

RU Series Universal Relays

Key features:

- Full featured universal miniature relays
- Designed with environment taken into consideration
- Two terminal styles: plug-in and PCB mount
- Non-polarized LED indicator
- No internal wires, lead-free construction
- Cadmium-free contacts
- Mechanical flag indicator
- Manual latching lever with color coding for AC or DC coil
- Snap-on yellow marking plate; optional marking plates are available in four other colors
- Maximum contact ratings: 10A (RU2), 6A (RU4), 3A (RU42)
- UL Recognized, CSA Certified, EN Compliant



With Latching or Momentary Lever

Mechanical Indicator*

The contact position can be confirmed through the five small windows.

Marking Plate

Standard yellow marking plate is easily replaced with optional marking plates in four colors for easy identification of relays.

LED Indicator*

Non-polarized green LED indicator is standard provision for plug-in terminal, latching lever types

Latching and Momentary Lever

Using the lever, operation can be checked without energizing the coil. The lever is color coded for AC and DC coils.

| | Latching | Momentary |
|----------|----------|-----------|
| AC coil: | Orange | Red |
| DC coil: | Green | Blue |



In Normal Operation



Note: Turn off the power to the relay coil when using the latching lever. After checking the operation, return the latching lever in the normal position.

Standard (without lever)

AC/DC Color Marking
For identification of AC or DC coils.
AC coil: Yellow
DC coil: Blue

Mechanical Indicator*

Marking Plate

LED Indicator*

Non-polarized green LED indicator is standard provision for plug-in terminal types.



AC Coil






DC Coil



| Coil Voltage | Tape Color |
|----------------|--------------------------------|
| 24V AC | White |
| 100 to 110V AC | Clear |
| 110 to 120V AC | Blue |
| 200 to 220V AC | Black |
| 220 to 240V AC | Red |
| 24V DC | Green |
| 6V DC | Voltage marking on yellow tape |
| 12V DC | |
| 48V DC | |
| 110V DC | |

*Not available on PCB type.

Part Number Selection

| Contact | Model | Part Number | | | Coil Voltage Code (Standard Stock in bold) |
|---|---------------------------|-------------|---------------------|----------------------|--|
| | | Standard | With Latching Lever | With Momentary Lever | |
| DPDT (10A)  | Standard | RU2S-C-□ | RU2S-□ | RU2S-M-□ | A24, A110, A220 D6, D12, D24 , D48, D110 |
| | With RC (AC coil only) | RU2S-CR-□ | RU2S-R-□ | RU2S-MR-□ | A110, A220 |
| | With diode (DC coil only) | RU2S-CD-□ | RU2S-D-□ | RU2S-MD-□ | D6, D12, D24 , D48, D110 |
| | PCB | RU2V-NF-□ | — | — | A24, A110, A220 D6, D12, D24 , D48, D110 |
| 4PDT (6A)  | Standard | RU4S-C-□ | RU4S-□ | RU4S-M-□ | A24, A110, A220 D6, D12, D24 , D48, D110 |
| | With RC (AC coil only) | RU4S-CR-□ | RU4S-R-□ | RU4S-MR-□ | A110, A220 |
| | With diode (DC coil only) | RU4S-CD-□ | RU4S-D-□ | RU4S-MD-□ | D6, D12, D24, D48, D110 |
| | PCB | RU4V-NF-□ | — | — | A24, A110 , A220 D6, D12, D24 , D48, D110 |
| 4PDT Bifurcated (3A)  | Standard | RU42S-C-□ | RU42S-□ | RU42S-M-□ | A24, A110, A220 D6, D12, D24 , D48, D110 |
| | With RC (AC coil only) | RU42S-CR-□ | RU42S-R-□ | RU42S-MR-□ | A110, A220 |
| | With diode (DC coil only) | RU42S-CD-□ | RU42S-D-□ | RU42S-MD-□ | D6, D12, D24, D48, D110 |
| | PCB | RU42V-NF-□ | — | — | A24, A110, A220 D6, D12, D24 , D48, D110 |

- 1. Plug-in terminal models have an LED indicator and a mechanical indicator as standard.
- 2. PCB models do not have an LED indicator or a mechanical indicator.

Ordering Information






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

(example) **RU2S-C** **A110**
Part No. Coil Voltage Code

Coil Voltage Table




| Coil Voltage Code | A24 | A110 | A220 | D6 | D12 | D24 | D48 | D110 |
|-------------------|--------|-------------|-------------|-------|--------|--------|--------|---------|
| Coil Rating | 24V AC | 110-120V AC | 220-240V AC | 6V DC | 12V DC | 24V DC | 48V DC | 110V DC |

Sockets

| Relays | Spring Clamp DIN Rail Mount | Standard DIN Rail Mount | Finger-safe DIN Rail Mount | Panel Mount | PCB Mount |
|-----------------------------|---|---|---|---|--|
| RU2S (DPDT) | SU2S-11L | SM2S-05 | SM2S-05C | SY4S-51 | SM2S-61 SM2S-62 |
| RU4S (4PDT) RU42S (4PDT) | SU4S-11L | SY4S-05 | SY4S-05C | | SY4S-61 SY4S-62 |
| |  |  |  |  |  |

Switches & Pilot Lights

Hold Down Springs & Clips

| Appearance | Item | Relay | For DIN Mount Socket | For Through Panel & PCB Mount Socket |
|---|--------------------------|---------------------|----------------------|--------------------------------------|
|  | Pullover Wire Spring | RU2S/RU4S/ RU42S | SY4S-02F1 | SY4S-51F1 |
|  | Leaf Spring (side latch) | RU2S/RU4S/ RU42S | SFA-202* | SFA-302* |
|  | Leaf Spring (top latch) | RU2S/RU4S/ RU42S | SFA-101* | SFA-301* |



Note: Order 2 pieces for each relay

Signaling Lights

Relays & Sockets

Accessories

| Name | Part Number | Color Code * |
|---------------|-------------|--|
| Marking Plate | RU9Z-P* | A (orange), G (green), S (blue), W (white), Y (yellow) |



Specify a color code when ordering. The marking plate can be removed from the relay by inserting a flat screwdriver under the marking plate.

Timers

Specifications

| Model (Contact) | RU2 (DPDT) | RU4 (4PDT) | RU42 (4PDT-bifurcated) |
|--------------------------------------|---|-----------------------|---------------------------|
| Contact Material | Silver alloy | Silver (gold clad) | Silver-nickel (gold clad) |
| Contact Resistance ¹ | 50 mΩ maximum | | |
| Minimum Applicable Load ² | 24V DC, 5 mA (reference value) | 1V DC, 1 mA | 1V DC, 0.1 mA |
| Operating Time ³ | 20 ms maximum | | |
| Release Time ³ | 20 ms maximum | | |
| Power Consumption | AC: 1.1 to 1.4VA (50 Hz), 0.9 to 1.2VA (60 Hz) DC: 0.9 to 1.0W | | |
| Insulation Resistance | 100MΩ minimum (500V DC megger) | | |
| Dielectric Strength | Between contact and coil: 2500V AC, 1 minute | | |
| | Between contacts of different poles: | | |
| | 2500V AC, 1 minute | 2000V AC, 1 minute | |
| Operating Frequency | Between contacts of the same pole: 1000V AC, 1 minute | | |
| | 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 (100G) Operating extremes: 150 m/s ² (15G) | | |
| Mechanical Life | AC: 50,000,000 operations DC: 100,000,000 operations | 50,000,000 operations | |
| Electrical Life ⁴ | See table on page 794 | | |
| Operating Temperature ⁵ | PCB model: -55 to +70°C (no freezing) Blade model: -55 to +60°C (no freezing) | | |
| Operating Humidity | 5 to 85% RH (no condensation) | | |
| Weight | Approx. 35g | | |

Contactors




Terminal Blocks

Circuit Breakers




1. Measured using 5V DC, 1A voltage drop method
2. Measured at operating frequency of 120 operations/min (failure rate level P, reference value)
3. Measured at the rated voltage (at 20°C), excluding contact bouncing;
Release time of AC relays with RC: 25 ms maximum
Release time of DC relays with diode: 40 ms maximum
4. Contact Load and Electrical Life (at ambient temperature 20°C)
5. Measured at the rated voltage.

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 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. |

Coil Ratings

| Rated Voltage (V) | Coil Voltage Code | Rated Current (mA) ±15% (at 20°C) | | Coil Resistance (Ω) ±10% (at 20°C) | Operating Characteristics (values at 20°C) | | | |
|-------------------|-------------------|-----------------------------------|----------|------------------------------------|--|----------------|-----------------|-------------|
| | | 50 Hz | 60 Hz | | Maximum Continuous Applied Voltage | Pickup Voltage | Dropout Voltage | |
| AC (50/60 Hz) | 24 | A24 | 49.3 | 42.5 | 164 | 110% | 80% maximum | 30% minimum |
| | 110-120 | A110 | 8.4-10.0 | 7.1-8.2 | 4,550 | | | |
| | 220-240 | A220 | 4.2-5.0 | 3.6-4.2 | 18,230 | | | |
| DC | 6 | D6 | 155 | | 40 | 110% | 80% maximum | 10% minimum |
| | 12 | D12 | 80 | | 160 | | | |
| | 24 | D24 | 44.7 | | 605 | | | |
| | 48 | D48 | 18 | | 2,560 | | | |
| | 110 | D110 | 8.9 | | 12,100 | | | |

 1. The rated current includes the current of the LED indicator.

Surge Suppressor Ratings


| Model | Ratings |
|---------|---|
| AC Coil | With RC RC series circuit R: 20 kΩ, C: 0.033 μF |
| DC Coil | With Diode Diode reverse voltage: 1000V Diode forward current: 1A |

UL and c-UL Ratings

| Voltage | Resistive | | | General Use | | | Horse Power Rating | | |
|---------|-----------|-----|------|-------------|-----|------|--------------------|--------|------|
| | RU2 | RU4 | RU42 | RU2 | RU4 | RU42 | RU2 | RU4 | RU42 |
| 250V AC | 10A | — | 3A | — | 6A | — | — | 1/10HP | — |
| 30V DC | 10A | 6A | 3A | — | — | — | — | — | — |

Contact Ratings

| Contact | Continuous Current | Maximum Contact Capacity | | | | |
|-----------------|--------------------|--------------------------|----------------|-------------|------------|-----------|
| | | Allowable Contact Power | | Voltage (V) | Rated Load | |
| | | Resistive Load | Inductive Load | | Res. Load | Ind. Load |
| DPDT | 10A | 2500VA AC | 1250VA AC | 250 AC | 10A | 5A |
| | | 300W DC | 150W DC | 30 DC | 10A | 5A |
| 4PDT | 6A | 1500VA AC | 600VA AC | 250 AC | 6A | 0.8A |
| | | 180W DC | 90W DC | 30 DC | 6A | 1.5A |
| 4PDT bifurcated | 3A | 750VA AC | 200VA AC | 250 AC | 3A | 0.8A |
| | | 90W DC | 45W DC | 30 DC | 3A | 1.5A |

 1. On 4PDT relays, the maximum allowable total current of neighboring two poles is 6A. At the rated load, make sure that the total current of neighboring two poles does not exceed 6A (3A + 3A = 6A).
2. Inductive load for the rated load — cos φ = 0.3, L/R = 7 ms

CSA Ratings

| Voltage | Resistive |
|---------|-----------|
| | RU42 |
| 250V AC | 3A |
| 30V DC | 3A |

TÜV Ratings

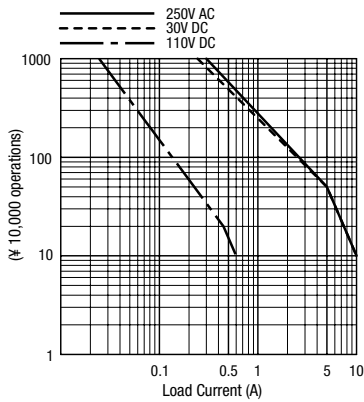
| Voltage | Resistive | | | Inductive | | |
|---------|-----------|-----|------|-----------|------|------|
| | RU2 | RU4 | RU42 | RU2 | RU4 | RU42 |
| 250V AC | 10A | 6A | 3A | 5A | 0.8A | 0.8A |
| 30V DC | 10A | 6A | 3A | 5A | 1.5A | 1.5A |

Socket Specifications

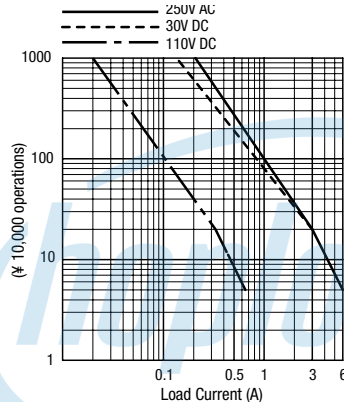
| | Sockets | Terminal | Electrical Rating | Wire Size | Torque |
|----------------------------|----------|--|---------------------------------------|------------------------|---------------|
| DIN Rail Mount Sockets | SU2S-11L | Spring clamp terminals | 250V/10A | 24-16 AWG | — |
| | SU4S-11L | Spring clamp terminals | 250V/6A (using RU4), 10A (using RU2) | 24-16 AWG | — |
| | SM2S-05 | M3 screw with captive wire clamp | 300V, 10A | Maximum up to 2-#14AWG | 5.5 - 9in•lbs |
| | SM2S-05C | M3 screw with captive wire clamp, fingersafe | 300V, 10A | Maximum up to 2-#14AWG | 5.5 - 9in•lbs |
| | SY4S-05 | M3 screw with captive wire clamp | 300V, 7A (using RU4), 10A (using RU2) | Maximum up to 2-#14AWG | 5.5 - 9in•lbs |
| | SY4S-05C | M3 screw with captive wire clamp, fingersafe | 300V, 7A (using RU4), 10A (using RU2) | Maximum up to 2-#14AWG | 5.5 - 9in•lbs |
| Through Panel Mount Socket | SY4S-51 | Solder | 300V, 7A | — | — |
| PCB Mount Socket | SY4S-61 | PCB mount | 300V, 7A | — | — |
| | SY4S-62 | PCB mount | 250V, 7A | — | — |

Electrical Life Curves

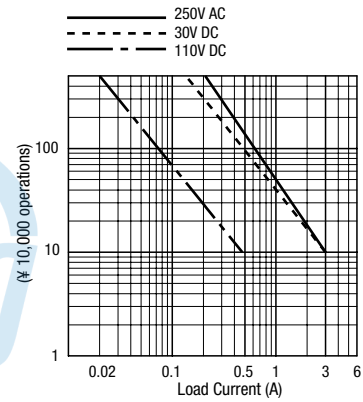
RU2 (Resistive Load)



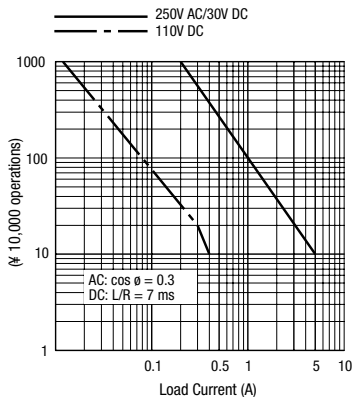
RU4 (Resistive Load)



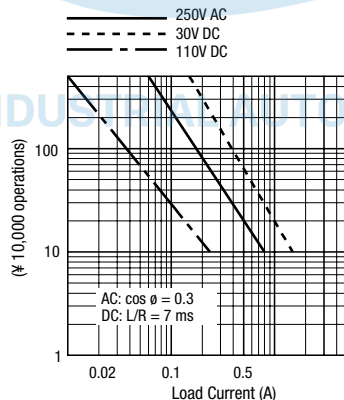
RU42 (Resistive Load)



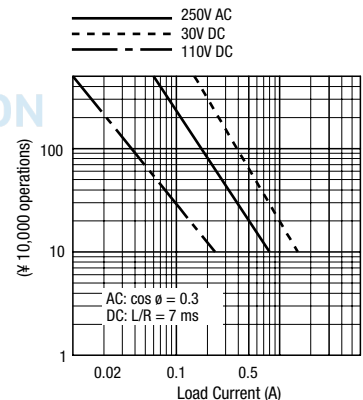
RU2 (Inductive Load)



RU4 (Inductive Load)

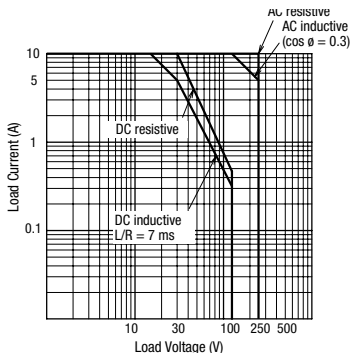


RU42 (Inductive Load)

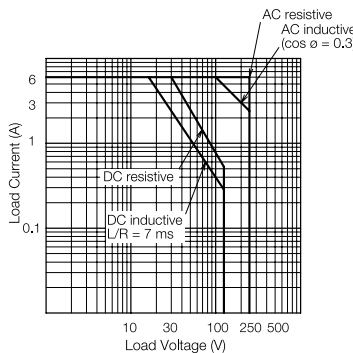


Maximum Switching Current

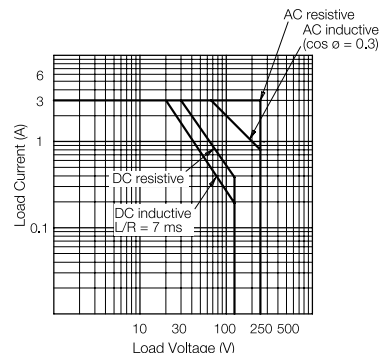
RU2



RU4

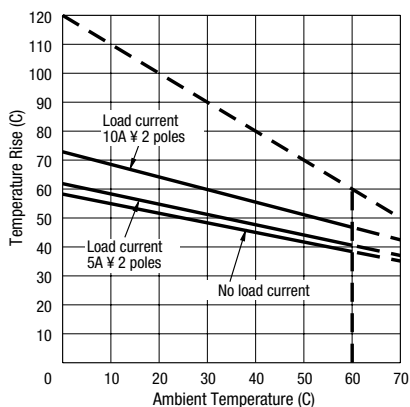


RU42 (Bifurcated)

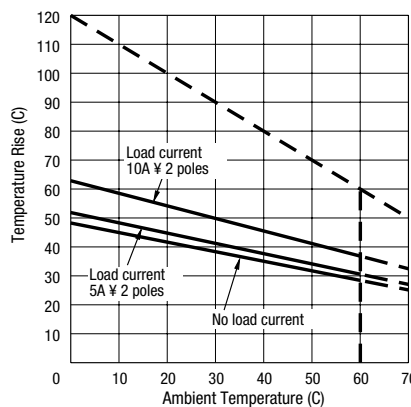


Ambient Temperature vs. Temperature Rise Curves

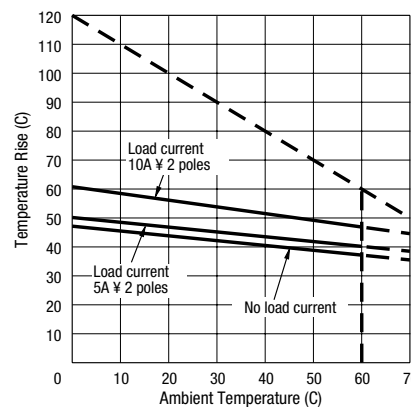
RU2 (AC Coil, 50 Hz)



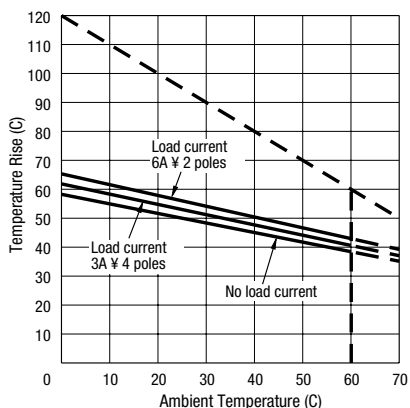
RU2 (AC Coil, 60 Hz)



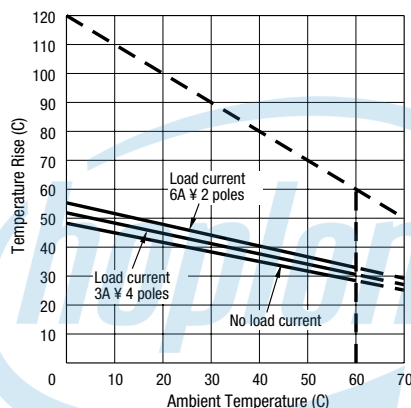
RU2 (DC Coil)



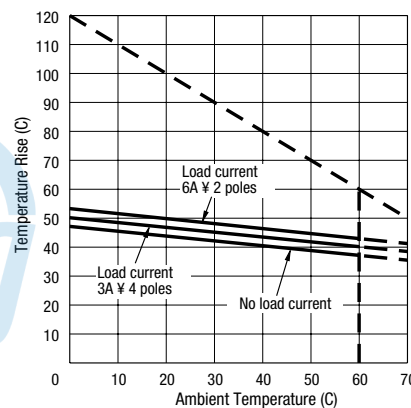
RU4/RU42 (AC Coil, 50 Hz)



RU4/RU42 (AC Coil, 60 Hz)



RU4/RU42 (DC Coil)

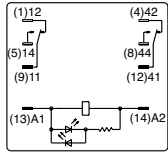


The above temperature rise curves show the characteristics when 100% the rated coil voltage is applied. The heat resistance of the coil is 120°C. The slant dashed line indicates the allowable temperature rise for the coil at different ambient temperatures. Load current 6A x 2 poles is for the RU4 models only.

INDUSTRIAL AUTOMATION

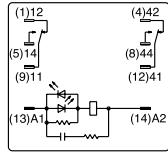
Internal Connection (View from Bottom)

RU2S-* Standard

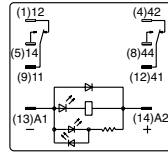


24V AC/DC coil or less

RU2S-*R with RC

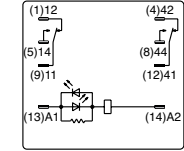
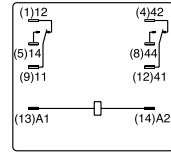


RU2S-*D With Diode

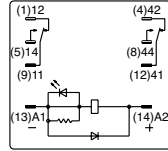


24V DC coil or less

RU2V-NF-*

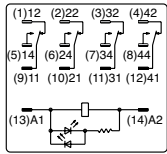


Over 24V AC/DC coil



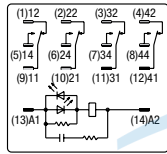
Over 24V DC coil

RU4S-*/RU42S-* Standard

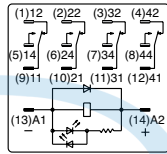


24V AC/DC coil or less

RU4S-*R/RU42S-*R With RC

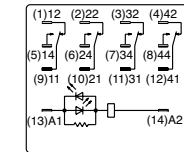
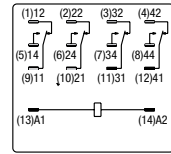


RU4S-*D/RU42S-*D With Diode

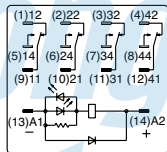


24V DC coil or less

RU4V-NF-*/RU42V-NF-*



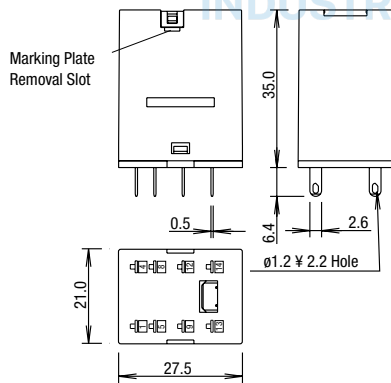
Over 24V AC/DC coil



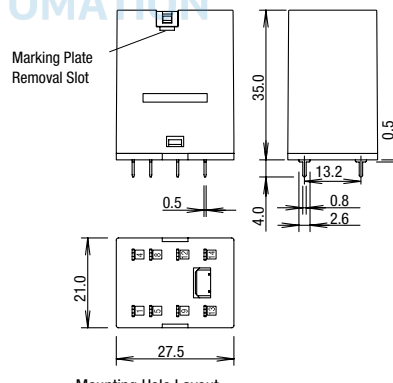
Over 24V DC coil

Dimensions (mm)

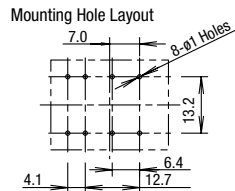
RU2S



RU2V



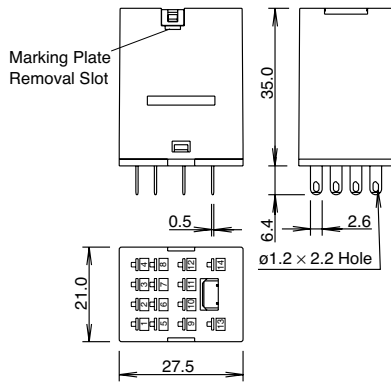
Marking plate removal slot is provided only on one side. Insert a flat screwdriver into the slot to remove the marking plate.



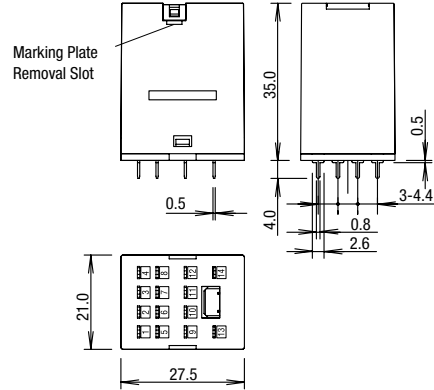
All dimensions in mm.

Dimensions con't (mm)

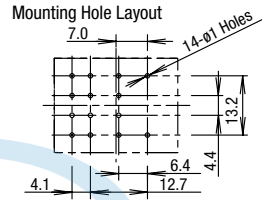
RU4S/RU42S



RU4V/RU42V



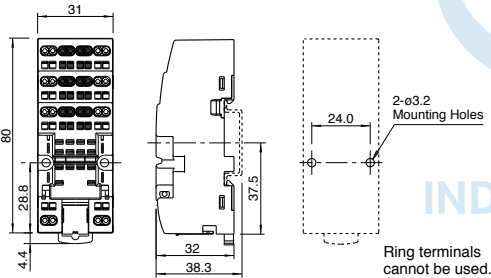
Marking plate removal slot is provided only on one side. Insert a flat screwdriver into the slot to remove the marking plate.



All dimensions in mm.

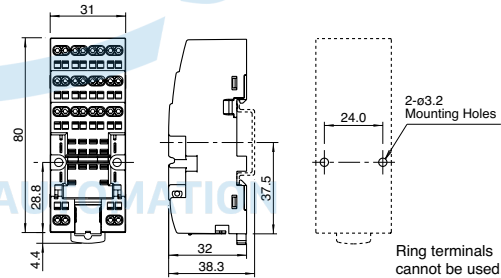
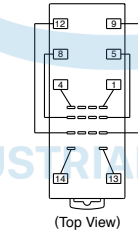
Spring Clamp DIN Rail Mount Sockets

SU2S-11L

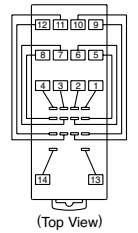


SU4S-11L

Terminal Arrangement

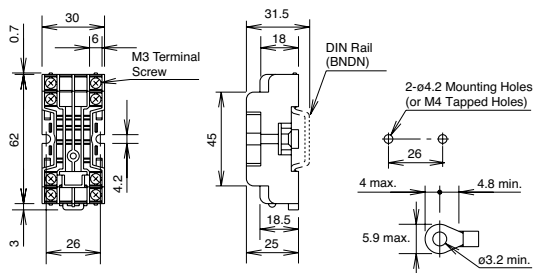


Terminal Arrangement

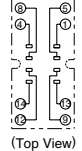


Standard DIN Rail Mount Sockets

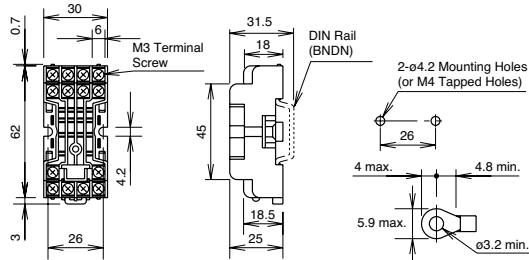
SM2S-05



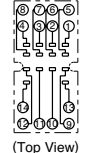
Terminal Arrangement



SY4S-05



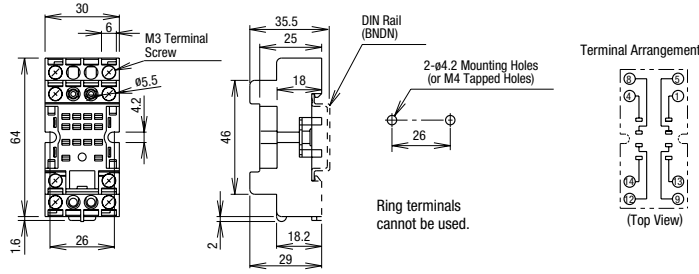
Terminal Arrangement



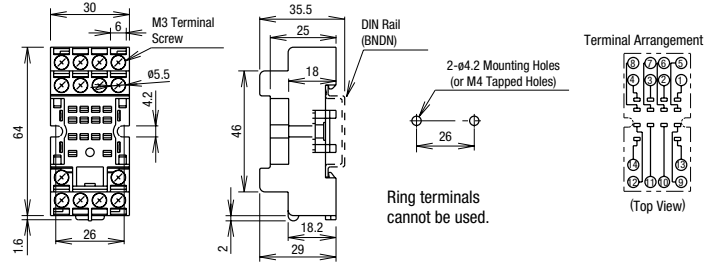
Dimensions con't (mm)

Finger-safe DIN Rail Mount Sockets

SM2S-05C

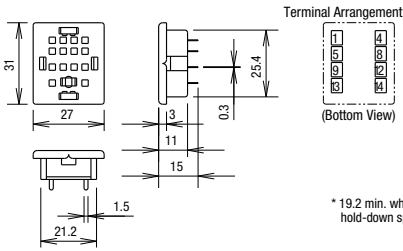


SY4S-05C

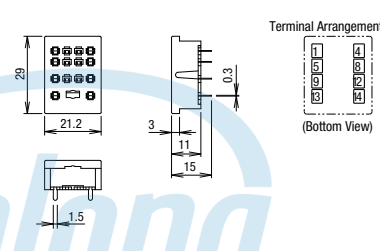


PCB Mount Sockets

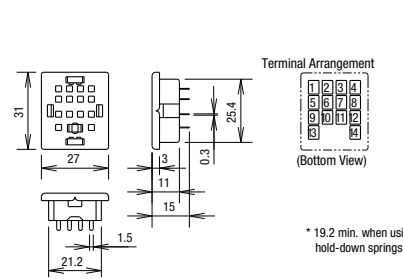
SM2S-61



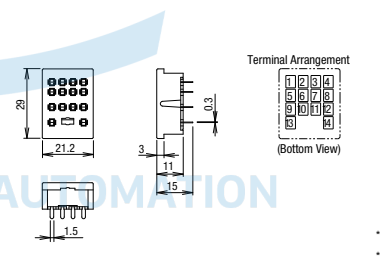
SM2S-62



SY4S-61

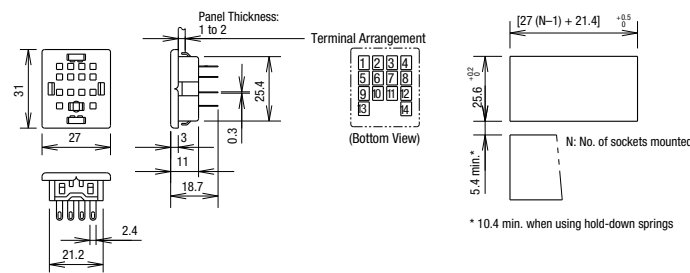


SY4S-62



Through Panel Mount Socket

SY4S-51



Switches & Pilot Lights

Signalng Lights

Relays & Sockets

Timers

Contactors

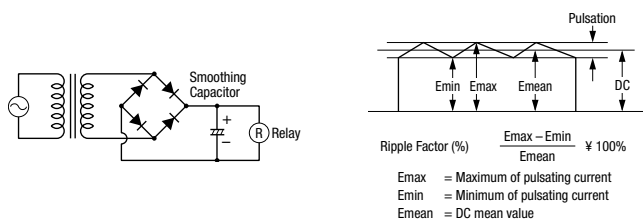
Terminal Blocks

Circuit Breakers

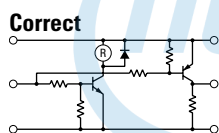
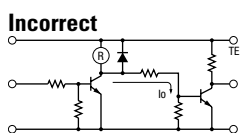
Operating Instructions

Driving Circuit for Relays

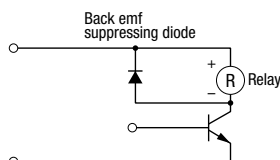
- To ensure correct relay operation, apply rated voltage to the relay coil.
- Input voltage for the DC coil:
A complete DC voltage is best for the coil power to make sure of stable relay operation. When using a power supply containing a ripple voltage, suppress the ripple factor within 5%. When power 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 | | This protection circuit can be used when the load impedance is smaller than the RC impedance in an AC load power circuit. • R: Resistor of approximately the same resistance value as the load • C: 0.1 to 1 μ F |
| Diode | | 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 |
| Varistor | | 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. |

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

| | |
|--|---|
| | 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. |
| | 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. |

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

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

INDUSTRIAL AUTOMATION