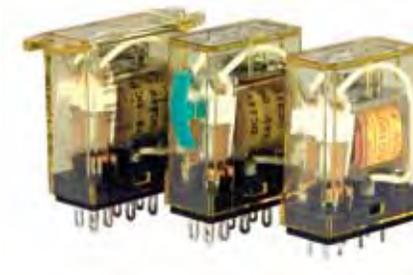


RY/RM Series Miniature Relays

Key features:

- RY2 (3A), RY4 (5A), RM2 (5A)
- General purpose miniature relays
- 3A or 5A contact capacity
- Wide variety of terminal styles and coil voltages meet a wide range of applications
- All 4PDT types have arc barriers.



Part Number Selection

| Contact | Model | Part Number | | Coil Voltage Code |
|--|---------------------------------|------------------|-------------------|---|
| | | Plug-in Terminal | PC Board Terminal | |
|  DPDT (Slim) 3A | Standard | RY2S-U □ | RY2V-U □ | AC6V, AC12V, AC24V, AC110V, AC120V, AC220V, AC240V DC6V, DC12V, D24V, DC48V, DC110V |
| | With Indicator | RY2S-UL □ | RY2V-UL □ | |
| | With Check Button | RY2S-UC □ | — | |
| | With Indicator and Check Button | RY2S-ULC □ | — | |
| | Top Bracket Mounting | RY2S-UT □ | — | |
| | With Diode (DC coil only) | RY2S-UD □ | RY2V-UD □ | |
|  DPDT (Wide) 5A | Standard | RM2S-U □ | RM2V-U □ | RYAC6V, AC12V, AC24V, AC110-120V, AC220-240V DC6V, DC12V, DC24V, DC48V, DC100-110V |
| | With Indicator | RM2S-UL □ | RM2V-UL □ | |
| | With Check Button | RM2S-UC □ | — | |
| | With Indicator and Check Button | RM2S-ULC □ | — | |
| | Top Bracket Mounting | RM2S-UT □ | — | |
| | With Diode (DC coil only) | RM2S-UD □ | — | |
|  4PDT 5A | Standard | RY4S-U □ | RY4V-U □ | AC6V, AC12V, AC24V, AC110-120V, AC220-240V DC6V, DC12V, DC24V, DC48V, DC100-110V |
| | With Indicator | RY4S-UL □ | RY4V-UL □ | |
| | With Check Button | RY4S-UC □ | — | |
| | With Indicator and Check Button | RY4S-ULC □ | — | |
| | Top Bracket Mounting | RY4S-UT □ | — | |
| | With Diode (DC coil only) | RY4S-UD □ | — | |
| With Indicator and Diode (DC coil only) | RY4S-ULD □ | — | | |



Top mount models are designed to mount directly to a panel and do not require a socket.

Ordering Information

When ordering, specify the Part No. and coil voltage code:

(example) **RY4S-U** **AC110-120V**
Part No. Coil Voltage Code

Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers

Contactors

Terminal Blocks

Circuit Breakers

Switches & Pilot Lights

Signaling Lights

Sockets

| Relays | Standard DIN Rail Mount | Finger-safe DIN Rail Mount | Through Panel Mount | PCB Mount |
|--------|-------------------------|----------------------------|---------------------|--------------------|
| RY2S | SY2S-05 | SY2S-05C | SY2S-51 | SY2S-61 |
| RM2 | SM2S-05 | SM2S-05C | SM2S-51 | SY4S-61 SY4S-62 |
| RY4S | SY4S-05 | SY4S-05C | SY4S-51 | |






Relays & Sockets

Timers

Hold Down Springs & Clips

| Appearance | Item | Relay | For DIN Mount Socket | For Through Panel & PCB Mount Socket |
|--|---------------------------------------|-----------|----------------------|--------------------------------------|
|  | Pullover Wire Spring | RY2S | SY2S-02F1 | SY4S-51F1 |
| | | RM2 | SY4S-51F1 | SY4S-51F1 |
| | | RY4S | | |
|  | Leaf Spring ¹ (side latch) | RY2S | SFA-202 ² | SFA-302 |
| | | RM2, RY4S | | |
|  | Leaf Spring ¹ (top latch) | RY2S | SFA-101 ² | SFA-301 |
| | | RM2 | | |
| | | RY4S | | |

-  1. Not available for PCB mount socket SY4S-62.
- 2. Order 2 pieces per relay.

Contactors

Terminal Blocks

Circuit Breakers

Accessories

| Item | Appearance | Use with | Part No. | Remarks |
|-------------------------------------|---|---|----------|---|
| Aluminum DIN Rail (1 meter length) |  | All DIN rail sockets | BNDN1000 | The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm). |
| DIN Rail End Stop |  | DIN rail | BNL5 | 9.1 mm wide. |
| Replacement Hold-Down Spring Anchor |  | Horseshoe clip for all DIN rail sockets | Y778-011 | For use on DIN rail mount socket when using pullover wire hold down spring. 2 pieces included with each socket. |

Specifications

| Contact Model | Standard Contact | | |
|------------------------------------|--|--|--|
| | RY2 - DPDT Slim | RM2 - DPDT Wide | RY4 - 4PDT |
| Contact Material | Gold-plated silver | Silver | Gold-plated silver |
| Contact Resistance ¹ | 50 mΩ maximum | 30 mΩ maximum | 50 mΩ maximum |
| Minimum Applicable Load | 24V DC, 5 mA; 5V DC, 10 mA (reference value) | 24V DC, 10 mA; 5V DC, 20 mA (reference value) | 24V DC, 5 mA; 5V DC, 10 mA (reference value) |
| Operating Time ² | 20 ms maximum | | |
| Release Time ² | 20 ms maximum | | |
| Power Consumption (approx.) | AC: 1.1 VA (50 Hz), 1 VA (60 Hz) DC: 0.8W | AC: 1.4 VA (50 Hz), 1.2 VA (60 Hz) DC: 0.9W | AC: 1.4 VA (50 Hz), 1.2 VA (60 Hz) DC: 0.9W |
| Insulation Resistance | 100 MΩ minimum (500V DC megger) | | |
| Dielectric Strength | Between live and dead parts: | | |
| | 1500V AC, 1 minute | 2000V AC, 1 minute | 2000V AC, 1 minute |
| | Between contact and coil: | | |
| | 1500V AC, 1 minute | 2000V AC, 1 minute | 2000V AC, 1 minute |
| | Between contacts of different poles: | | |
| | 1500V AC, 1 minute | 2000V AC, 1 minute | 2000V AC, 1 minute |
| Dielectric Strength | Between contacts of the same pole: | | |
| | 1000V AC, 1 minute | 1000V AC, 1 minute | 1000V AC, 1 minute |
| Operating Frequency | Electrical: 1800 operations/h maximum Mechanical: 18,000 operations/h maximum | | |
| Vibration Resistance | Damage limits: 10 to 55 Hz, amplitude 0.5 mm Operating extremes: 10 to 55 Hz, amplitude 0.5 mm | | |
| Shock Resistance | Damage limits: 1000 m/s ² Operating extremes: 100 m/s ² (DPDT Slim), 200 m/s ² (4PDT, DPDT Wide) | | |
| Mechanical Life | 50,000,000 operations | | |
| Electrical Life | 200,000 operations (220V AC, 3A) | 500,000 operations (220V AC, 5A) | 100,000 operations (220V AC, 5A) 200,000 operations (220V AC, 3A) |
| Operating Temperature ³ | -25 to +55°C (no freezing) | -25 to +45°C (no freezing) | -25 to +55°C (no freezing) ⁴ |
| Operating Humidity | 45 to 85% RH (no condensation) | | |
| Weight (approx.) | 23g | 35g | 34g |



Note: Above values are initial values.

1. Measured using 5V DC, 1A voltage drop method
2. Measured at the rated voltage (at 20°C), excluding contact bouncing
Release time of relays with diode: 40 ms maximum

3. For use under different temperature conditions, refer to Continuous Load Current vs. Operating Temperature Curve. The operating temperature range of relays with indicator or diode is -25 to +40°C.
4. When the total current of 4 contacts is less than 15A, the operating temperature range is -25 to +70°C.

Switches & Pilot Lights

Signaling Lights

AC Coil Ratings

| Voltage (V) | Rated Current (mA) ±15% at 20°C | | | | Coil Resistance (Ω) ±10% at 20°C | | Operation Characteristics (against rated values at 20°C) | | |
|-------------|---------------------------------|------------------|-----------|------------------|----------------------------------|------------------|--|----------------|-----------------|
| | AC 50Hz | | AC 60Hz | | | | | | |
| | DPDT Slim | DPDT Wide & 4PDT | DPDT Slim | DPDT Wide & 4PDT | DPDT Slim | DPDT Wide & 4PDT | Max. Continuous Applied Voltage | Pickup Voltage | Dropout Voltage |
| 6 | 170 | 240 | 150 | 200 | 18.8 | 9.4 | 110% | 80% maximum | 30% minimum |
| 12 | 86 | 121 | 75 | 100 | 76.8 | 39.3 | | | |
| 24 | 42 | 60.5 | 37 | 50 | 300 | 153 | | | |
| 110 | 9.6 | — | 8.4 | — | 6,950 | — | | | |
| 110-120 | — | 9.4-10.8 | — | 8.0-9.2 | — | 4,290 | | | |
| 120 | 8.6 | — | 7.5 | — | 8,100 | — | | | |
| 220 | 4.7 | — | 4.1 | — | 25,892 | — | | | |
| 220-240 | — | 4.7-5.4 | — | 4.0-4.6 | — | 18,820 | | | |
| 240 | 4.9 | — | 4.3 | — | 26,710 | — | | | |

Relays & Sockets

Timers

DC Coil Ratings

| Voltage (V) | Rated Current (mA) ±15% at 20°C | | Coil Resistance (Ω) ±10% at 20°C | | Operation Characteristics (against rated values at 20°C) | | |
|-------------|---------------------------------|------------------|----------------------------------|------------------|--|----------------|-----------------|
| | DPDT Slim | DPDT Wide & 4PDT | DPDT Slim | DPDT Wide & 4PDT | Max. Continuous Applied Voltage | Pickup Voltage | Dropout Voltage |
| 6 | 128 | 150 | 47 | 40 | 110% | 80% maximum | 10% minimum |
| 12 | 64 | 75 | 188 | 160 | | | |
| 24 | 32 | 36.9 | 750 | 650 | | | |
| 48 | 18 | 18.5 | 2,660 | 2,600 | | | |
| 100-110 | — | 8.2-9.0 | — | 12,250 | | | |
| 110 | 8 | — | 13,800 | — | | | |

Contactors

Terminal Blocks

Contact Ratings

| Maximum Contact Capacity | | | | | | |
|--------------------------|--------------------|-------------------------|---------------------|-------------|-----------|-----------|
| Contact | Continuous Current | Allowable Contact Power | | Rated Load | | |
| | | Resistive Load | Inductive Load | Voltage (V) | Res. Load | Ind. Load |
| DPDT Slim (RY2) | 3A | 660 VA AC 90W DC | 176 VA AC 45W DC | 110V AC | 3A | 1.5A |
| | | | | 220V AC | 3A | 0.8A |
| | | | | 30V DC | 3A | 1.5A |
| DPDT Wide (RM2) | 5A | 1100VA AC 150W DC | 440VA AC 75W DC | 110V AC | 5A | 2.5A |
| | | | | 220V AC | 5A | 2A |
| | | | | 30V DC | 5A | 2.5A |
| 4PDT (RY4) | 5A | 1200 VA AC 150W DC | 288 VA AC 60W DC | 240V AC | 5A | 1.2A |
| | | | | 30V DC | 5A | 2A |

 Note: Inductive load for the rated load — $\cos \phi = 0.3$, $L/R = 7$ ms

TÜV Ratings

| Voltage | DPDT Slim | DPDT Wide | 4PDT |
|---------|-----------|-----------|------|
| 240V AC | 3A | 5A | 5A |
| 30V DC | 3A | 5A | 5A |

 AC: $\cos \phi = 1.0$, DC: $L/R = 0$ ms

Circuit Breakers

UL Ratings

| Voltage | Resistive | | | General use | | |
|---------|-----------|-----------|------|-------------|-----------|------|
| | DPDT Slim | DPDT Wide | 4PDT | DPDT Slim | DPDT Wide | 4PDT |
| 240V AC | 3A | 5A | 5A | 0.8A | 2A | 5A |
| 120V AC | — | — | — | 1.5A | 2.5A | — |
| 100V DC | 0.2A | 0.4A | 0.2A | 0.2A | — | 0.2A |
| 30V DC | 3A | 5A | 5A | 3A | — | 5A |

CSA Ratings

| Voltage | Resistive | | | General use | | |
|---------|-----------|-----------|------|-------------|-----------|------|
| | DPDT Slim | DPDT Wide | 4PDT | DPDT Slim | DPDT Wide | 4PDT |
| 240V AC | 3A | 5A | 5A | 0.8A | 2A | 5A |
| 120V AC | 3A | 5A | — | 1.5A | 2.5A | — |
| 100V DC | — | — | — | 0.2A | 0.4A | 0.2A |
| 30V DC | 3A | 5A | 5A | 1.5A | 2.5A | 1.5A |

Socket Specifications

| | Sockets | Terminal | Electrical Rating | Wire Size | Torque |
|----------------------------|----------|---|-------------------|------------------------|----------------|
| DIN Rail Mount Sockets | SY2S-05 | M3 screws with captive wire clamp | 300V, 7A | Maximum up to 2-#14AWG | 5.5 - 9 in•lbs |
| | SM2S-05 | M3 screw with captive wire clamp | 300V, 10A | Maximum up to 2-#14AWG | 5.5 - 9 in•lbs |
| | SY4S-05 | M3 screw with captive wire clamp | 300V, 7A* | Maximum up to 2-#14AWG | 5.5 - 9 in•lbs |
| Finger-safe DIN Rail Mount | SY2S-05C | M3 screws with captive wire clamp, fingersafe | 300V, 7A | Maximum up to 2-#14AWG | 5.5 - 9 in•lbs |
| | SM2S-05C | M3 screw with captive wire clamp, fingersafe | 300V, 10A | Maximum up to 2-#14AWG | 5.5 - 9 in•lbs |
| | SY4S-05C | M3 screw with captive wire clamp, fingersafe | 300V, 7A* | Maximum up to 2-#14AWG | 5.5 - 9 in•lbs |
| Through Panel Mount Socket | SY2S-51 | Solder | 250V, 7A | — | — |
| | SM2S-51 | Solder | 250V, 10A | — | — |
| | SY4S-51 | Solder | 250V, 7A* | — | — |
| PCB Mount Socket | SY2S-61 | PCB Mount | 300V, 7A | — | — |
| | SY4S-61 | PCB Mount | 300V, 7A | — | — |
| | SY4S-62 | PCB Mount | 250V, 7A | — | — |



* When using only 2 poles of the 4-poles, the UL recognized current is 10A.

Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers

Contactors

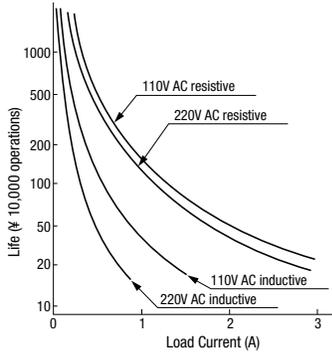
Terminal Blocks

Circuit Breakers

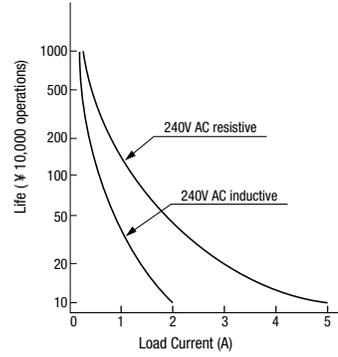
Characteristics (Reference Data)

Electrical Life Curves

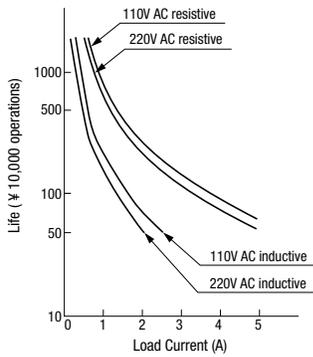
AC Load (RY2)



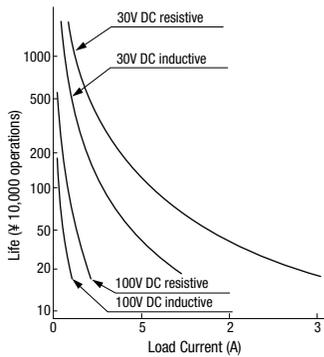
(RY4)



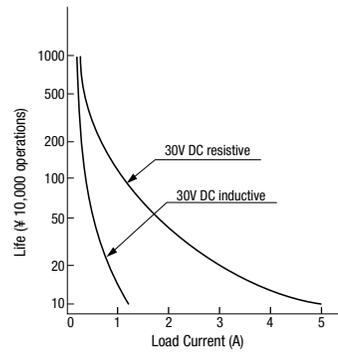
(RM2)



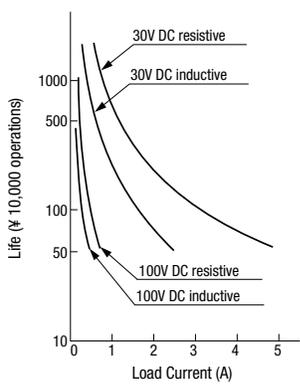
DC Load (RY2)



(RY4)



(RM2)



Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers

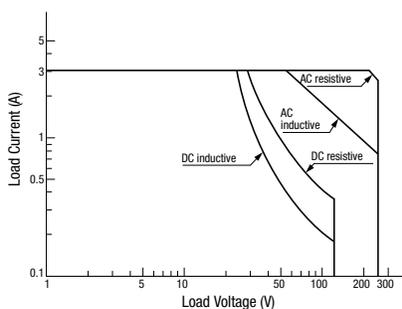
Contactors

Terminal Blocks

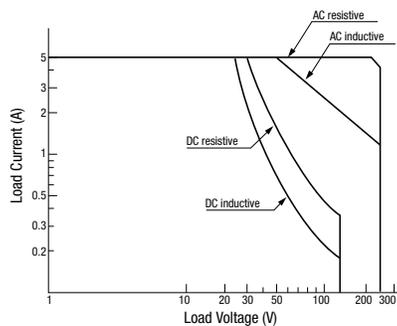
Circuit Breakers

Maximum Switching Capacity

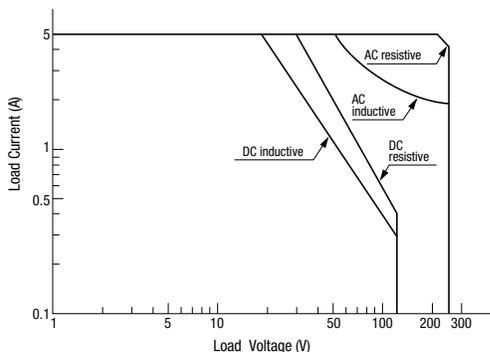
(RY2)



(RY4)

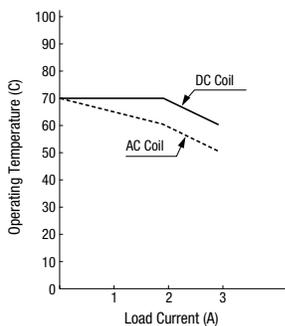


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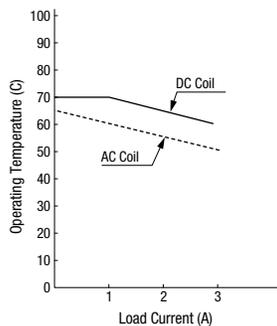


Continuous Load Current vs. Operating Temperature Curve (Standard Type, With Check Button, and Top Bracket Mounting Type)

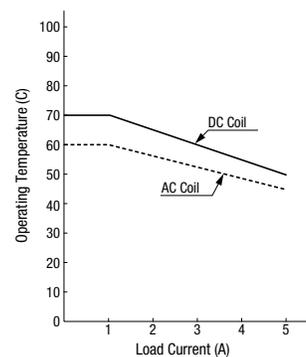
(RY2)



(RY4)

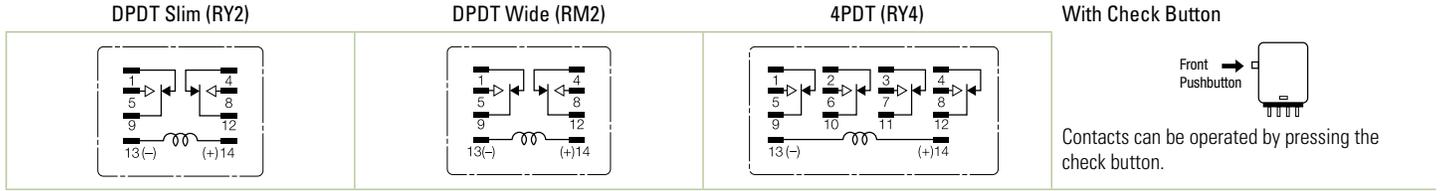


(RM2)



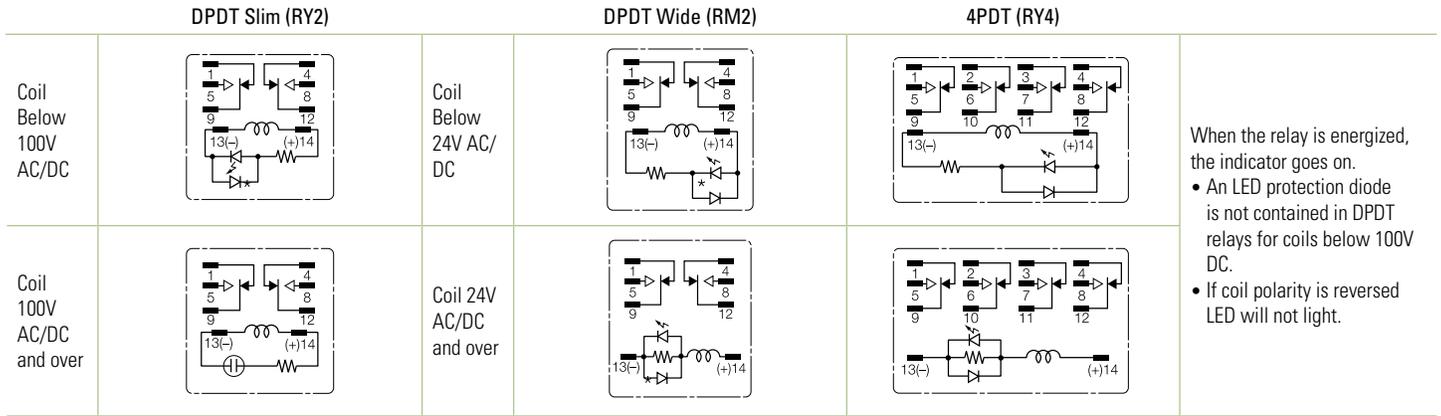
Switches & Pilot Lights

Internal Connection (View from Bottom)
Standard Type



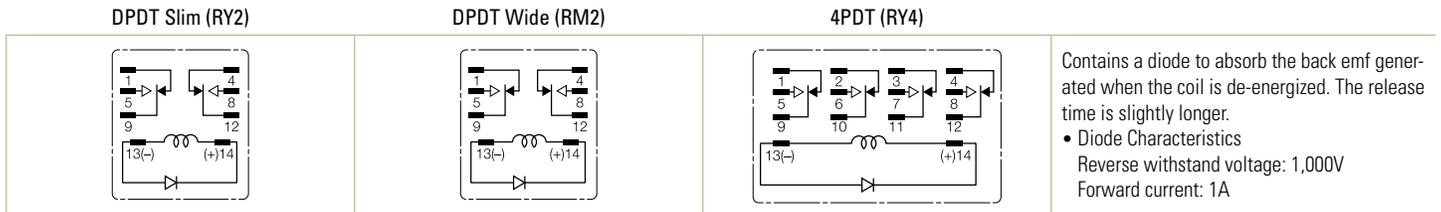
Signaling Lights

With Indicator (-L type)



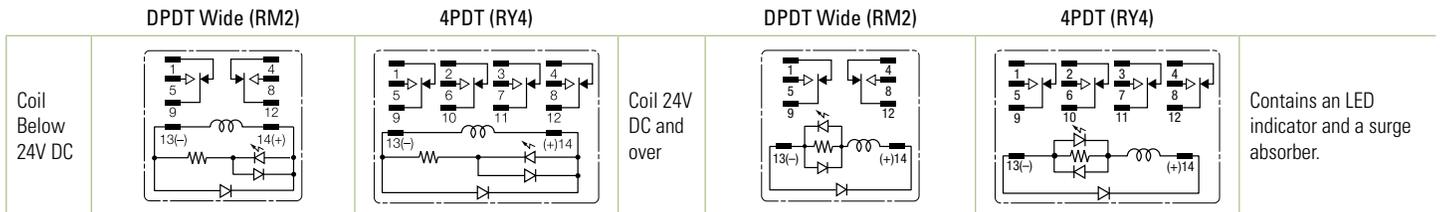
Relays & Sockets

With Diode (-D type)



Timers

With Indicator and Diode (-LD type)



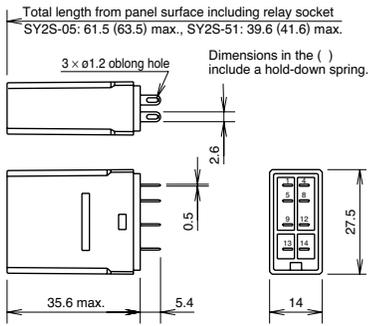
Contactors

Terminal Blocks

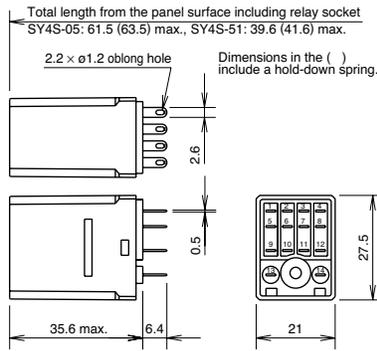
Circuit Breakers

Dimensions (mm)

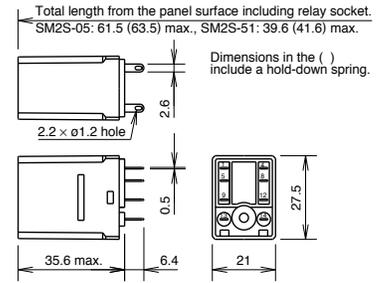
RY2S



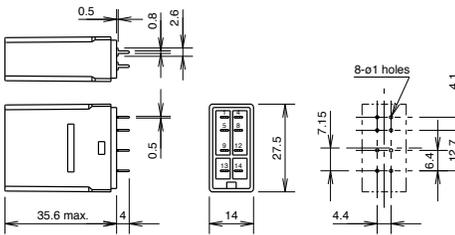
RY4S



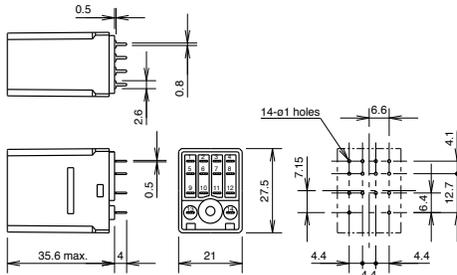
RM2S



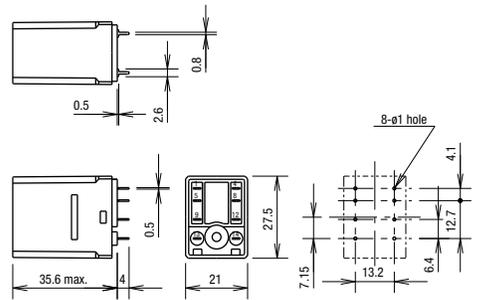
RY2V



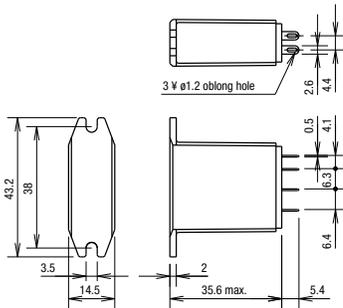
RY4V



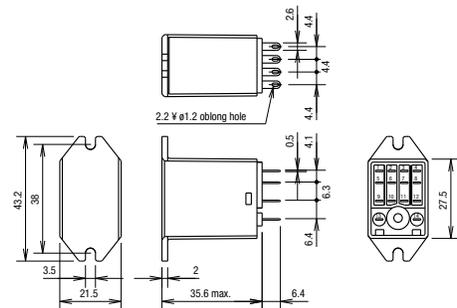
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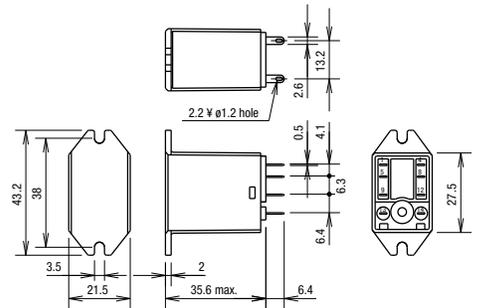
RY2S-UT



RY4S-UT



RM2S-UT



Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers

Contactors

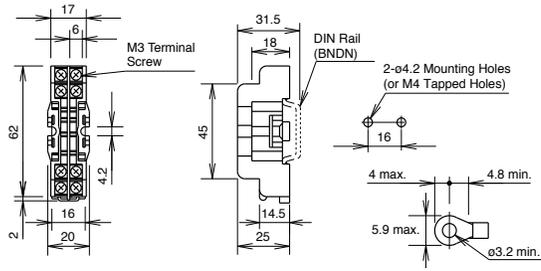
Terminal Blocks

Circuit Breakers

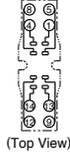
Dimensions

Standard DIN Rail Mount Sockets

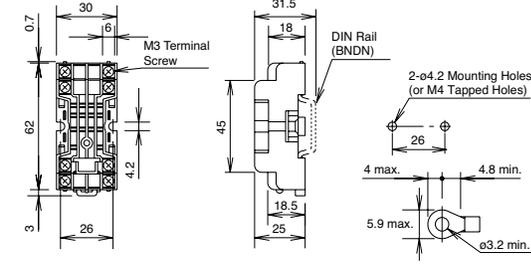
SY2S-05



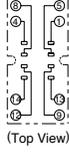
Terminal Arrangement



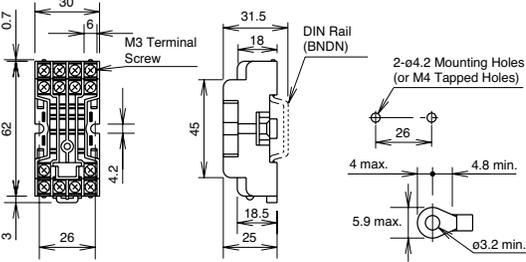
SM2S-05



Terminal Arrangement



SY4S-05

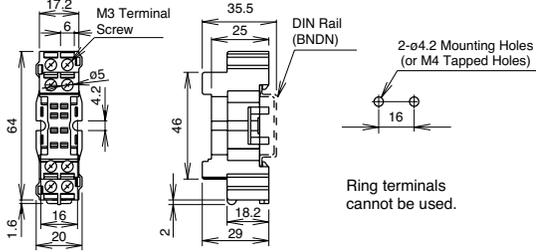


Terminal Arrangement

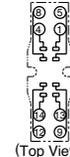


Finger-safe DIN Rail Mount Sockets

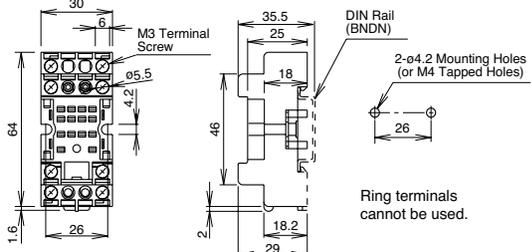
SY2S-05C



Terminal Arrangement



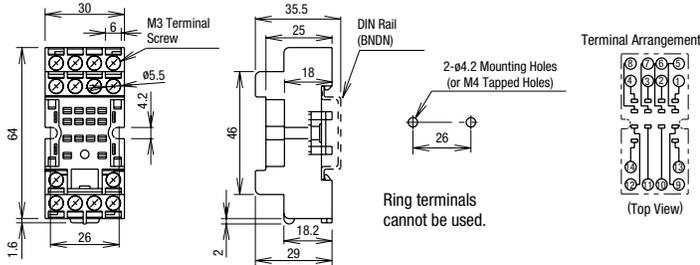
SM2S-05C



Terminal Arrangement



SY4S-05C



Terminal Arrangement



Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers

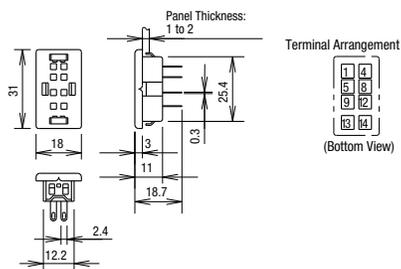
Contactors

Terminal Blocks

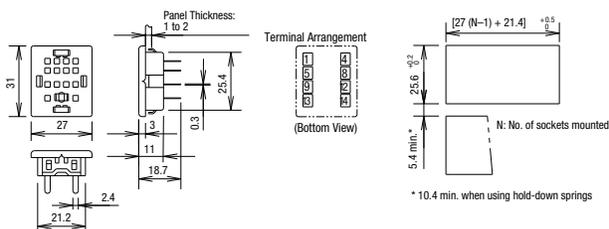
Circuit Breakers

Through Panel Mount Socket

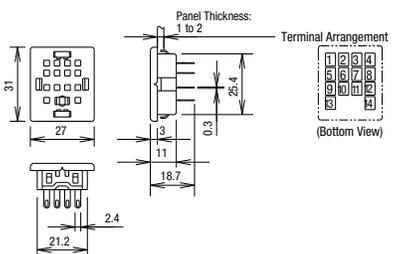
SY2S-51



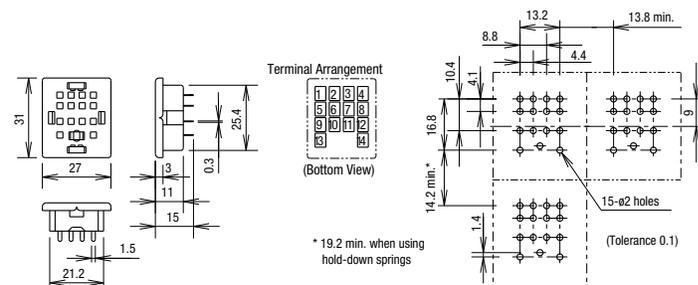
SM2S-51



SY4S-51

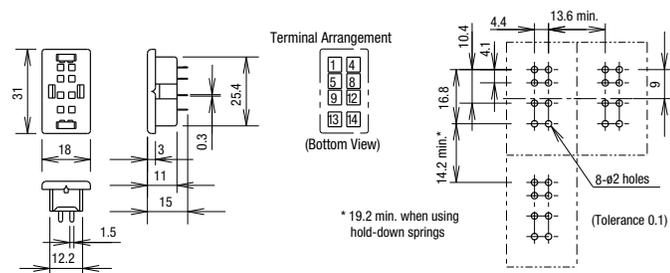


SY4S-61

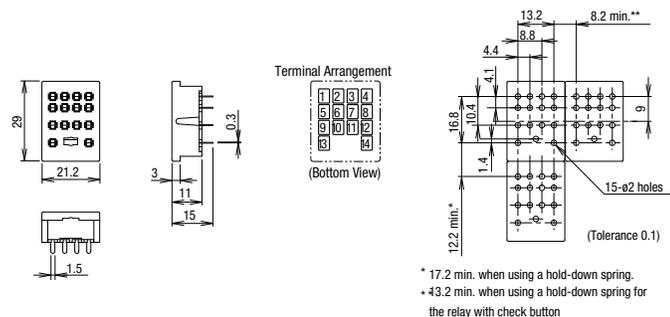


PCB Mount Sockets

SY2S-61



SY4S-62



Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers

Contactors

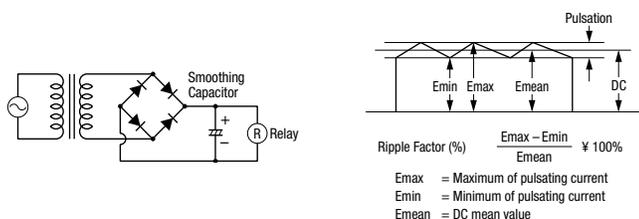
Terminal Blocks

Circuit Breakers

Operating Instructions

Driving Circuit for Relays

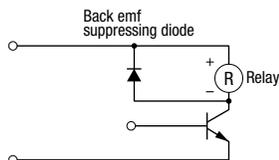
- To ensure correct relay operation, apply rated voltage to the relay coil.
- Input voltage for the DC coil:
A complete DC voltage is best for the coil power to make sure of stable relay operation. When using a power supply containing a ripple voltage, suppress the ripple factor within 5%. When power is supplied through a rectification circuit, the relay operating characteristics, such as pickup voltage and dropout voltage, depend on the ripple factor. Connect a smoothing capacitor for better operating characteristics as shown below.



- Leakage current while relay is off:
When driving an element at the same time as the relay operation, special consideration is needed for the circuit design. As shown in the incorrect circuit below, leakage current (I_0) flows through the relay coil while the relay is off. Leakage current causes coil release failure or adversely affects the vibration resistance and shock resistance. Design a circuit as shown in the correct example.



- Surge suppression for transistor driving circuits:
When the relay coil is turned off, a high-voltage pulse is generated, causing a transistor to deteriorate and sometimes to break. Be sure to connect a diode to suppress the back electromotive force. Then, the coil release time becomes slightly longer. To shorten the coil release time, connect a Zener diode between the collector and emitter of the transistor. Select a Zener diode with a Zener voltage slightly higher than the power voltage.



Protection for Relay Contacts

- The contact ratings show maximum values. Make sure that these values are not exceeded. When an inrush current flows through the load, the contact may become welded. If this is the case, connect a contact protection circuit, such as a current limiting resistor.
- Contact protection circuit:
When switching an inductive load, arcing causes carbides to form on the contacts, resulting in increased contact resistance. In consideration of contact reliability, contact life, and noise suppression, use of a surge absorbing circuit is recommended. Note that the release time of the load becomes slightly longer. Check the operation using the actual load. Incorrect use of a contact protection circuit will adversely affect switching characteristics. Four typical examples of contact protection circuits are shown in the following table:

| | |
|----------|---|
| RC | <p> <ul style="list-style-type: none"> R: Resistor of approximately the same resistance value as the load C: 0.1 to 1 μF </p> |
| Diode | <p> This protection circuit can be used for DC load power circuits. Use a diode with the following ratings. Reverse withstand voltage: Power voltage of the load circuit x 10 Forward current: More than the load current </p> |
| Varistor | <p> This protection circuit can be used for both AC and DC load power circuits. For a best result, when using a power voltage of 24 to 48V AC/DC, connect a varistor across the load. When using a power voltage of 100 to 240V AC/DC, connect a varistor across the contacts. </p> |

- Do not use a contact protection circuit as shown below:

| | |
|--|--|
| | <p>This protection circuit is very effective in arc suppression when opening the contacts. But, the capacitor is charged while the contacts are opened. When the contacts are closed, the capacitor is discharged through the contacts, increasing the possibility of contact welding.</p> |
| | <p>This protection circuit is very effective in arc suppression when opening the contacts. But, when the contacts are closed, a current flows to charge the capacitor, causing contact welding.</p> |

Generally, switching a DC inductive load is more difficult than switching a DC resistive load. Using an appropriate arc suppressor, however, will improve the switching characteristics of a DC inductive load.

Soldering

- When soldering the relay terminals, use a soldering iron of 30 to 60W, and quickly complete soldering (within approximately 3 seconds).
- Use a non-corrosive rosin flux.

Operating Instructions con't

Other Precautions

1. General notice:

To maintain the initial characteristics, do not drop or shock the relay.

The relay cover cannot be removed from the base during normal operation. To maintain the initial characteristics, do not remove the relay cover.

Use the relay in environments free from condensation, dust, sulfur dioxide (SO₂), and hydrogen sulfide (H₂S).

Make sure that the coil voltage does not exceed applicable coil voltage range.

2. UL and CSA ratings may differ from product rated values determined by IDEC.

3. Do not use relays in the vicinity of strong magnetic field, as this may affect relay operation.

Safety Precautions

- Turn off the power to the relay before starting installation, removal, wiring, maintenance, and inspection of the relays. Failure to turn power off may cause electrical shock or fire hazard.
- Observe specifications and rated values, otherwise electrical shock or fire hazard may be caused.
- Use wires of the proper size to meet voltage and current requirements. Tighten the terminal screws on the relay socket to the proper tightening torque.
- Surge absorbing elements on AC relays with RC or DC relays with diode are provided to absorb the back electromotive force generated by the coil. When the relay is subject to an excessive external surge voltage, the surge absorbing element may be damaged. Add another surge absorbing provision to the relay to prevent damage.

Precautions for the RU Relays

- Before operating the latching lever of the RU relay, turn off the power to the RU relay. After checking the circuit, return the latching lever to the original position.
- Do not use the latching lever as a switch. The durability of the latching lever is a minimum of 100 operations.
- When using DC loads on 4PDT relays, apply a positive voltage to terminals of neighboring poles and a negative voltage to the other terminals of neighboring poles to prevent the possibility of short circuits.
- DC relays with a diode have a polarity in the coil terminals. Apply the DC voltage to the correct terminals.