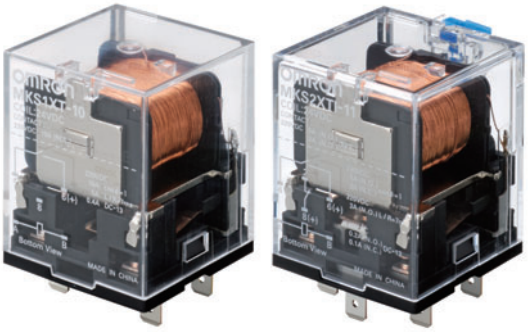
New Product

OMRON

Power Relays
MK-S(X)

MK-S-series Relays with DC-switching Models That Can Switch 220 VDC, 10 A (Resistive Load).



- Switch a DC load of 220 VDC, 10 A (resistive load).
- Models for AC Loads can switch 250 VAC, 15 A (resistive load).
- Lineup includes models with SPST-NO and SPST-NO/SPST-NC contact forms.
- Using a SPST-NO/SPST-NC contact form enables detecting contact welding. (When the NO contacts become welded, the NC contacts will maintain a minimum distance of 0.5 mm.)
- Models available with operation indicators and built-in test buttons.
- RoHS compliant.
- Standards: UL, IEC (TÜV certification)
  (Application for the above standards has been made using the P7MF-06 and P7MF-06-D Sockets (sold separately).)

Ordering Information

General-purpose Relays

Models for DC Loads

Contact form / Type	SPST-NO		SPST-NO/SPST-NC	
	Rated coil voltage (V)	Model	Rated coil voltage (V)	Model
Standard Models	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS1XT-10	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS2XT-11
Models with Built-in Operation Indicators	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS1XTN-10	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS2XTN-11
Models with Test Button	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS1XTI-10	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS2XTI-11
Models with Test Button and Built-in Operation Indicators	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS1XTIN-10	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS2XTIN-11

Models for AC Loads

Contact form / Type	SPST-NO		SPST-NO/SPST-NC	
	Rated coil voltage (V)	Model	Rated coil voltage (V)	Model
Standard Models	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS1T-10	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS2T-11
Models with Built-in Operation Indicators	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS1TN-10	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS2TN-11
Models with Test Button	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS1TI-10	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS2TI-11
Models with Test Button and Built-in Operation Indicators	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS1TIN-10	AC: 24, 100, 110, 120, 200, 220, 230, 240 DC: 12, 24, 48, 110, 220	MKS2TIN-11

Accessory (Order Separately)

Connecting Socket

Classifications		Built-in diode	Model
Back-connecting Socket	PCB Terminals	No	P7M-06P
Front-connecting Socket	Mounts to DIN Track or via screws	No	P7MF-06
		Yes	P7MF-06-D

Specifications

Ratings

Operating Coil

Item		Rated current (mA)		Coil resistance (Ω)	Must operate voltage (V)	Must release voltage (V)	Maximum voltage allowable (V)	Power consumption (VA, W)
Rated voltage (V)		50 Hz	60 Hz		Percentage of rated voltage			
AC	24	110	96.3	48.4	80% max.	30% min. at 60 Hz 25% min. at 50 Hz	110%	Approx. 2.3 VA at 60 Hz Approx. 2.7 VA at 50 Hz
	100	26.6	23.1	760				
	110	24.2	21.0	932				
	120	22.2	19.3	1,130				
	200	13.3	11.6	3,160				
	220	12.1	10.5	3,550				
	230	11.5	10.0	4,250				
	240	11.0	9.6	4,480				
DC	12	126		95		15% min.		Approx. 1.5 W
	24	63.2		380				
	48	32.0		1,500				
	110	13.6		8,060				
	220	6.8		32,200				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.
2. Performance characteristic data are measured at a coil temperature of 23°C.
3. The maximum allowable voltage is the maximum value of the allowable voltage range for the operating power supply for the relay coil. There is no continuous allowance.
4. The rated current is approximately 5 mA higher for Models with Built-in Operation Indicators (DC operating coils).

Contact Ratings for Models for DC Loads

Item / Contact form		SPST-NO			SPST-NO/SPST-NC		
Model		MKS1XT(I)(N)-10			MKS2XT(I)(N)-11		
Load		Resistive load	Inductive load		Resistive load	Inductive load	
			L/R = 7 ms	DC13 class		L/R = 7 ms	DC13 class
Contact configuration	NO	Double-break			Double-break		
	NC	---			Single-break		
Contact material		AgSnIn			AgSnIn		
Rated load	NO	10 A, 220 VDC	5 A, 220 VDC	0.4 A, 220 VDC	5 A, 220 VDC	3 A, 220 VDC	0.2 A, 220 VDC
	NC	---			2 A, 220 VDC	0.3 A, 220 VDC	0.1 A, 220 VDC
Rated carry current	NO	10 A			5 A		
	NC	---			2 A		
Max. switching voltage	NO	220 VDC			220 VDC		
	NC	---					
Max. switching current	NO	10 A			5 A		
	NC	---			2 A		
Max. switching capacity (reference value)	NO	2,200 W	---	---	1,100 W	---	---
	NC	---			440 W	---	---

Note: If the L/R of an inductive load exceeds 7 ms with a Model for a DC Load, the arc interruption time must be less than approximately 50 ms to use the Relay. Design the circuit so that the arc interruption time is 50 ms or less.

✻ These values apply to a switching frequency of 30 times per minute.

Contact Ratings for Models for AC Loads

Item / Contact form		SPST-NO	SPST-NO/SPST-NC
Model		MKS1T(I)(N)-10	MKS2T(I)(N)-11
Load		Resistive load	Resistive load
Contact configuration	NO	Double-break	Double-break
	NC	---	Single-break
Contact material		AgSnIn	AgSnIn
Rated load	NO	15 A, 250 VAC	15 A, 250 VAC
	NC	---	5 A, 250 VAC
Rated carry current	NO	15 A	15 A
	NC	---	5 A
Max. switching voltage	NO	250 VAC	250 VAC
	NC	---	
Max. switching current	NO	15 A	15 A
	NC	---	5 A
Max. switching capacity (reference value)	NO	3,750 VA	3,750 VA
	NC	---	1,250 VA

✻ These values apply to a switching frequency of 20 times per minute.

Characteristics

Contact resistance ✻1		100 mΩ max.
Operate time ✻2		AC: 20 ms max. DC: 30 ms max.
Release time ✻2		20 ms max.
Max. operating frequency	**Mechanical**	18,000 operations/h
	Rated load	Models for DC loads: 1,800 times/hour Models for AC loads: 1,200 times/hour
Insulation resistance ✻3		100 MΩ min.
Dielectric strength	**Between coil and contacts**	2,500 VAC 50/60 Hz for 1 min between
	Between contacts of different polarity	2,500 VAC 50/60 Hz for 1 min between
	Between contacts of same polarity	1,000 VAC 50/60 Hz for 1 min
Vibration resistance	**Destruction**	10 to 55 to 10 Hz, 0.50-mm single amplitude (1.0-mm double amplitude)
	Malfunction	10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	**Destruction**	Back-connecting Socket (P7M-06P) mounting: 1,000 m/s^2 Front-connecting Socket (P7MF-06(-D)) mounting:500m/s^2
	Malfunction	100 m/s^2
Endurance	**Mechanical**	1,000,000 operations min. (at 18,000 operations/hr)
	Electrical ✻4	100,000 operations min. (at rated load and maximum switching frequency)
Failure rate P level (reference value)		10 mA at 24 VDC
Ambient operating temperature		–40°C to 60°C (with no icing or condensation) **Note:** The range is –25°C to 60°C for models with built-in operation indicators.
Ambient operating humidity		5% to 85%
Weight		SPST-NO: Approx. 73 g, SPST-NO/SPST-NC: Approx. 82 g

Note: The values given above are initial values.
✻1. The contact resistance was measured for 1 A at 5 VDC using the voltage drop method.
✻2. The operate time was measured with the rated voltage imposed and any contact bounce ignored at an ambient temperature of 23°C.
✻3. The insulation resistance was measured with a 500-VDC insulation resistance tester at the same places as those used for checking the dielectric strength.
✻4. The electrical endurance was measured at an ambient temperature of 23°C.

Approved Standards

UL508 (File No. E41515) c UL us

Model	Coil ratings	Contact ratings		Operations
MKS1XT□-□	12 to 220 VDC 24 to 240 VAC	NO contacts	10 A, 220 VDC (Resistive) 5 A, 220 VDC L/R ($T_{0.632}$) = 7 ms 0.4 A, 220 VDC L/R ($T_{0.95}$) = 300 ms	6,000
MKS2XT□-□		NO contacts	5 A, 220 VDC (Resistive) 3 A, 220 VDC L/R ($T_{0.632}$) = 7 ms 0.2 A, 220 VDC L/R ($T_{0.95}$) = 300 ms	
		NC contacts	2 A, 220 VDC (Resistive) 0.3 A, 220 VDC L/R ($T_{0.632}$) = 7 ms 0.1 A, 220 VDC L/R ($T_{0.95}$) = 300 ms	
MKS1T□-□		NO contacts	15 A, 250 VAC (Resistive)	
MKS2T□-□		NO contacts	15 A, 250 VAC (Resistive)	
		NC contacts	5 A, 250 VAC (Resistive)	

CSA Standard: CSA Certification by c UL us: CSA C22.2 No.14

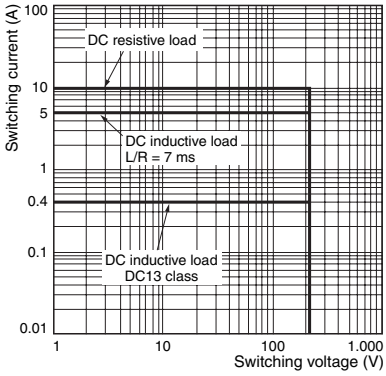
IEC Standard/TÜV Certification: IEC61810-1 (Certification No. R50104853)

Model	Coil ratings	Contact ratings		Operations
MKS1XT□-□	12, 24, 48, 110, 220 VDC 24, 100, 110, 120, 200, 220, 230, 240 VAC	NO contacts	DC-1: 10 A, 220 VDC 5 A, 220 VDC L/R ($T_{0.632}$) = 7 ms DC-13: 0.4 A, 220 VDC	100,000
MKS2XT□-□		NO contacts	DC-1: 5 A, 220 VDC 3 A, 220 VDC L/R ($T_{0.632}$) = 7 ms DC-13: 0.2 A, 220 VDC	
		NC contacts	DC-1: 2 A, 220 VDC 0.3 A, 220 VDC L/R ($T_{0.632}$) = 7 ms DC-13: 0.1 A, 220 VDC	
MKS1T□-□		NO contacts	AC-1: 15 A, 250 VAC 50/60 Hz	
MKS2T□-□		NO contacts	AC-1: 15 A, 250 VAC 50/60 Hz	
		NC contacts	AC-1: 5 A, 250 VAC 50/60 Hz	

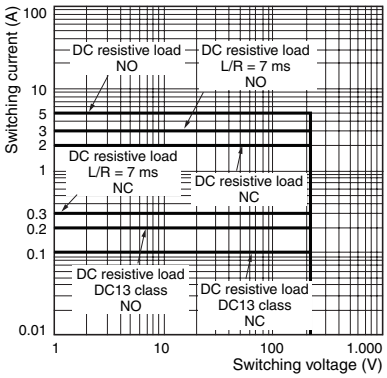
Engineering Data

Maximum Switching Power

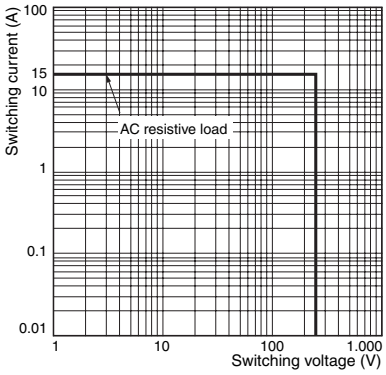
MKS1XT-10, MKS1XTN-10 MKS1XTI-10, MKS1XTIN-10



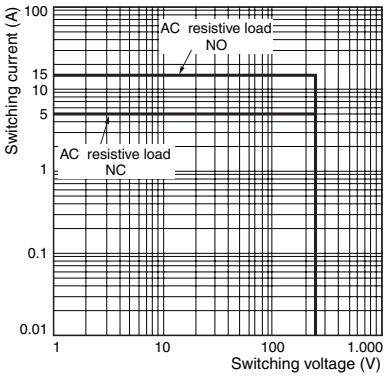
MKS2XT-11, MKS2XTN-11 MKS2XTI-11, MKS2XTIN-11



MKS1T-10, MKS1TN-10 MKS1TI-10, MKS1TIN-10

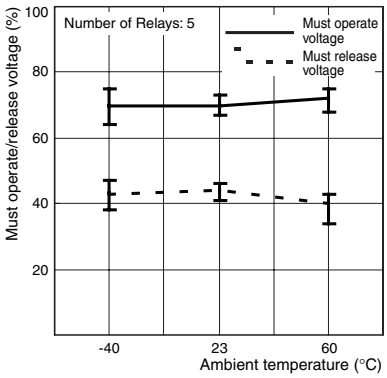


MKS2T-11, MKS2TN-11 MKS2TI-11, MKS2TIN-11

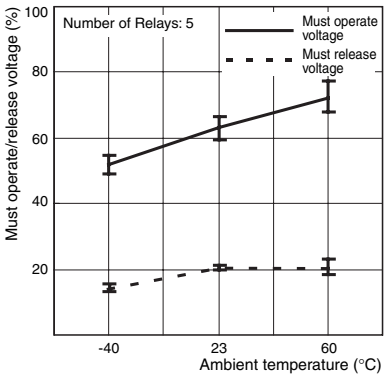


Ambient Temperature vs. Must Operate Voltage and Must Release Voltage

MKS2XT-11
AC Specification (60 Hz)

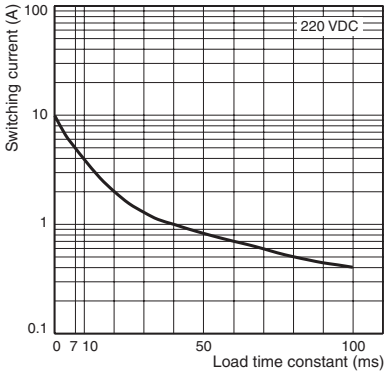


MKS2XT-11
DC Specification

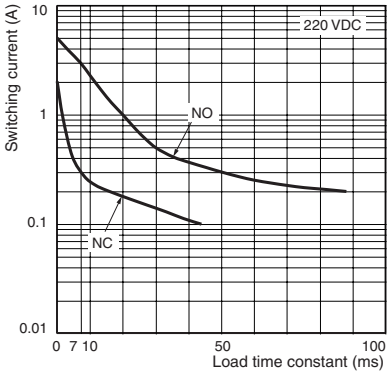


Inductive Load Switching Power (Models for DC Loads)

MKS1XT-10, MKS1XTN-10 MKS1XTI-10, MKS1XTIN-10

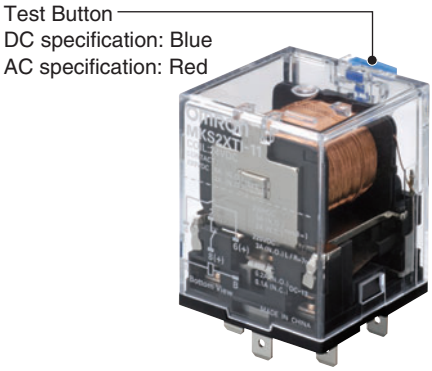


MKS2XT-11, MKS2XTN-11 MKS2XTI-11, MKS2XTIN-11

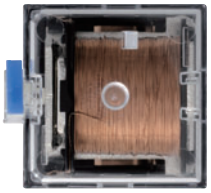


Test Button

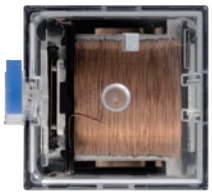
The circuit can be checked using either of two modes.



Normal

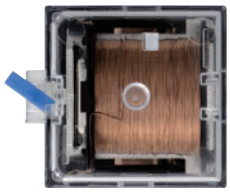


Mode 1
(momentary)



Press the button for operation. (No tool is required.)

Mode 2
(locked)



Lock the contacts by pressing down on the button and turning it.

Test Button Applications

Example: Checking operation of Relays and sequence circuits.

Dimensions

(Unit: mm)

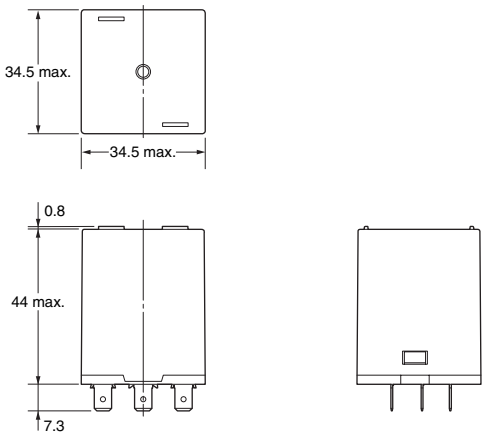
General-purpose Relays

Models for DC Loads

Standard Models
MKS1XT-10 **MKS2XT-11**
Models with Built-in Operation Indicators
MKS1XTN-10 **MKS2XTN-11**

Models for AC Loads

Standard Models
MKS1T-10 **MKS2T-11**
Models with Built-in Operation Indicators
MKS1TN-10 **MKS2TN-11**

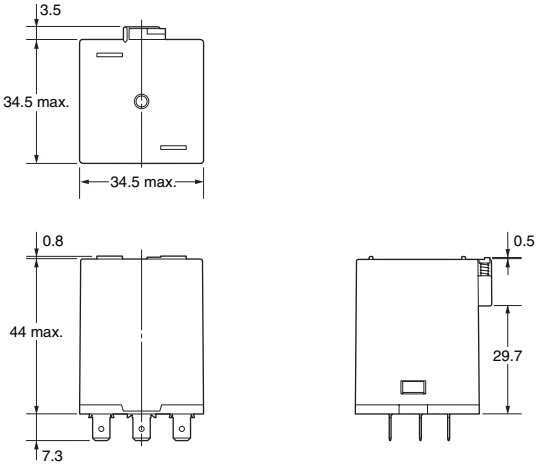


Models for DC Loads

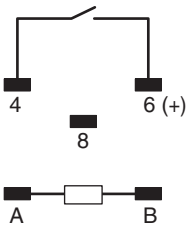
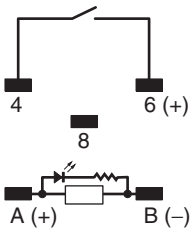
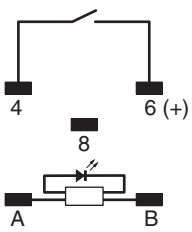
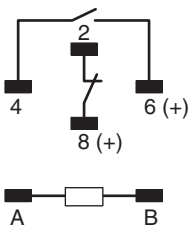
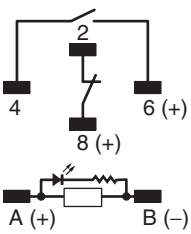
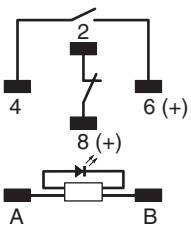
Models with Test Button
MKS1XTI-10 **MKS2XTI-11**
Models with Test Button and Built-in Operation Indicators
MKS1XTIN-10 **MKS2XTIN-11**

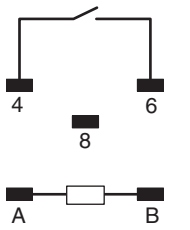
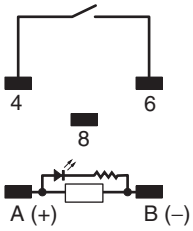
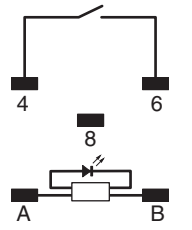
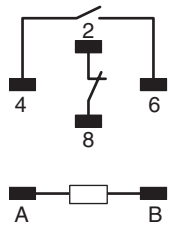
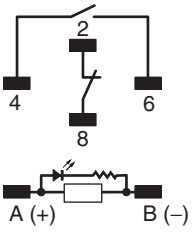
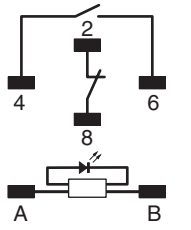
Models for AC Loads

Models with Test Button
MKS1TI-10 **MKS2TI-11**
Models with Test Button and Built-in Operation Indicators
MKS1TIN-10 **MKS2TIN-11**



Terminal Arrangement/Internal Connection (Bottom View)

MKS1XT-10 MKS1XTI-10	MKS1XTN-10 MKS1XTIN-10		MKS2XT-11 MKS2XTI-11	MKS2XTN-11 MKS2XTIN-11	
	DC specification	AC specification		DC specification	AC specification
					

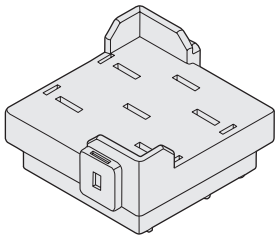
MKS1T-10 MKS1TI-10	MKS1TN-10 MKS1TIN-10		MKS2T-11 MKS2TI-11	MKS2TN-11 MKS2TIN-11	
	DC specification	AC specification		DC specification	AC specification
					

Note: 1. Wire properly using the correct coil polarity.
2. The contact terminals on Models for DC Loads have polarity. Wire properly using the correct polarity.

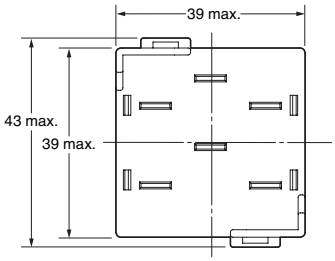
Connecting Socket

Back-connecting Socket

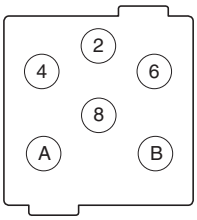
P7M-06P



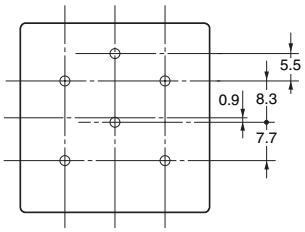
Dimensions

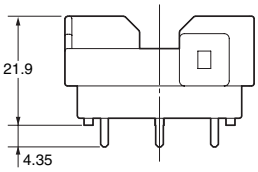


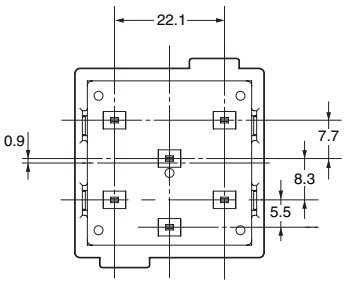
Terminal Arrangement/Internal Connections (Bottom View)



PCB Mounting Holes (Bottom View)

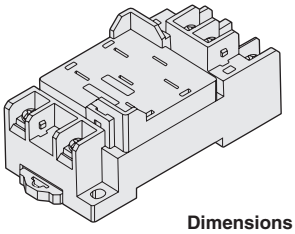




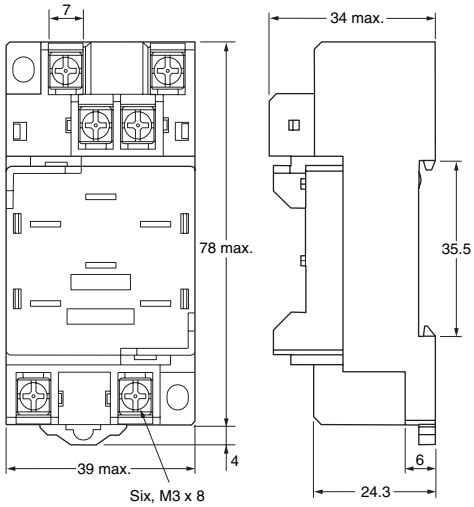


Front-connecting Socket

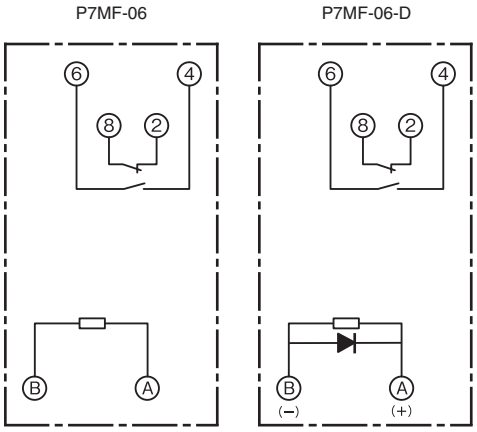
P7MF-06
P7MF-06-D



Dimensions

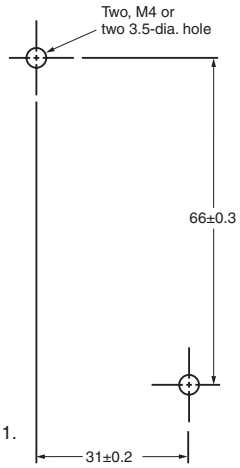


Terminal Arrangement/Internal Connections (TOP View)



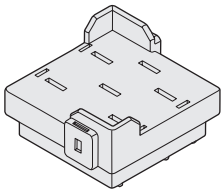
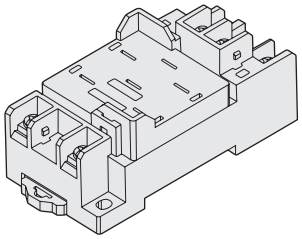
Note: 1. The internal connections diagram is for the MKS2(X)T□□-11.
2. The P7MF-06-D has polarity. Be careful to wire with the correct polarity.

Mounting Holes (TOP View)



Accessory (Order Separately)

Connecting Socket

Socket / Number of poles	Back-connecting Socket PCB terminals	Front-connecting Socket Mounts to DIN Track or via screws
2	P7M-06P 	P7MF-06 P7MF-06-D 

Note: 1. The P7M-06P, P7MF-06, and P7MF-06-D can be used with models for DC loads with an SPST-NO or SPST-NO/SPST-NC contact form or with models for AC loads with an SPST-NO or SPST-NO/SPST-NC contact form.

2. The P7MF-06-D has a built-in diode and can thus be used only with Relays with DC operating coils. Do not use it with a Relay with an AC operating coil.

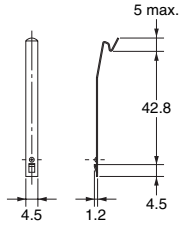
3. Refer to *Gang Mounting* on page 10 for the conditions required for gang mounting.

Relay Hold-down Clips

Use the Clips to securely mount the Relay and prevent it from falling due to vibration or shock.

Socket		Applicable Relay models	MKS1XT-10 MKS1XTI-10 MKS1XTIN-10 MKS1T-10 MKS1TI-10 MKS1TIN-10	MKS2XT-11 MKS2XTI-11 MKS2XTIN-11 MKS2T-11 MKS2TI-11 MKS2TIN-11
Back-connecting Socket	PCB terminals	P7M-06P	PYC-A2	
Front-connecting Socket	Mounts to DIN Track or via screws	P7MF-06		
		P7MF-06-D		

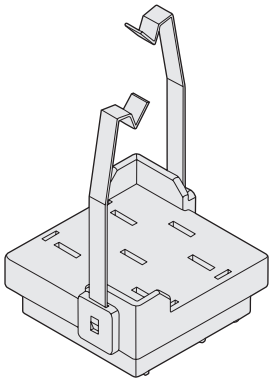
PYC-A2
One Set (Two Clips)

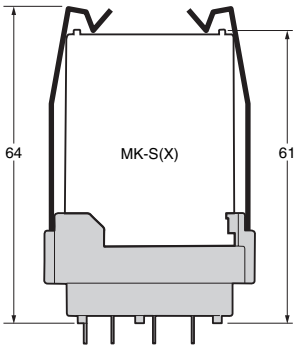


Note: The minimum order for the PYC-A2 is ten clips.

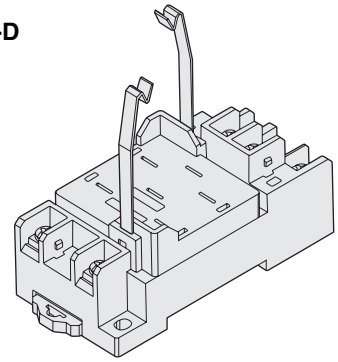
Socket Mounting Height

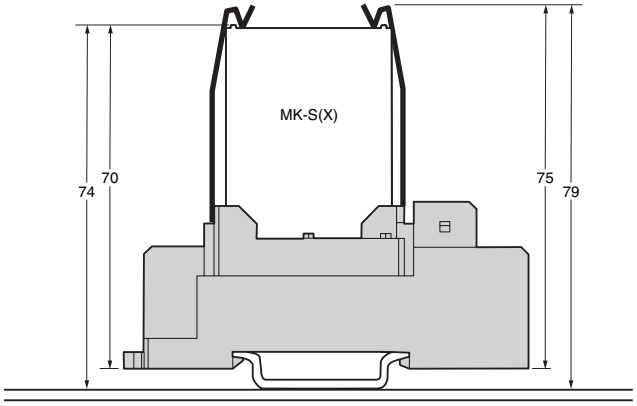
P7M-06P





P7MF-06
P7MF-06-D





Safety Precautions

Refer also to *Precautions for All Relays*.

Precautions for Correct Use

Installation

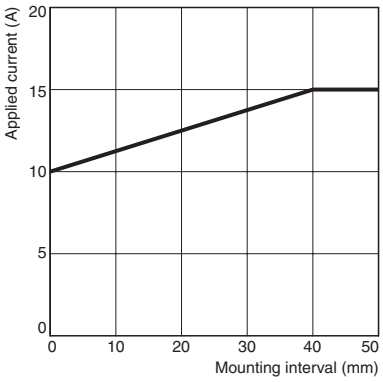
- Models for DC loads (i.e., models with "X" in the model number) have permanent magnets built into the insulating block. If a permanent magnet or other magnetic body comes near the Relay, magnetic interference will occur with the built-in permanent magnet and the contact switching capacity will be decreased.
- Models for AC loads do not contain a permanent magnet.
- When mounting a P7MF-06(-D) Front-mounting Socket to a DIN Track, attach PFP-M End Plates on both sides of the Socket to prevent it from moving.

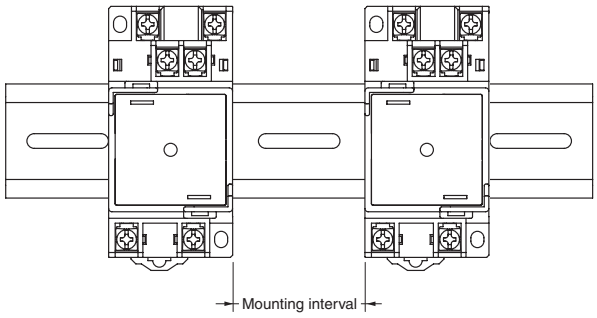
Gang Mounting

Conditions for Gang Mounting Relays

		Socket	
Relay	**Rated current of Relay**	**Back-Connecting Socket**	**Front-Connecting Socket**
Models for DC Loads	**10A**	❍	❍
Models for AC Loads	**15A**	❍	✻

✻ Gang mounting of the Front-Mounting Sockets is not possible if the contact carry current exceeds 10A.Provide space on both the right and left sides of the Sockets.
The mounting pitch is given in the following diagram.





Wiring

- The contact terminals on Models for DC Loads (i.e., models with "X" in the model number) have polarity. Wiring with incorrect polarity may result in inability to turn OFF the Relay or loss of functionality.
- Wire models with built-in operation indicators with the correct coil polarity (DC operating coil).

Test Button

- Turn OFF the power supply before operating the test button. Always return the test button to the original position after you use it.
- Do not use the test button as a switch.
- The durability of the test button is 100 operations minimum.

Operating Environment

Do not use the Relay in environments with combustible gas. Doing so may result in explosion due to arcing.

Storage

Models for DC Loads (i.e., models with "X" in the model number) are magnetized because they have a built-in magnet to deflect and extinguish the arc. Do not install the Relay near IC cards or other items that may be adversely affected by magnetism.

Usage

Use the Relay mounted in the P7M-06P or P7MF-06(-D) Socket.

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