Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers

Contactors

Terminal Blocks

Circuit Breakers

RF2V 2-Pole Force Guided Relays/SJ Series Relay Sockets

Key features:

- 2-pole force guided relay to reduce cost and installation space.
- Force guided contact mechanism (EN50205 Type A TÜV approved).
- Reinforced insulation between coil and contact and contacts of different poles.
- Mechanical indicator shows contact status.
- Two terminal styles - socket mounting and PC board mounting.
- RTIII degree of protection, LED, diode models available.
- Can be used with SJ series relay socket.
- Applicable Standards Mark Certification
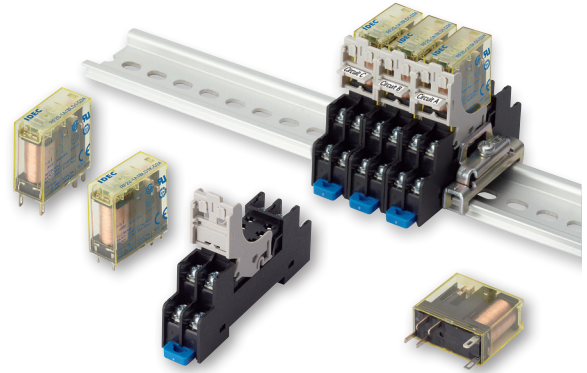
Applicable Standard	Marking	Certification Organization/ File Number
UL60947-4-1a	c**UL**us	UL/Recogntion File No. E55996
CSA C22.2 No.14	CSA	CSA File No. LR35144
EN50205 EN61810-1	TÜV	TÜV SÜD
	CE	EU Low Voltage Directive

Part Numbers

Contact Configuration		Terminal Style	LED Indicator	w/Diode	Degree of Protection (Note)		Rated Coil Voltage	Part No.
					Flux-tight (RTII)	Sealed (RTIII)		
2-pole	SPST-NO + SPST-NC	Plug-in	With	√	√		12V DC	RF2S-1A1BLD1-D12
			Without	—	√		24V DC	RF2S-1A1B-D24
				√	√			RF2S-1A1BD1-D24
			With	√	√			RF2S-1A1BLD1-D24
				√		√		RF2S-1A1BLD1K-D24
			Without	—	√		48V DC	RF2S-1A1B-D48
			With	√	√			RF2S-1A1BLD1-D48
				√		√		RF2S-1A1BLD1K-D48
		PC Board	Without	—	√		12V DC	RF2V-1A1B-D12
				—	√		24V DC	RF2V-1A1B-D24
				—		√		RF2V-1A1BK-D24
				√	√			RF2V-1A1BD1-D24
				√		√		RF2V-1A1BD1K-D24
			With	√		√		RF2V-1A1BLD1K-D24
			Without	—	√		48V DC	RF2V-1A1B-D48
	DPDT		Without	—	√		24V DC	RF2V-2C-D24

IDEC

Part Number Structure

RF 2 S - 1A1B - LD1-K D24

Series Name

No of poles
2 : 2-pole

Terminal Construction
S : Plug-in
V : PC Board

Contact Arrangement
1 A 1 B : 1 Form X
2 C : DPDT

Rated Coil Voltage
D12 : 12V DC
D24 : 24V DC
D48 : 48V DC

Options
Blank : Standard
L : With LED
D : With diode (Note 1)
D1 : With diode of reverse polarity coil (Note 2)
LD : With LED indicator & diode (Note 1)
LD1 : With LED indicator & diode of reverse polarity coil (Note 2)

Degree of Protection
Blank : RTII
K : RTIII

Note 1: With diode: terminal 1 −, terminal 8 +
Note 2: With diode of reverse polarity coil: terminal 1 +, terminal 8 −
Note 3: Used interpreting part numbers. Not all variations are possible.
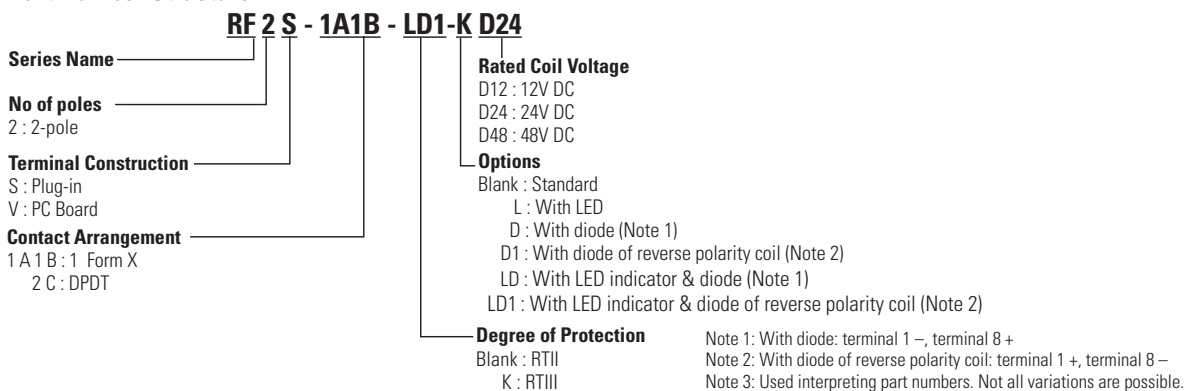
Coil Ratings

Rated Voltage (V)	Rated Current (mA) ±15% (at 20°C)		Coil Resistance ±10% (at 20°C)		Operating Characteristics (against rated values at 20°C)			Power Consumption
	Without LED	With LED	Without LED	With LED	Minimum Pickup Voltage	Dropout Voltage	Maximum Continuous Applied Voltage	
12V DC	58	63	205	205	75% maximum	10% minimum	110%	Approx. 0.7W
24V DC	29	33	820	820				
48V DC	14.6	18	3300	3300				

ℹ️ Note: Maximum continuous applied voltage is the maximum voltage that can be applied to relay coils.

Standards Ratings

Voltage	UL Rating Resistive		CSA Rating Resistive	
	NO	NC	NO	NC
277V AC	6A	3A	6A	3A
30V DC	6A	3A	6A	3A

Voltage	TÜV Rating Resistive	
	NO	NC
240VAC	6A	3A
24V DC	6A	3A

Sockets

Style		No. of Poles	Part Number
	Standard Screw Terminal	2	SJ2S-05BW
	Fingersafe Screw Terminal	2	SJ2S-07LW
	PC Board Mount Sockets	2	SJ2S-61

Certification for Sockets

Applicable Standard	Marking	Certification Organization/File Number
UL508	c ⓊⓁ® US	UL Recognition File No. E62437
CSA C22.2 No.14	⬡TÜV	CSA File No. LR84913
EN60999-1 (Note 4) EN60664-1 (Note 5)	CE	EC Low Voltage Directive

Note 4: Finger-safe screw terminal only.
Note 5: PC board terminal only.

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Specifications

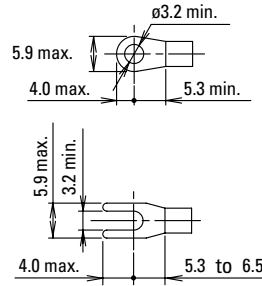| Model	RF2S (Plug-in Terminal) 2-pole	RF2V (PC board terminal) 2-pole
Contact Configuration	SPST-NO + SPST-NC, DPDT	
Contact Resistance (initial value) [1]	100 mΩ maximum	
Contact Material	AgNi+Au-Clad	
Rated Load (resistive load)	NO contact: 240V AC, 6A/24V DC, 6A NC contact: 240V AC, 3A/24V DC, 3A	
Allowable Switching Power (resistive load)	NO contact: 1440VA/144W, NC contact: 720VA/72W	
Allowable Switching Voltage	250V AC, 125V DC	
Allowable Switching Current	6A	
Minimum Applicable Load [2]	1V DC, 1mA	
Power Consumption (approx.)	Approx. 0.7W	
Insulation Resistance	1000 MΩ minimum (500V DC megger, same measurement positions as the dielectric strength)	
Dielectric Strength — Between contact and coil	5000V AC, 1 minute	
Dielectric Strength — Between contacts of the same pole	4000V AC , 1 minute	
Dielectric Strength — Between contacts of different poles	1500V AC, 1 minute	
Operating Time (at 20°C)	15 ms maximum (at the rated coil voltage, excluding contact bounce time)	
Response Time (at 20°C) [3]	5ms max. (at the rated coil voltage, without diode) 20ms max. (at the rated coil voltage, with diode)	
Release Time (at 20°C)	10ms max. (at the rated coil voltage, excluding contact bounce time, without diode) 25ms max. (at the rated coil voltage, excluding contact bounce time, with diode)	
Vibration Resistance — Operating Extremes	NO contact: 10 to 55Hz, amplitude 0.75mm NC contact:10 to 55Hz, amplitude 0.2mm	
Vibration Resistance — Damage Limits	10 to 55Hz, amplitude 0.75mm	
Shock Resistance — Operating Extremes	No Contact 100 m/s², NC contact: 50 m/s²	
Shock Resistance — Damage Limits	1000 m/s²	
Electrical Life	NO contact: 100,000 operations minimum (operating frequency 1,800 per hour) at 240V 6A resistive load or 2A inductive load (power factor 0.4) 100,000 operations minimum (operating frequency 1,800 per hour) at 24V 6A resistive load or 1A inductive load (time constant 48ms) NC contact: 100,000 operations minimum (operating frequency 1,800 per hour) at 240V AC, 3A resistive load or 2A inductive load (power factor 0.4) 100,000 operations minimum (operating frequency 1,800 per hour) at 24V DC, 3A resistive load or 1A inductive load (time constant 48ms)	
Mechanical Life	10 million operations minimum (operating frequency 10,800 operations per hour)	
Operating Temperature	Single mounting: −40 to +70°C (no freezing) Collective mounting: −40 to +55°C (no freezing)	−40 to +70°C (no freezing)===
Operating Humidity	5 to 85%RH (no condensation)	
Storage Temperature	−40 to +85°C (no freezing)	
Operating Frequency (rated load)	1200 operations per hour	
Weight (approx.)	18g (without LED/diode), 20g (with LED/with diode/with LED & diode)	

1. Measured using 5V DC,1A voltage drop method.
2. Failure rate level P (reference value)
3. Response time is the time until NO contact opens, after the coil voltage is turned off.

Socket Specifications

Part Number	SJ2S-05B/-07L	SJ2S-61
Mounting	DIN Rail	PC Board
Rated Current	8A	
Rated Insulation Voltage	250V AC/DC	
Dielectric Strength — Between contact and coil	4000V AC, 1 minute	5000V AC, 1 minute
Dielectric Strength — Between contacts of the same pole	1000V AC, 1 minute	
Dielectric Strength — Between contacts of the different pole	3000V AC, 1 minute	
Screw Terminal Style	M3 slotted Phillips screw	-
Applicable Wire	2mm^2	-
Recommended Screw Tightening Torque	0.6 to 1.0 N·m	-
Terminal Strength	Wire tensile strength: 50N min.	-
Vibration Resistance	Damage limits: 90 m/s2 Resonance: 10 to 55 Hz, amplitude 0.75 mm	
Shock Resistance	1000 m/s^2	
Operating Temperature [1]	−40 to +70°C (no freezing)	
Operating Humidity	5 to 85% RH (no condensation)	
Storage Temperature	−55 to +85°C (no freezing)	
Storage Humidity	5 to 85% RH (no condensation)	
Degree of Protection (Scre Terminal)	SJ2S-07L: IP20 (IEC 60529)	-
Weight (approx.)	4034g	4.5g

1. When using at 70 to 85°C, reduce the switching current by 0.1A/°C.

Applicable Crimping Terminals Specifications

ø3.2 min.
5.9 max.
4.0 max.
5.3 min.

5.9 max.
3.2 min.
4.0 max.
5.3 to 6.5

Note: Ring tongue terminals cannot be used on SJ2S-0L.

Description/Shape		Material	Part No.	Ordering No.	Package Quantity	Remarks
Removable Marking Plate		Plastic (white)	SJ9Z-PW	SJ9Z-PWPN10	10	15.2 / 8.6 / 0.75 / 0.15 / 5 / 1.2 Marking area: 15.2 × 7.25 mm
Jumper	For 2 sockets	Nickel-coated brass with polypropylene coating	SJ9Z-JF2	SJ9Z-JF2PN10		Terminal centers: 15.5mm Rated current: 12A Ensure that the total current to the jumper does not exceed the maximum current.
	For 5 sockets		SJ9Z-JF5	SJ9Z-JF5PN10		
	For 8 sockets		SJ9Z-JF8	SJ9Z-JF8PN10		
	For 10 sockets		SJ9Z-JF10	SJ9Z-JF10PN10		
Replacement Release Lever (with integrated marking plate)		Plastic (gray)	SJ9Z-CM	SJ9Z-CMPN05	5	15.3 / 38.5 / 28.1 When not using marking plate

Switches & Pilot Lights

Signaling Lights

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Timers
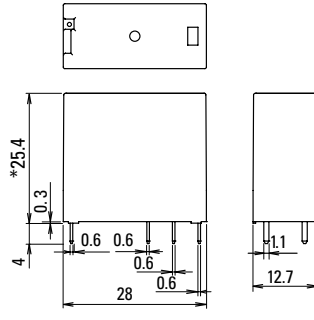
Contactors

Terminal Blocks

Circuit Breakers

RF2V Dimensions (mm)

RF2S (plug-in terminal)
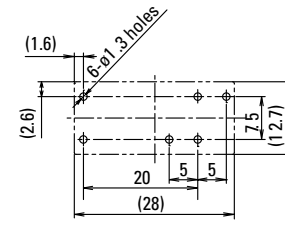**Standard (without LED/diode)**
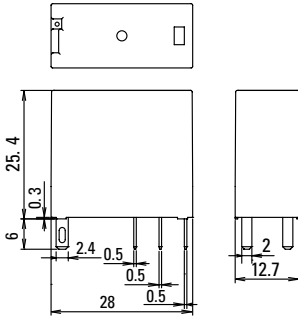
RF2V (PC board terminal)
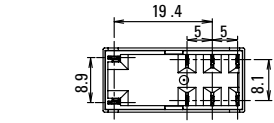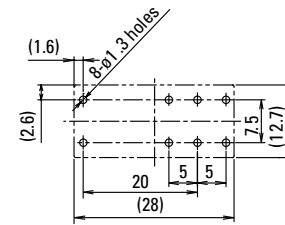**Standard (without LED/diode)**

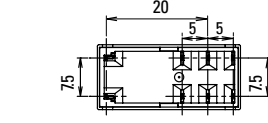**PC Board Terminal type Mounting Hole Layout (Bottom View)**

RF2V (SPST-NO + SPST-NC)
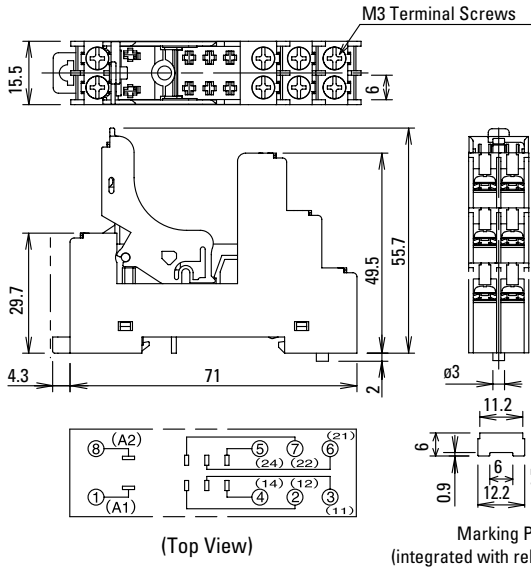
With LED/diode: 28.4

RF2V (DPDT)

With LED/diode: 28.4

With LED/diode

Diode
LED
Mechanical Indicator

With LED/diode

Diode
LED
Mechanical Indicator
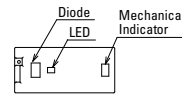
Socket Dimensions

SJ2S-07L
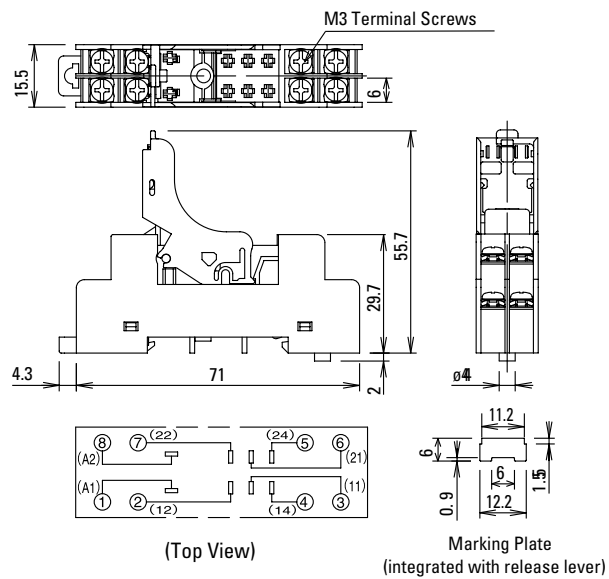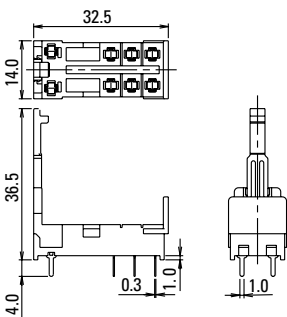
M3 Terminal Screws

ø3

11.2

Marking Plate
(integrated with release lever)

(Top View)

SJ2S-05B

M3 Terminal Screws

ø4

11.2

Marking Plate
(integrated with release lever)

(Top View)

SJ2S-61

Internal Connection (View from Bottom)
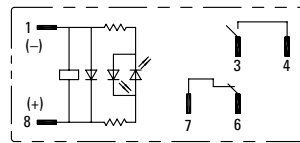
RF2 -1A1B-☐

Standard
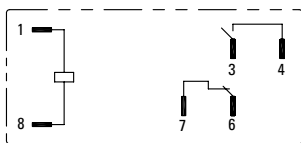
RF2* -1A1BLD1-☐

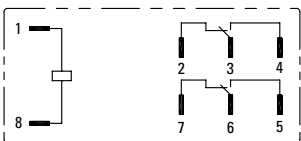With LED indicator + diode of reverse polarity coil
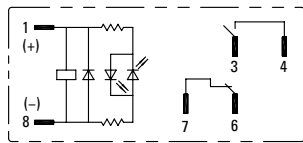
RF2 -1A1BLD-☐
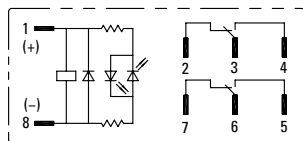
With LED indicator + diode
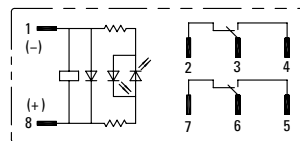

RF2 *-2C-☐

Standard

RF2 -2CLD1-☐

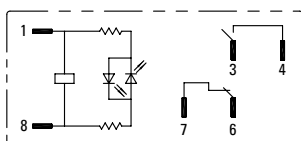With LED indicator + diode of reverse polarity coil
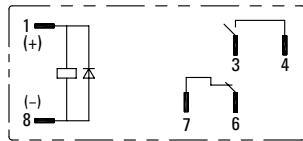

RF2* -2CLD-☐

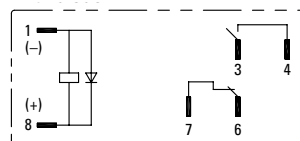With LED indicator + diode

RF2* -1A1BL-☐

With LED indicator

RF2* -1A1BD1-☐

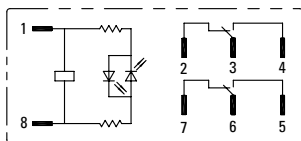With diode of reverse polarity coil

RF2* -1A1BD-☐

With diode

RF2* -2CL-☐

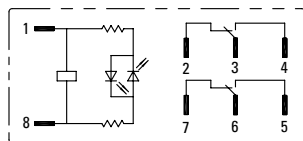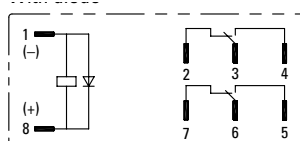With LED indicatorl

RF2* -2CD1-☐

With diode of reverse polarity coil
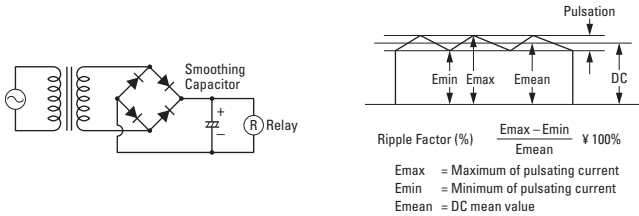

RF2* -2CD-☐

With diode

Relays with diode have polarity. Take polarity into consideration when wiring.
When using DPDT model as a force guided relay, use in SPST-NO + SPST-NC wiring (EN50205).

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Operating Instructions

Driving Circuit for Relays

1. To ensure correct relay operation, apply rated voltage to the relay coil.

2. 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.

$$\text{Ripple Factor (\%)} \quad \frac{Emax - Emin}{Emean} \quad ¥ \, 100\%$$

Emax = Maximum of pulsating current
Emin = Minimum of pulsating current
Emean = DC mean value

3. 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 (Io) 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.

Incorrect   **Correct**
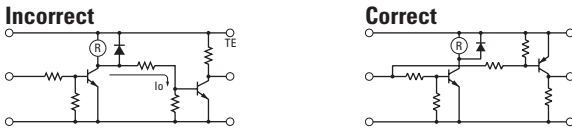
4. Surge suppression for transistor driving circuits:
   When the relay coil is turned off, a high-voltage pulse is generated, causing a transistor to deteriorate and sometimes to break. Be sure to connect a diode to suppress the back electromotive force. Then, the coil release time becomes slightly 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.
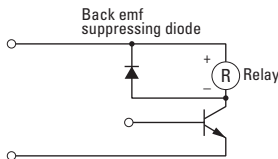
Protection for Relay Contacts

1. 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.

2. 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 µF
		This protection circuit can be used for both AC and DC load power circuits. R: Resistor of approximately the same resistance value as the load C: 0.1 to 1 µF
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.

3. 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

1. When soldering the relay terminals, use a soldering iron of 30 to 60W, and quickly complete soldering (within approximately 3 seconds).

2. Use a non-corrosive rosin flux.

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