

RJ Series Slim Power Relays

Compact and rugged power relays. Large switching capacity.

- Compact housing only 12.7-mm wide.
Large contact rating
RJ1 (1-pole): 16A (UL general use rating @250V AC)
RJ2 (2-pole): 8A
- Non-polarized LED indicator available on blade type. IDEC's unique light guide structure enables high visibility of coil status from any direction.
- Excellent electrical and mechanical life.
Electrical life: 200,000 operations (AC load)
Mechanical life: 30 million operations (AC coil)
- RoHS directive compliant (EU directive 2002/95/EC). Contains no lead, cadmium, mercury, hexavalent chromium, PBB or PBDE).
- Diode model:
Diode reverse withstand voltage: 1000V
- UL recognized, CSA certified, EN compliant.



UL508
UL File No. E55996



CSA C22.2 No. 14
1608322
CSA File No. LR35144





EN61810-1
VDE (REG.-Nr B312)



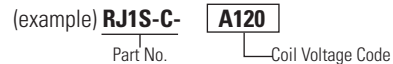
EN61810-1
EC Low Voltage Directive

Part Number Selection

| | Terminal | Contact | Model | Part Number | Coil Voltage Code (Standard Stock in bold) |
|---|----------|---------|------------------------------------|-------------|---|
|  | Blade | SPDT | Standard | RJ1S-C- | A24 , A110, A120 , A220, A240 , D12, D24 , D48, D100 |
| | | | with LED | RJ1S-CL- | D12, D24 , D48, D100 |
| | | | with Surge Suppression Diode | RJ1S-CD- | |
| | | | with LED & Surge Suppression Diode | RJ1S-CLD- | |
| | | DPDT | Standard | RJ2S-C- | A24 , A110, A120 , A220, A240 , D12, D24 , D48, D100 |
| | | | with LED | RJ2S-CL- | D12, D24 , D48, D100 |
| | | | with Surge Suppression Diode | RJ2S-CD- | |
| | | | with LED & Surge Suppression Diode | RJ2S-CLD- | |
|  | PCB | SPDT | Standard | RJ1V-C- | A24 , A110, A120 , A220, A240 , D5, D6, D12, D24 , D48, D100 |
| | | | High Capacity | RJ1V-CH- | |
| | | SPST-NO | Standard | RJ1V-A- | |
| | | | High Capacity | RJ1V-AH- | |
| | | DPDT | Standard | RJ2V-C- | |
| | | DPST-NO | Standard | RJ2V-A- | |

Ordering Information

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



Coil Voltage Table

| Coil Voltage Code | A12 | A24 | A110 | A120 | A220 | A240 | D5 | D6 | D12 | D24 | D48 | D100 |
|-------------------|--------|--------|---------|---------|---------|---------|-------|-------|--------|--------|--------|-----------------|
| Coil Rating | 12V AC | 24V AC | 110V AC | 120V AC | 220V AC | 240V AC | 5V DC | 6V DC | 12V DC | 24V DC | 48V DC | 100-110V DCV DC |

Switches & Pilot Lights

Display Lights

Relays & Sockets




Timers

Terminal Blocks

Circuit Breakers

Sockets

| | Relays | Standard DIN Rail Mount | Finger-safe DIN Rail Mount | PCB Mount |
|--------------|-------------------|-------------------------|----------------------------|-----------|
| Blade Models | RJ1S (Std) | SJ1S-05B | SJ1S-07L | SJ1S-61 |
| | RJ2S (Std) | SJ2S-05B | SJ2S-07L | SJ2S-61 |
| PCB Models | RJ1V (Std) | — | SQ1V-07B* | SQ1V-63* |
| | RJ1V (HC) RJ2V | — | SQ2V-07B* | SQ2V-63* |

*Hold-down clip or spring must be removed to use with RJ PCB relays.



Replacement Hold Down Springs

| Part Number | Used With Socket |
|-------------|--|
| SJ9Z-C1 | SJ1S-05B, SJ1S-07L, SJ2S-05B, SJ2S-07L |
| SQ9Z-C | SQ1V-07B, SQ2V-07B |
| SQ9Z-C63 | SQ1V-63, SQ2V-63 |

Jumpers for SJ Sockets

| Poles | Part Number | Quantity |
|-------|-------------|------------------------------------|
| 2 | SJ9Z-JF2 | Must purchase in quantities of 10. |
| 5 | SJ9Z-JF5 | |
| 8 | SJ9Z-JF8 | |
| 10 | SJ9Z-JF10 | |

Accessories

| Description | Appearance | Use with | Part No. | Remarks |
|------------------------------------|--|----------------------|----------|--|
| Aluminum DIN Rail (1 meter length) |  | All DIN rail sockets | BNDN1000 | IDEC offers a low-profile DIN rail (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. |

Specifications

| Model | | RJ1 | RJ2 |
|--|--|--|--------------------|
| Number of Poles | | 1-pole | 2-pole |
| Contact Configuration | | SPDT | DPDT |
| Contact Material | | Silver-nickel alloy | |
| Degree of Protection | | IP40 | |
| Contact Resistance (initial value) (*1) | | 50 mΩ maximum | |
| Operate Time (*2) | | 15 ms maximum | |
| Release Time (*2) | | 10 ms maximum (with diode: 20 ms maximum) | |
| Dielectric Strength | Between contact and coil | 5000V AC, 1 minute | 5000V AC, 1 minute |
| | Between contacts of the same pole | 1000V AC, 1 minute | 1000V AC, 1 minute |
| | Between contacts of different poles | — | 3000V AC, 1 minute |
| Vibration Resistance | Operating extremes | 10 to 55 Hz, amplitude 0.75 mm | |
| | Damage limits | 10 to 55 Hz, amplitude 0.75 mm | |
| Shock Resistance | Operating extremes | NO contact: 200 m/s ² , NC contact: 100 m/s ² | |
| | Damage limits | 1000 m/s ² | |
| Electrical Life (rated load) | | AC load: 200,000 operations minimum (operation frequency 1800 operations per hour) DC load: 100,000 operations minimum (operation frequency 1800 operations per hour) | |
| Mechanical Life (no load) | | AC coil: 30,000,000 operations minimum (operation frequency 18,000 operations per hour) DC coil: 50,000,000 operations minimum (operation frequency 18,000 operations per hour) | |
| Operating Temperature (*3) | | -40 to +70°C (no freezing) | |
| Operating Humidity | | 5 to 85% RH (no condensation) | |
| Weight (approx.) | | 19g (blade type), 17g (PCB form C type), 16g (PCB form A type) | |

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 bounce time.
 3. 100% rated voltage.

Switches & Pilot Lights

Display Lights

Relays & Sockets

Timers

Terminal Blocks

Circuit Breakers

Coil Ratings

| Rated Voltage | | | Coil Voltage Code | Rated Current (mA) ±15% (at 20°C) | | | | Coil Resistance (ohms)±10% (at 20°C) | Operating Characteristics ² | | | Power Consumption | |
|---------------|--------------------|----------|-------------------|--------------------------------------|------|-----------------------|------|--|--|-----------------|--|-------------------|--------|
| | | | | Without LED ¹ | | With LED ¹ | | | Pickup Voltage | Dropout Voltage | Maximum Allowable Voltage ³ | | |
| | | | | 50Hz | 60Hz | 50Hz | 60Hz | | | | | | |
| AC | Blade & PCB Models | 24V | A24 | 43.9 | 37.5 | 47.5 | 41.1 | 243 | 80% max | 30% min | 140% | 0.9VA (60Hz) | |
| | | 120V | A120 | 8.8 | 7.5 | 8.7 | 7.4 | | | | | | 6,400 |
| | | 240V | A240 | 4.3 | 3.7 | 4.3 | 3.7 | | | | | | 25,570 |
| Rated Voltage | | | Coil Voltage Code | Rated Current (mA) ±15% (at 20°C) | | | | Coil Resistance (ohms)±10% (at 20°C) | Operating Characteristics ² | | | Power Consumption | |
| | | | | Without LED ¹ | | With LED ¹ | | | Pickup Voltage | Dropout Voltage | Maximum Allowable Voltage ³ | | |
| | | | | 50Hz | 60Hz | 50Hz | 60Hz | | | | | | |
| DC | Blade Models | 12V | D12 | 44.2 | | 48.0 | | 271 | 70% max | 10% min | 170% | 0.53W | |
| | | 24V | D24 | 22.1 | | 25.7 | | 1,080 | | | | | |
| | | 48V | D48 | 11.0 | | 10.7 | | 4,340 | | | | | |
| | | 100-110V | D100 | 5.3 - 5.8 | | 5.2 - 5.7 | | 18,870 | | | 160% | | |
| | PCB Models | 5V | D5 | 106 | | - | | 47.2 | 70% max | 10% min | 170% | 0.53-0.64W | |
| | | 6V | D6 | 88.3 | | - | | 67.9 | | | | | |
| | | 12V | D12 | 44.2 | | - | | 271 | | | | | |
| | | 24V | D24 | 22.1 | | - | | 1,080 | | | | | |
| | | 48V | D48 | 11.0 | | - | | 4,340 | | | | | |
| | | 100-110V | D100 | 5.3 - 5.8 | | - | | 18,870 | | | 160% | | |

- 1. LED Indicator is only available on Blade relays.
- 2. Operating characteristics are at 20°C.
- 3. The maximum allowable voltage is the maximum value which can be applied to the relay coils.

Contact Ratings

| Model | | Contact | Allowable Contact Power | | Rated Load | | | Allowable Switching Current | Allowable Switching Voltage | Minimum Applicable Load | | |
|--------------|---------|--------------------|-------------------------|----------------|------------|----------------|------------------------------------|-----------------------------|-----------------------------|-------------------------|--------|----|
| | | | Resistive Load | Inductive Load | Voltage | Resistive Load | Inductive Load cosφ=0.3 L/R=7ms | | | | | |
| Blade Models | 1 pole | NO | 3000V AC | 1875VA | 250V AC | 12A | 7.5A | 16A | AC250V | DC5V | | |
| | | NC | 3000V AC | 1875VA | 250V AC | 12A | 7.5A | 6A | DC30V | 100mA | | |
| | 2 poles | NO | 2000V AC | 1000VA | 250V AC | 8A | 4A | 4A | AC250V | DC5V | | |
| | | NC | 2000V AC | 1000VA | 250V AC | 8A | 4A | 4A | DC30V | 100mA | | |
| PCB Models | 1 pole | Standard Type | NO | 3000V AC | 1875VA | 250V AC | 12A | 7.5A | 12A | AC250V | DC5V | |
| | | | NC | 3000V AC | 1875VA | 250V AC | 12A | 7.5A | | | | 6A |
| | | High Capacity Type | NO | 4000V AC | 2000VA | 250V AC | 16A | 8A | 16A | AC250V | DC5V | |
| | | | NC | 4000V AC | 2000VA | 250V AC | 16A | 8A | | | | 8A |
| | | | 2 poles | NO | 2000V AC | 1000VA | 250V AC | 8A | 4A | 8A | AC250V | |
| | | | | NC | 2000V AC | 1000VA | 250V AC | 8A | 4A | | | 4A |

Agency Ratings

| Voltage | UL | | | | CSA | | | | | | | | VDE | | | |
|---------|-------------|----|-----|----|-----------|-----|-----|----|-----------|------|-----|----|-----------|-----|---------------|-----|
| | General Use | | | | Resistive | | | | Inductive | | | | Resistive | | AC-15, DC-13* | |
| | RJ1 | | RJ2 | | RJ1 | | RJ2 | | RJ1 | | RJ2 | | RJ1 | RJ2 | RJ1 | RJ2 |
| 250V AC | 16A | 6A | 8A | 4A | 12A | 12A | 8A | 8A | 7.5A | 7.5A | 4A | 4A | 12A | 8A | 6A | 3A |
| 30V DC | 12A | 6A | 8A | 4A | 12A | 6A | 8A | 4A | 6A | 3A | 4A | 2A | 12A | 8A | 2.5A | 2A |

*According to the utilization categories of IEC60947-5-1

Socket Specifications

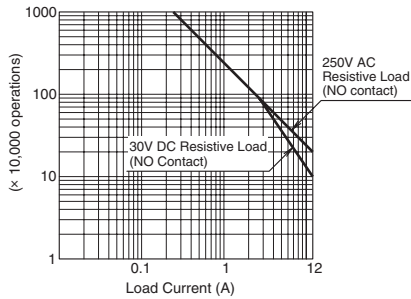
| | Socket | Terminal | Electrical Rating | Wire Size | Torque |
|--|----------|--|-------------------|---------------------------|----------------------------------|
| DIN Rail/ Panel Mount | SJ1S-05B | M3 screw with captive wire clamp | 250V, 12A | Maximum up to 2 - #14 AWG | 0.6 - 1.0N•m (Maximum 1.2N•m) |
| | SJ2S-05B | M3 screw with captive wire clamp | 250V, 8A | Maximum up to 2 - #14 AWG | 0.6 - 1.0N•m (Maximum 1.2N•m) |
| Finger-safe DIN Rail/ Panel Mount | SJ1S-07L | M3 screw with captive wire clamp, fingersafe | 250V, 12A | Maximum up to 2 - #14 AWG | 0.6 - 1.0N•m (Maximum 1.2N•m) |
| | SJ2S-07L | M3 screw with captive wire clamp, fingersafe | 250V, 8A | Maximum up to 2 - #14 AWG | 0.6 - 1.0N•m (Maximum 1.2N•m) |
| | SQ1V-07B | M3 screw with box clamp, fingersafe | 300V, 12A | Maximum up to 2 - #14 AWG | 1.0N•m Maximum |
| | SQ2V-07B | M3 screw with box clamp, fingersafe | 300V, 10A | Maximum up to 2 - #14 AWG | 1.0N•m Maximum |
| PCB Mount | SJ1S-61 | PCB mount | 250V, 12A | — | — |
| | SJ2S-61 | PCB mount | 250V, 8A | — | — |
| | SQ1V-63 | PCB mount | 300V, 12A | — | — |
| | SQ2V-63 | PCB mount | 300V, 12A | — | — |

Switches & Pilot Lights

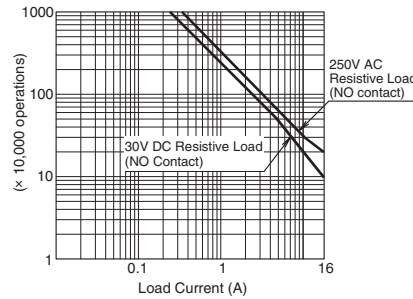
Display Lights

Electrical Life Curve (Resistive Load)

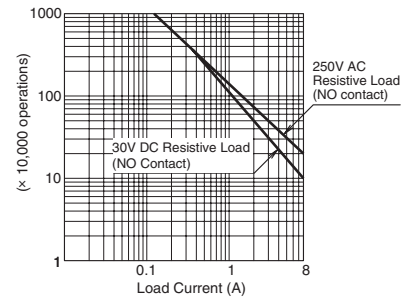
RJ1



RJ1 High Capacity



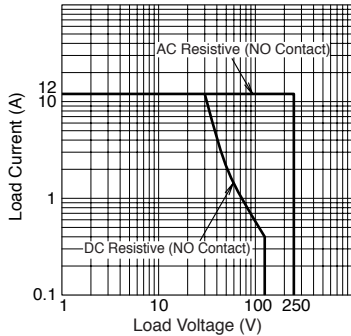
RJ2



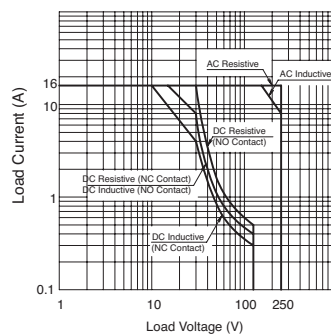
Relays & Sockets

Maximum Switching Capacity (Resistive Load)

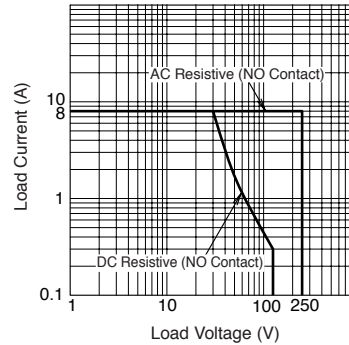
RJ1



RJ1 High Capacity



RJ2



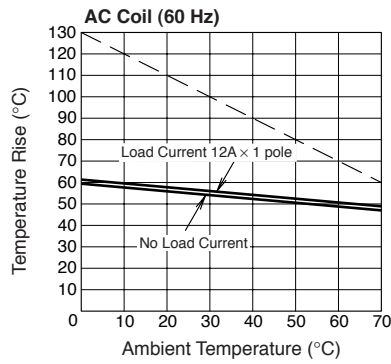
Timers

Terminal Blocks

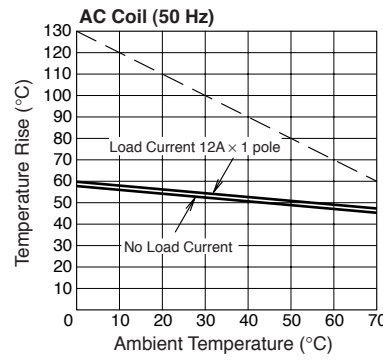
Circuit Breakers

Operating Temperature and Coil Temperature Rise

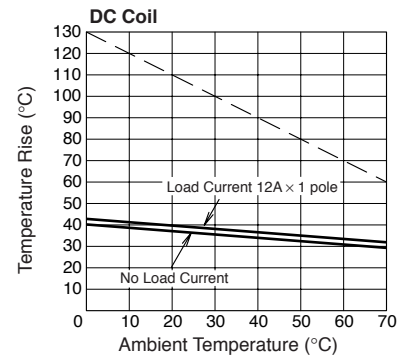
RJ1 (AC Coil, 60 Hz)



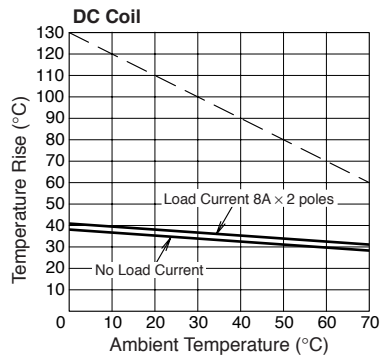
RJ1 (AC Coil, 50 Hz)



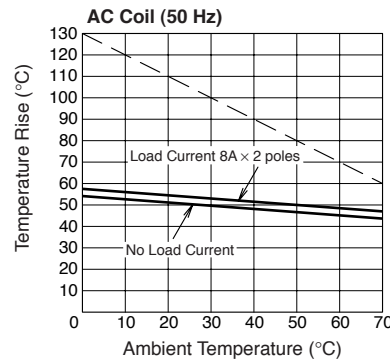
RJ1 (DC Coil)



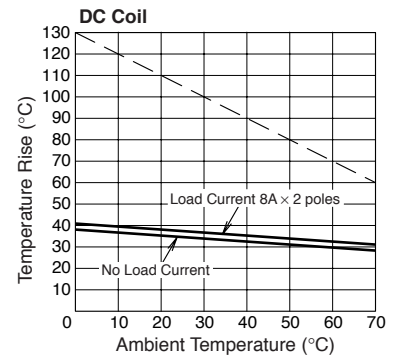
RJ2 (AC Coil, 60 Hz)



RJ2 (AC Coil, 50 Hz)



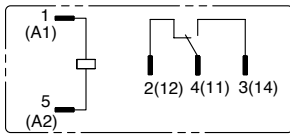
RJ2 (DC Coil)



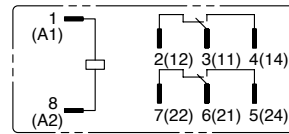
The above temperature rise curves show characteristics when 100% the rated coil voltage is applied. The slanted dashed line indicates allowable temperature rise for the coil at different ambient temperatures.

Internal Connection (View from Bottom)

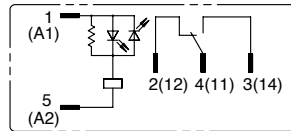
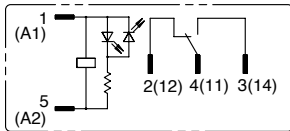
RJ1S-C-* Standard



RJ2S-C-* Standard



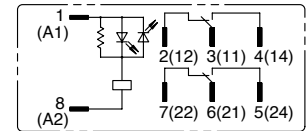
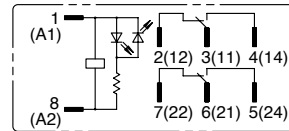
RJ1S-CL-* With LED Indicator



Coil voltage 24V AC/DC and below

Coil voltage greater than 24V AC/DC

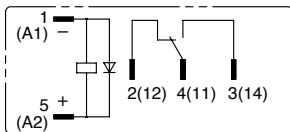
RJ2S-CL-* With LED Indicator



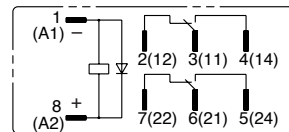
Coil voltage 24V AC/DC and below

Coil voltage greater than 24V AC/DC

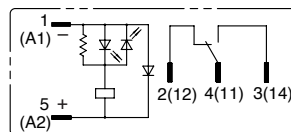
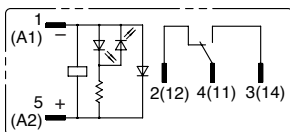
RJ1S-CD-* With Diode



RJ2S-CD-* With Diode



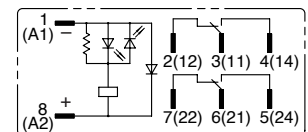
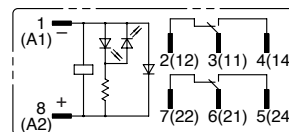
RJ1S-CLD-* With LED Indicator and Diode



Coil voltage 24V DC and below

Coil voltage greater than 24V DC

RJ2S-CLD-* With LED Indicator and Diode



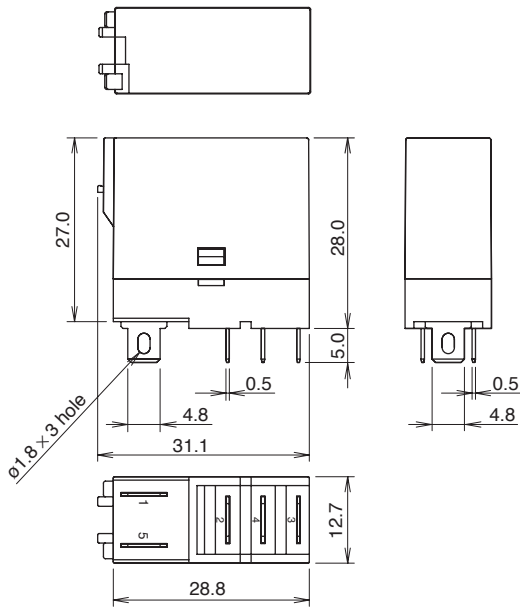
Coil voltage 24V DC and below

Coil voltage greater than 24V DC

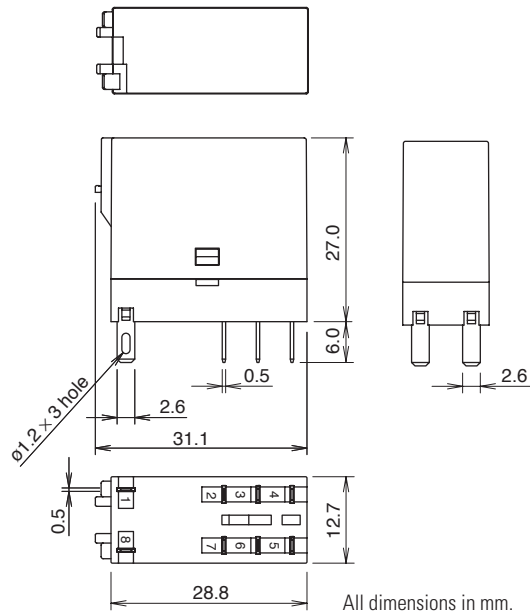
Dimensions (mm)

Blade Relay (mm)

RJ1S



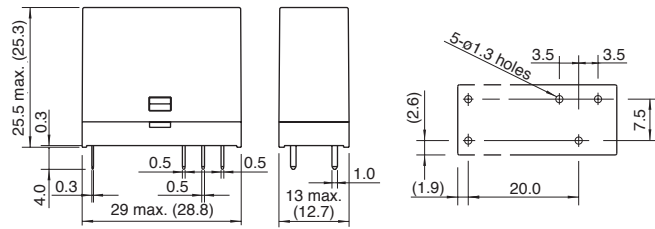
RJ2S



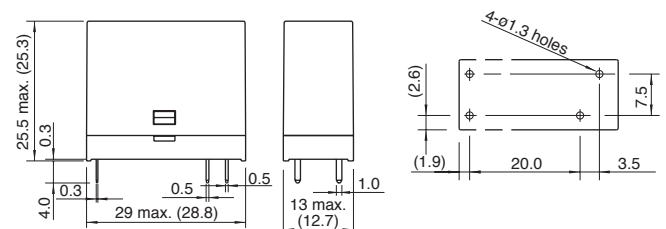
All dimensions in mm.

PCB Relay (mm)

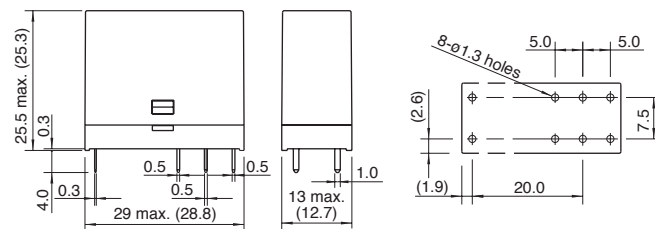
RJ1V-C-*



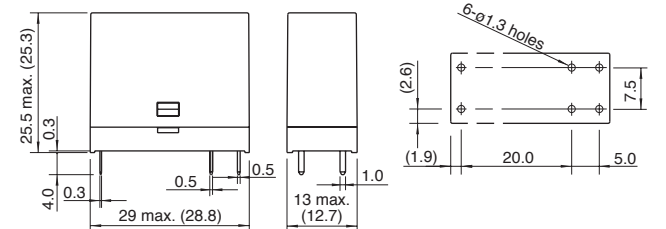
RJ1V-A-*



RJ1V-CH-*/RJ2V-C-*



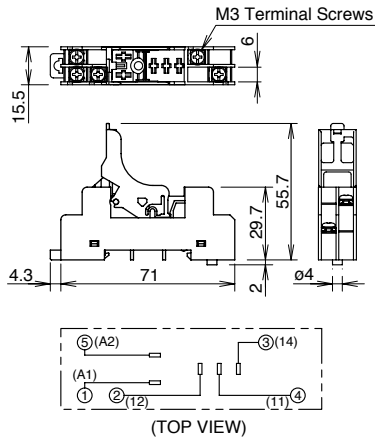
RJ1V-AH-*/RJ2V-A-*



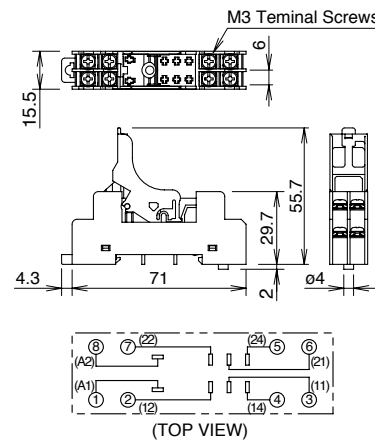
Dimensions con't (mm)

Standard DIN Rail Mount Sockets

SJ1S-05B

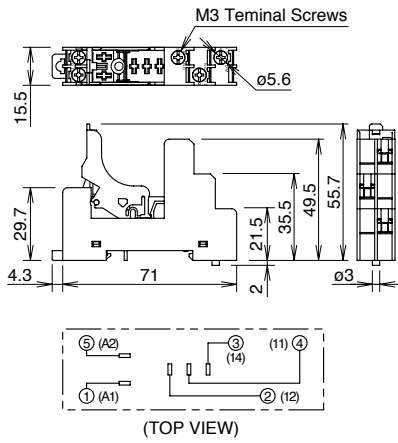


SJ2S-05B

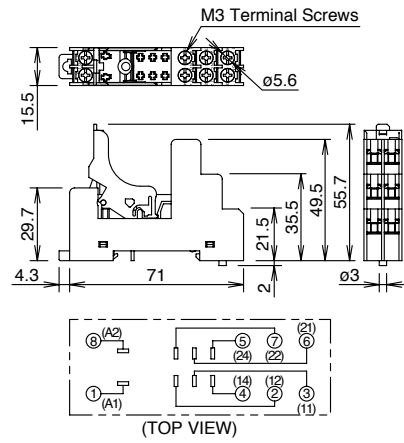


Finger-safe DIN Rail Mount Sockets

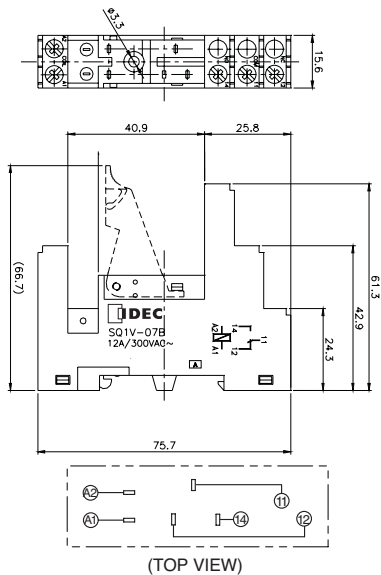
SJ1S-07L



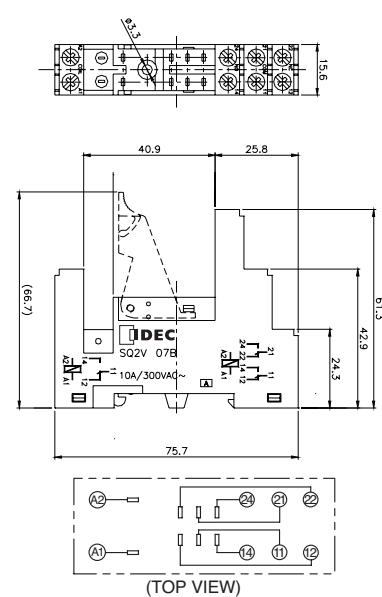
SJ2S-07L



SQ1V-07B



SQ2V-07B



Switches & Pilot Lights

Display Lights

Relays & Sockets

Timers

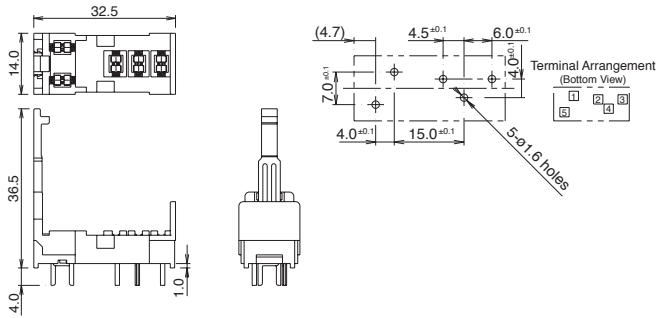
Terminal Blocks

Circuit Breakers

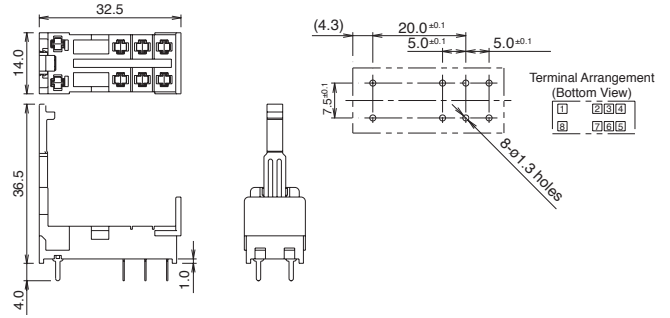
Dimensions con't (mm)

PC Mount Sockets

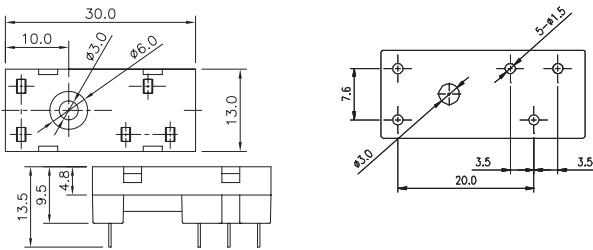
SJ1S-61



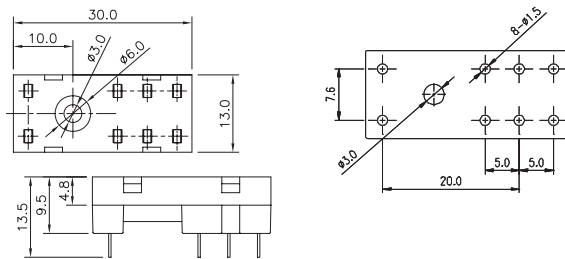
SJ2S-61



SQ1V-63



SQ2V-63



Switches & Pilot Lights

Display Lights

Relays & Sockets

Timers

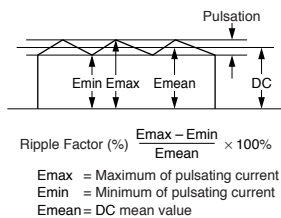
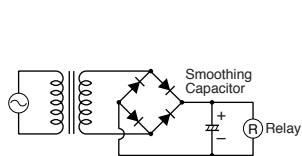
Terminal Blocks

Circuit Breakers

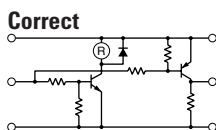
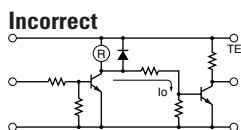
Operating Instructions

Driving Circuit for Relays

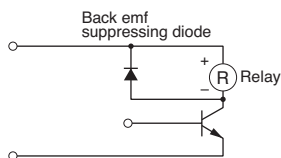
- To ensure correct relay operation, apply rated voltage to the relay coil.
- Input voltage for the DC coil:
A complete DC voltage is best for the coil power to make sure of stable relay operation. When using a power supply containing a ripple voltage, suppress the ripple factor within 5%. When power 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_o*) 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 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>This protection circuit can be used when the load impedance is smaller than the RC impedance in an AC load power circuit.</p> <ul style="list-style-type: none"> R: Resistor of approximately the same resistance value as the load C: 0.1 to 1 μF |
| Diode | | <p>This protection circuit can be used for DC load power circuits. Use a diode with the following ratings.</p> <p>Reverse withstand voltage: Power voltage of the load circuit x 10</p> <p>Forward current: More than the load current</p> |
| Varistor | | <p>This protection circuit can be used for both AC and DC load power circuits.</p> <p>For a best result, when using a power voltage of 24 to 48V AC/DC, connect a varistor across the load.</p> <p>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.

Switches & Pilot Lights

Display Lights

Relays & Sockets

Timers

Terminal Blocks

Circuit Breakers

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.