  | Part No.      | Nominal coil voltage, V AC | Pick-up voltage, V AC (max.) | Drop-out voltage, V AC (min.) | Max. allowable voltage, V AC | Inductance, H | Nominal coil current, mA | Nominal operating power, VA |
|--------------------------------------|--|---------------|----------------------------|------------------------------|-------------------------------|------------------------------|---------------|--------------------------|-----------------------------|
| 2 Form C<br>Top Mounting Type (TM)   |  | HP2-TM-AC6V   | 6                          | 4.8                          | 1.8                           | 6.6                          | 0.049         | 310                      | 1.9                         |
|                                      |  | HP2-TM-AC12V  | 12                         | 9.6                          | 3.6                           | 13.2                         | 0.190         | 160                      | 1.9                         |
|                                      |  | HP2-TM-AC24V  | 24                         | 19.2                         | 7.2                           | 26.4                         | 0.776         | 78                       | 1.9                         |
|                                      |  | HP2-TM-AC48V  | 48                         | 38.4                         | 14.4                          | 52.8                         | 3.106         | 39                       | 1.9                         |
|                                      |  | HP2-TM-AC115V | 115                        | 92                           | 34.5                          | 126.5                        | 15.83         | 18                       | 2.1                         |
|                                      |  | HP2-TM-AC220V | 220                        | 176                          | 66                            | 242                          | 57.90         | 9.5                      | 2.1                         |
|                                      |  | HP2-TM-AC240V | 240                        | 192                          | 72                            | 264                          | 66.26         | 9.0                      | 2.2                         |
| 3 Form C<br>Direct Mounting Type (M) |  | HP3-M-AC6V    | 6                          | 4.8                          | 1.8                           | 6.6                          | 0.030         | 520                      | 3.1                         |
|                                      |  | HP3-M-AC12V   | 12                         | 9.6                          | 3.6                           | 13.2                         | 0.119         | 260                      | 3.1                         |
|                                      |  | HP3-M-AC24V   | 24                         | 19.2                         | 7.2                           | 26.4                         | 0.475         | 130                      | 3.1                         |
|                                      |  | HP3-M-AC48V   | 48                         | 38.4                         | 14.4                          | 52.8                         | 1.899         | 65                       | 3.1                         |
|                                      |  | HP3-M-AC115V  | 115                        | 92                           | 34.5                          | 126.5                        | 10.36         | 28.5                     | 3.3                         |
|                                      |  | HP3-M-AC220V  | 220                        | 176                          | 66                            | 242                          | 39.32         | 14.2                     | 3.1                         |
|                                      |  | HP3-M-AC240V  | 240                        | 192                          | 72                            | 264                          | 44.05         | 13.9                     | 3.3                         |

**4. Direct mounting (with lamp wired) type****DC TYPES**

| Type               | Part No.      | Nominal coil voltage, V DC | Pick-up voltage, V DC (max.) | Drop-out voltage, V DC (min.) | Max. allowable voltage, V DC | Coil resistance, $\Omega$ ( $\pm 10\%$ ) | Nominal coil current, mA | Nominal operating power, W |
|--------------------|---------------|----------------------------|------------------------------|-------------------------------|------------------------------|------------------------------------------|--------------------------|----------------------------|
| 3 Form C Neon lamp | HP3-ML-DC110V | 110                        | 88                           | 16.5                          | 121                          | 7,450                                    | 14.9                     | 1.6                        |

AC TYPE (50/60 Hz) at 60 Hz, 20°C 68°F

| Type               | Part No.      | Nominal coil voltage, V AC | Pick-up voltage, V AC (max.) | Drop-out voltage, V AC (min.) | Max. allowable voltage, V AC | Inductance, H | Nominal coil current, mA | Nominal operating power, VA |
|--------------------|---------------|----------------------------|------------------------------|-------------------------------|------------------------------|---------------|--------------------------|-----------------------------|
| 3 Form C Neon lamp | HP3-ML-AC115V | 115 V                      | 92                           | 34.5                          | 126.5                        | 10.36         | 28.5                     | 3.3                         |
|                    | HP3-ML-AC220V | 220 V                      | 176                          | 66                            | 242                          | 39.32         | 14.2                     | 3.1                         |
|                    | HP3-ML-AC240V | 240 V                      | 192                          | 72                            | 264                          | 44.05         | 13.9                     | 3.3                         |

**LAMP-WIRED RELAYS****Specifications**

Life of neon lamp....continuous: more than 25,000 hours

(more than 3 years)

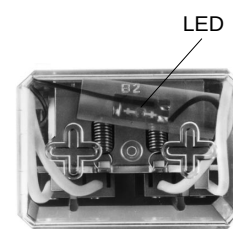
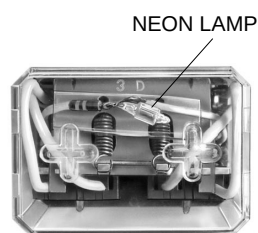
on/off = 1: more than 6 years

Life of LED.....continuous: more than 50,000 hours

(more than 5.5 years)

on/off = 1: more than 100,000 hours

(more than 11 years)

**Variation**

| Type                              | Coil Voltage |       |                            |
|-----------------------------------|--------------|-------|----------------------------|
|                                   | AC           | DC    |                            |
| HP2-L<br>HP3-L<br>HP3-ML<br>HP4-L | 6 V          | 6 V   | LED (Light emitting diode) |
|                                   | 12 V         | 12 V  |                            |
|                                   | 24 V         | 24 V  |                            |
|                                   | —            | 48 V  |                            |
|                                   | 115 V        | 110 V | Neon lamp                  |
|                                   | 220 V        | —     |                            |
|                                   | 240 V        | —     |                            |

Notes:

1. AC 48 V type is not available for lamp wiring.

**Circuit diagrams**

Circuit diagrams

Neon lamp type

A circuit diagram for a neon lamp type. It shows a battery symbol connected in series with a resistor and a coil. The coil is represented by a series of loops. Two arrows point to the terminals of the coil, labeled "(coil terminal)".

LED type

A circuit diagram for an LED type. It shows a battery symbol connected in series with a resistor and a coil. The coil is represented by a series of loops. Two arrows point to the terminals of the coil, labeled "(coil terminal)". Inside the coil loop, there is a dashed box containing an LED symbol and a resistor. The LED is labeled "LED". The battery symbol is labeled with "(+)" and "(~)" on the left and "(-)" and "(~)" on the right.

Terminal No.

(DC type)

| Type     | HP2-L | HP3-L<br>HP3-ML | HP4-L |
|----------|-------|-----------------|-------|
| Polarity |       |                 |       |
| (+)      | 7     | 10              | 10    |
| (-)      | 2     | 2               | 1     |

Notes:

1. Pay attention to the polarity of coil See circuit diagram (LED type only).

**Operating current of LED**

| Coil Voltage | Operating current of LED |
|--------------|--------------------------|
| DC 6V        | DC 6.4 mA                |
| DC 12V       | DC 5.7 mA                |
| DC 24V       | DC 4.7 mA                |
| DC 48V       | DC 4.5 mA                |
| AC 6V        | AC 10.5 mA               |
| AC 12V       | AC 9.0 mA                |
| AC 24V       | AC 7.7 mA                |

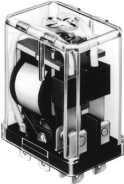
Notes:

1. Operating current of relays should be increased by the value of LED operating current. Please refer the table. Operating current of neon lamp is approx. 0.3 mA to 0.4 mA.

2. To use the HP relay in the inductive load circuit, the contact protection circuit is recommended.

ACCESSORIES

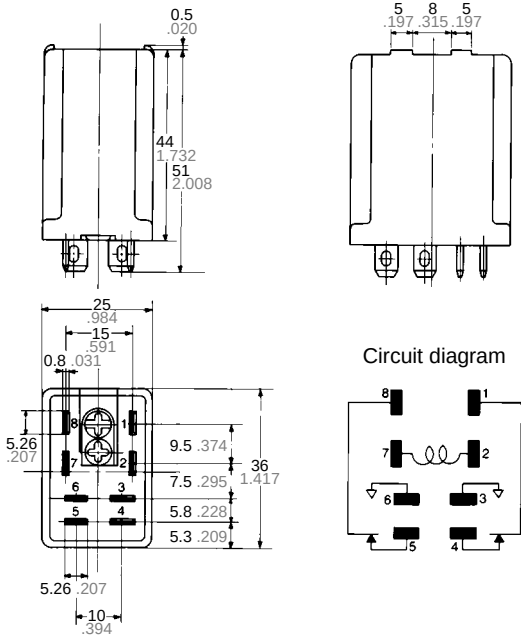
Please refer to "MOUNTING METHODS" for further information.  
UL, CSA recognized except BRACKET and INSERTING PLATE.

| HP  | Relay                                                                             | Solder terminal socket<br>for rectangular hold boring<br>(with hold-down clip)                                 | Screw terminal socket<br>for DIN rail assembly<br>(with hold-down clip)                                         | For HP2, HP4                                                                                                                        |
|-----|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| HP2 |  | HP2-SRS<br><br>(UL, CSA, VDE) | HP2-SFD<br><br>(UL, CSA)      | HP-BRACKET<br>for direct mounting<br>            |
| HP3 |  | HP3-SRS<br><br>(UL, CSA, VDE) | HP3-SFD<br><br>(UL, CSA, VDE) | HP INSERTION PLATE for P/C<br>board mounting<br> |
| HP4 |  | HP4-SRS<br><br>(UL, CSA)      | HP4-SFD<br><br>(UL, CSA)      |                                                                                                                                     |

DIMENSIONS AND WIRING DIAGRAM

mm inch

HP2 (2 Form C) Plug-in terminal types

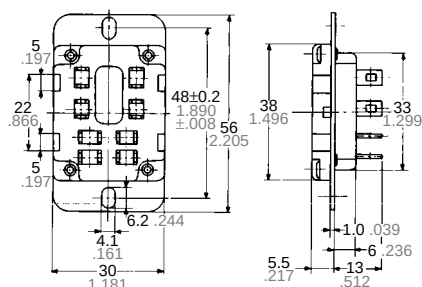


Accepts  
Faston 205

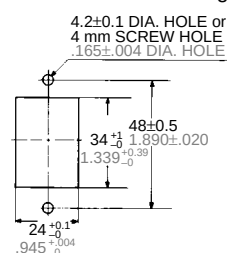
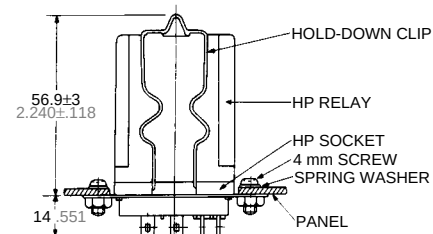
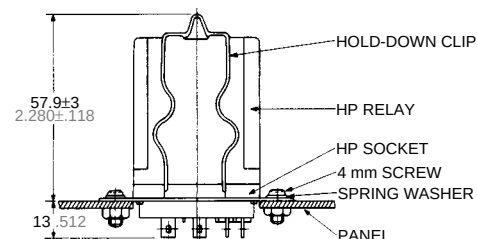
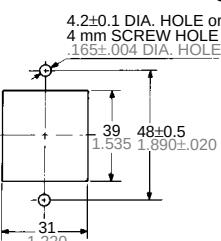
| Dimension :                  | General tolerance |
|------------------------------|-------------------|
| Max. 2mm .079 inch:          | ±0.2 ±.008        |
| 2 to 9mm .079 to .354 inch:  | ±0.5 ±.020        |
| 9 to 20mm .354 to .787 inch: | ±1.0 ±.039        |
| Min. 20mm .787 inch:         | ±1.5 ±.059        |

**HP2-SRS (with hold-down clip)**

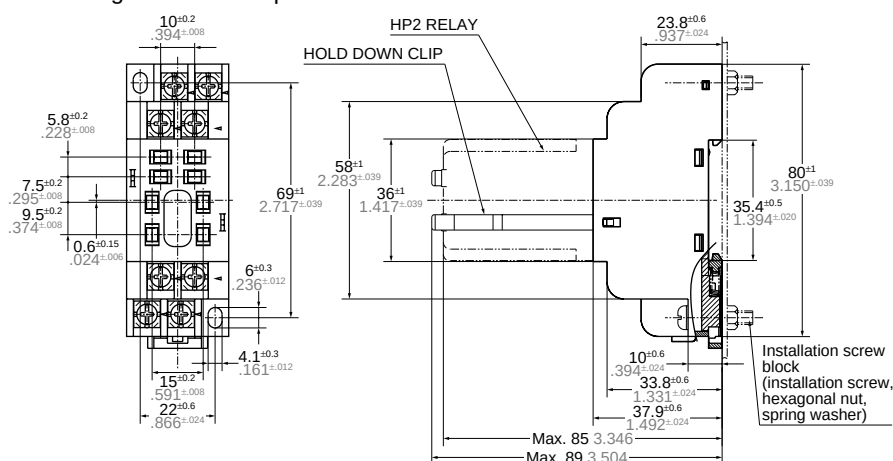
Optimum space-saving panel cut-out.  
Can be mounted from either the front or the rear of the panel.



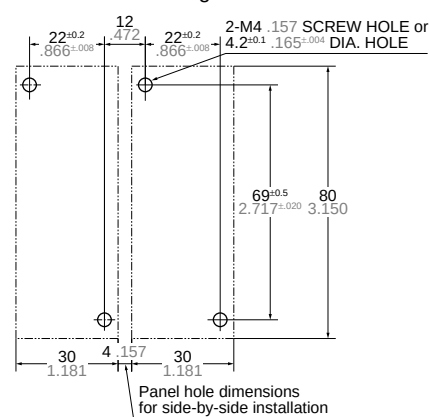
| Dimension :                  | General tolerance |
|------------------------------|-------------------|
| Max. 2mm .079 inch:          | ±0.2 ±.008        |
| 2 to 9mm .079 to .354 inch:  | ±0.5 ±.020        |
| 9 to 20mm .354 to .787 inch: | ±1.0 ±.039        |
| Min. 20mm .787 inch:         | ±1.5 ±.059        |

**Front surface-mounting****Rear surface-mounting****HP2-SFD (with hold-down clip)**

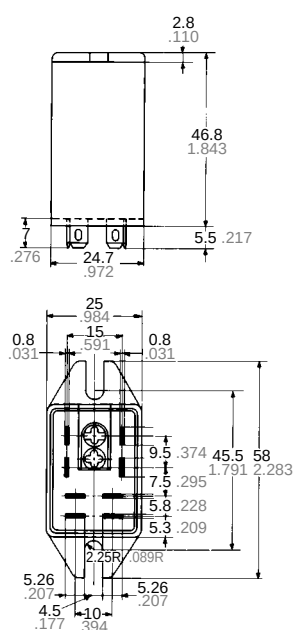
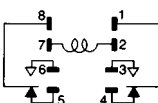
Front wiring in restricted space



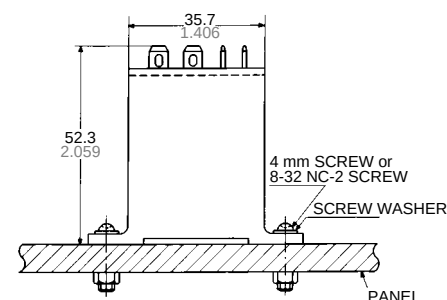
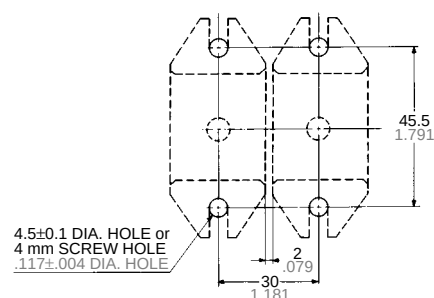
| Dimension :                  | General tolerance |
|------------------------------|-------------------|
| Max. 2mm .079 inch:          | ±0.2 ±.008        |
| 2 to 9mm .079 to .354 inch:  | ±0.5 ±.020        |
| 9 to 20mm .354 to .787 inch: | ±1.0 ±.039        |
| Min. 20mm .787 inch:         | ±1.5 ±.059        |

**Mounting dimensions**

Note: Hold down clip and installation screw block are included in package.

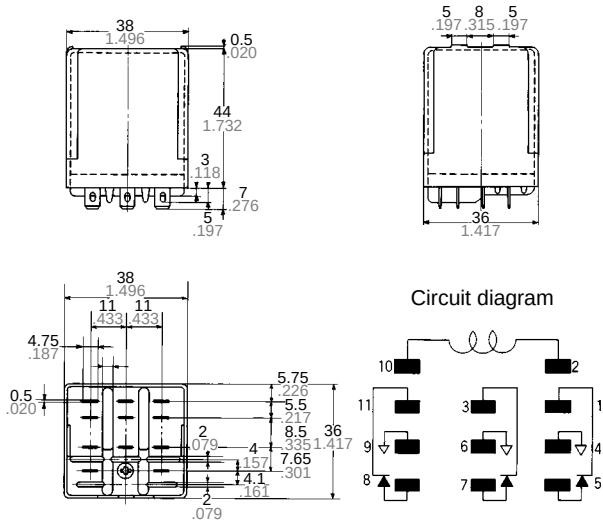
**HP2-TM (2 Form C) Top mounting types****Circuit diagram**

| Dimension :                  | General tolerance |
|------------------------------|-------------------|
| Max. 2mm .079 inch:          | ±0.2 ±.008        |
| 2 to 9mm .079 to .354 inch:  | ±0.5 ±.020        |
| 9 to 20mm .354 to .787 inch: | ±1.0 ±.039        |
| Min. 20mm .787 inch:         | ±1.5 ±.059        |

**Mounting dimensions**

Accepts  
Faston 205





### Dimension :

Max. 2mm .079 inch:

2 to 9mm .079 to .354 inch:

9 to 20mm .354 to .787 inch:

Min. 20mm .787 inch:

### General tolerance

$\pm 0.2 \pm .008$

$\pm 0.5 \pm .020$

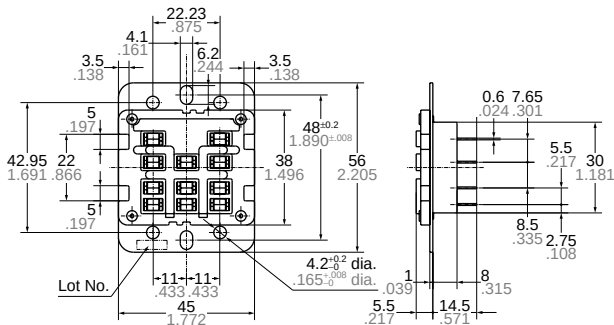
$\pm 1.0 \pm .039$

$\pm 1.5 \pm .059$

Accepts  
Faston 187

## HP3-SRS (with hold-down clip)

Optimum space-saving panel cut-out.  
Can be mounted from either the front or  
the rear of the panel.



### Dimension :

Max. 2mm .079 inch:

2 to 9mm .079 to .354 inch:

9 to 20mm .354 to .787 inch:

Min. 20mm .787 inch:

### General tolerance

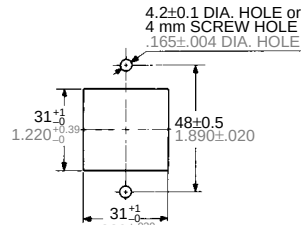
$\pm 0.2 \pm .008$

$\pm 0.5 \pm .020$

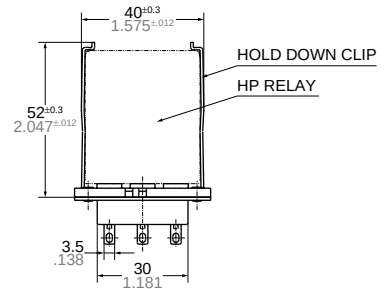
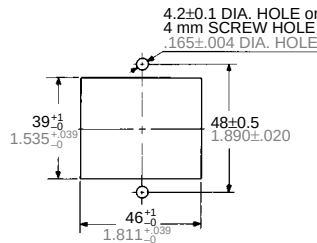
$\pm 1.0 \pm .039$

$\pm 1.5 \pm .059$

### Front surface-mounting

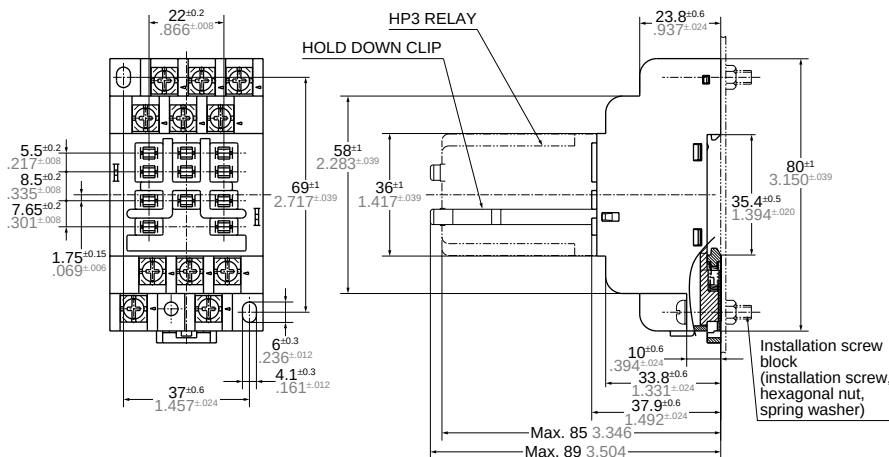


### Rear surface-mounting



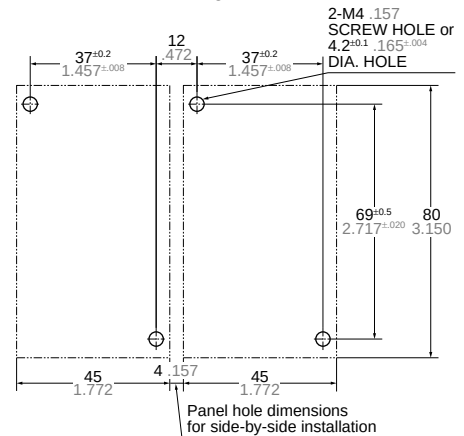
## HP3-SFD (with hold-down clip)

Front wiring in restricted space



Note: Hold down clip and installation screw block are included in package.

### Mounting dimensions



### Dimension :

Max. 2mm .079 inch:

2 to 9mm .079 to .354 inch:

9 to 20mm .354 to .787 inch:

Min. 20mm .787 inch:

### General tolerance

$\pm 0.2 \pm .008$

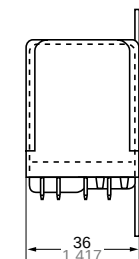
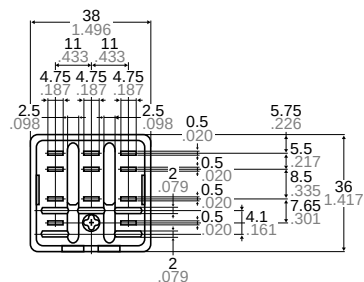
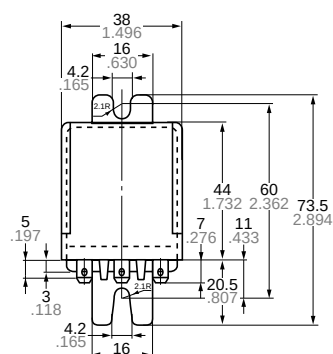
$\pm 0.5 \pm .020$

$\pm 1.0 \pm .039$

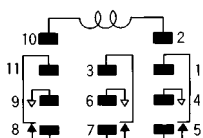
$\pm 1.5 \pm .059$



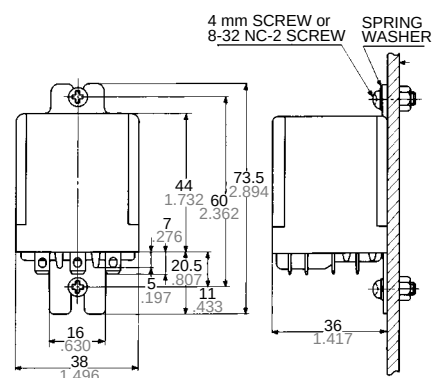
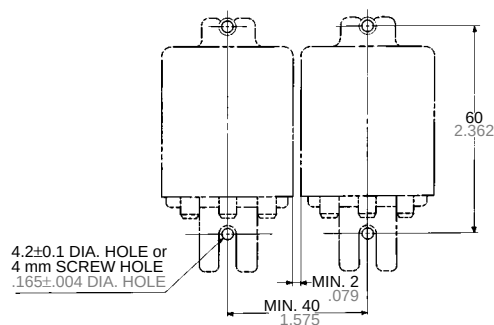
## HP3-M (3 Form C) Direct mounting types



Circuit diagram



Mounting dimension



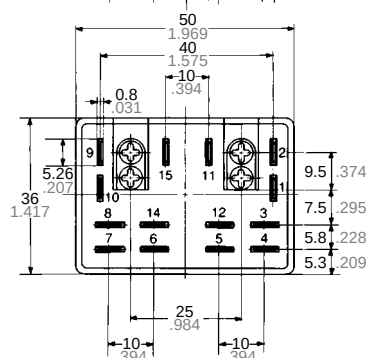
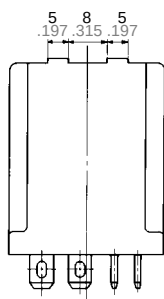
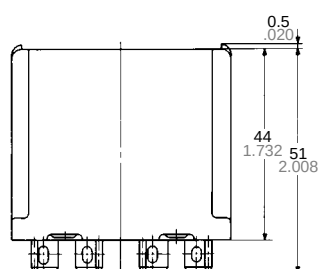
Accepts  
Faston 187

Dimension :

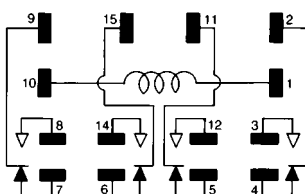
|                              |                    |
|------------------------------|--------------------|
| Max. 2mm .079 inch:          | $\pm 0.2 \pm .008$ |
| 2 to 9mm .079 to .354 inch:  | $\pm 0.5 \pm .020$ |
| 9 to 20mm .354 to .787 inch: | $\pm 1.0 \pm .039$ |
| Min. 20mm .787 inch:         | $\pm 1.5 \pm .059$ |

General tolerance

## HP4 (4 Form C) Plug-in terminal types



Circuit diagram



Accepts  
Faston 187

Dimension :

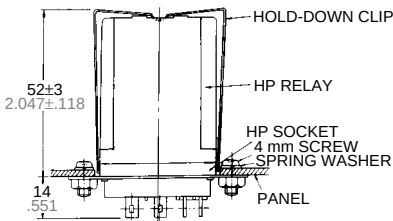
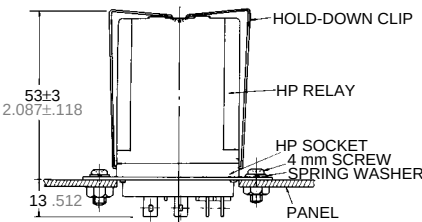
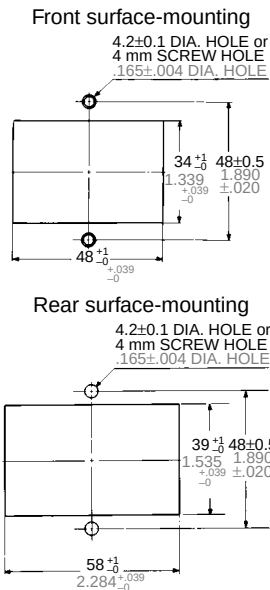
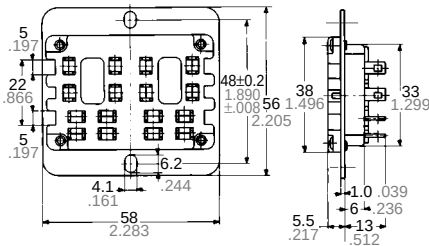
|                              |                    |
|------------------------------|--------------------|
| Max. 2mm .079 inch:          | $\pm 0.2 \pm .008$ |
| 2 to 9mm .079 to .354 inch:  | $\pm 0.5 \pm .020$ |
| 9 to 20mm .354 to .787 inch: | $\pm 1.0 \pm .039$ |
| Min. 20mm .787 inch:         | $\pm 1.5 \pm .059$ |

General tolerance

HP4-SRS (with hold-down clip)

mm inch

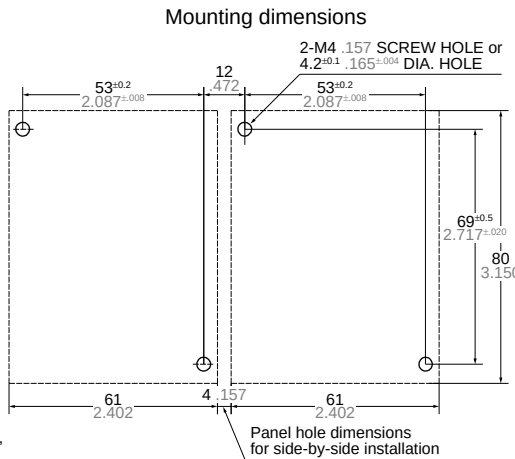
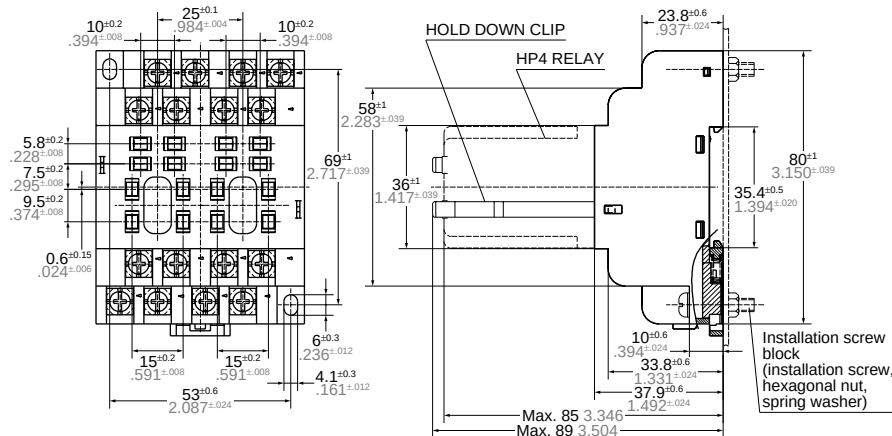
Optimum space-saving panel cut-out.  
Can be mounted from either the front or the rear of the panel.



| Dimension :                  | General tolerance |
|------------------------------|-------------------|
| Max. 2mm .079 inch:          | ±0.2 ±.008        |
| 2 to 9mm .079 to .354 inch:  | ±0.5 ±.020        |
| 9 to 20mm .354 to .787 inch: | ±1.0 ±.039        |
| Min. 20mm .787 inch:         | ±1.5 ±.059        |

HP4-SFD (with hold-down clip)

Front wiring in restricted space.  
Two HP2 relays can be mounted in one socket.



Note: Hold down clip and installation screw block are included in package.

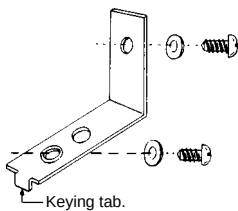
| Dimension :                  | General tolerance |
|------------------------------|-------------------|
| Max. 2mm .079 inch:          | ±0.2 ±.008        |
| 2 to 9mm .079 to .354 inch:  | ±0.5 ±.020        |
| 9 to 20mm .354 to .787 inch: | ±1.0 ±.039        |
| Min. 20mm .787 inch:         | ±1.5 ±.059        |

ACCESSORIES for HP2 and HP4 types

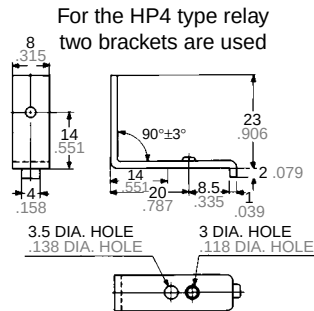
HP Bracket (with 2 screws, 2 washers)  
The HP Bracket is used for mounting HP2 relays and HP4 relays directly to the panel. It facilitates soldering or quick connections with Faston 205 tab 0.8 mm .031 inch.

- Notes:
1. This bracket is unavailable for UL, CSA and VDE applications.
  2. When using the special bracket, it is recommended to use the screws and washers called out in the chart in the next page in order to eliminate any possible damage to the relay coil.

Mounting methods  
(a) Remove the M3 × 7 screw (red colored) fixed to the relay, and place the bracket on the relay with the attaching M3 × 7 screw (blue colored) and the spring washer.



(b) Use the additional M3 × 7 screw and washer for attaching the bracket to the panel.



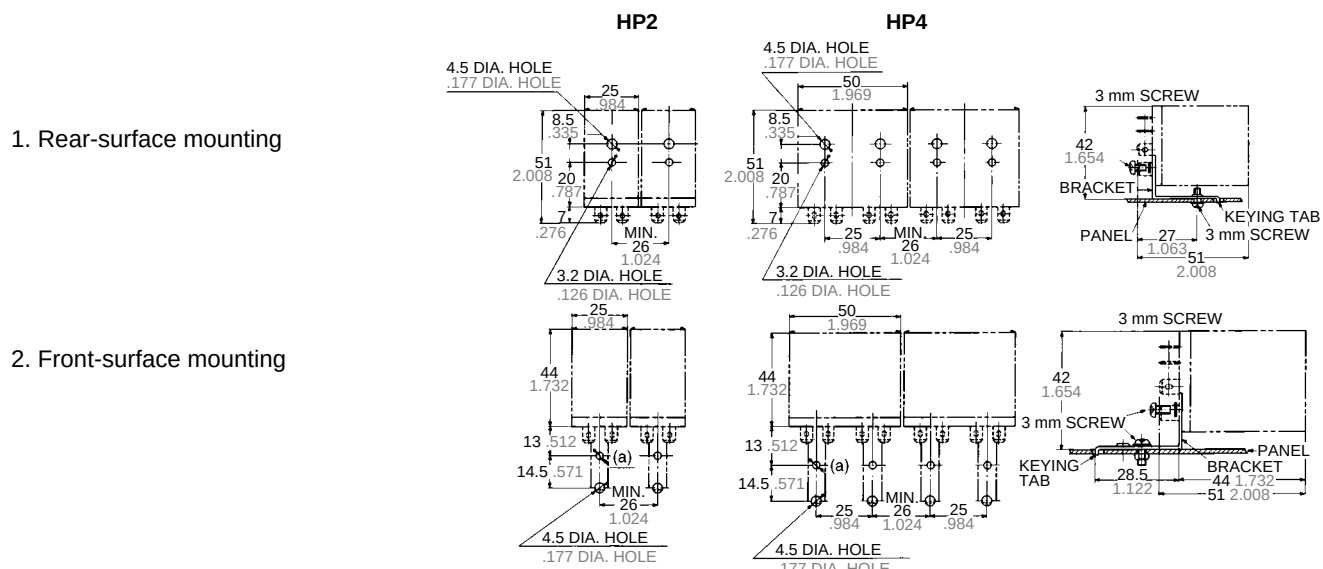
| Thickness of a special bracket | 1.0 mm (.039 inch) | 1.6 mm (.063 inch) | 2.0 mm (.079 inch) |
|--------------------------------|--------------------|--------------------|--------------------|
| A suitable screw               | M3 × 7-M3 × 8      | M3 × 8             | M3 × 8-M3 × 10     |
| A suitable washer              | for M3             | for M3             | for M3             |

|                       |       |   |   |   |   |
|-----------------------|-------|---|---|---|---|
| Millimeter            | Screw | M | 3 | × | 7 |
| 3mm .118inch diameter |       |   |   |   |   |
| 7mm .276inch length   |       |   |   |   |   |

## Dimensions and mounting method

mm inch



## HP Inserting Plate for HP2 and HP4 types

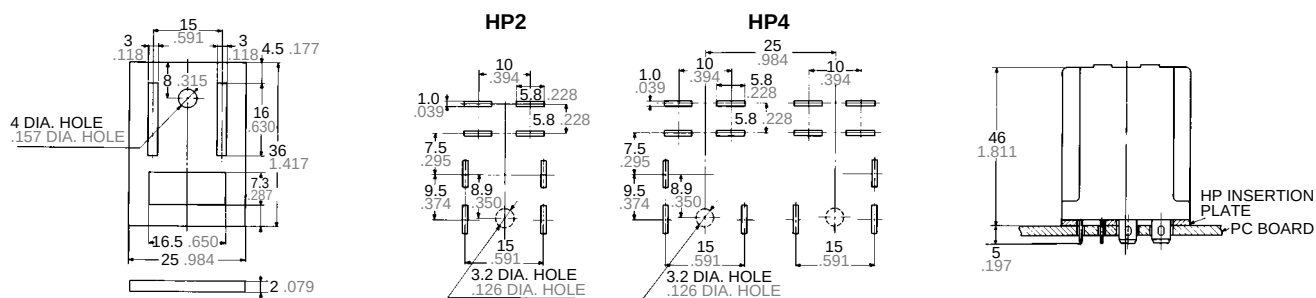
1. HP inserting plate is used for mounting HP2 and HP4 relays on a printed board to adjust the length of the terminals.

2. If adjustment by soldering is not suitable, bore 1/8" diameter hole on the printed circuit board and mount the relay with a M3 × 10 screw. The chart to the right suggests the proper screws for different printed circuit boards.

3. Two plates are used for the HP4 type relay.

| Thickness of P/C board | Suitable screw |
|------------------------|----------------|
| 1.0 mm .039 inch       | M3 × 10        |
| 1.2 mm .047 inch       | M3 × 10        |

## PC board pattern



Please refer to the above second instruction.

Tolerance:  $\pm 0.1 \pm 0.004$

**For Cautions for Use, see Relay Technical Information (Page 48 to 76).**