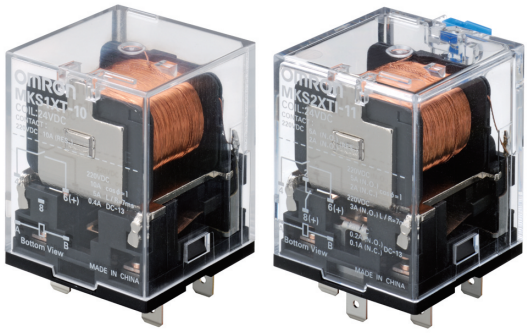
General Purpose Power Relays
MKS-X

MK-S-series Relays with AC and DC Load switching Models

- Models for DC Loads can switch 220 VDC, 10 A (resistive).
- Models for AC Loads can switch 250 VAC, 15 A (resistive).
- Lineup includes models with 1FormA and 1FormA+1FormB contact arrangements.
- Models available with operation indicators and built-in test buttons.
- Standards: UL/CSA, IEC (TÜV certification)
- RoHS compliant.



Ordering Information

■ List of Models

Contact form	Models for DC Loads		Models for AC Loads	
	SPST-NO	SPST-NO/SPST-NC	SPST-NO	SPST-NO/SPST-NC
Type	Model	Model	Model	Model
Standard	**MKS1XT-10**	**MKS2XT-11**	**MKS1T-10**	**MKS2T-11**
Built-in Operation Indicators	**MKS1XTN-10**	**MKS2XTN-11**	**MKS1TN-10**	**MKS2TN-11**
Test Button	**MKS1XTI-10**	**MKS2XTI-11**	**MKS1TI-10**	**MKS2TI-11**
Test Button and Built-in Operation Indicators	**MKS1XTIN-10**	**MKS2XTIN-11**	**MKS1TIN-10**	**MKS2TIN-11**

Note: 1. When ordering, add the rated voltage to the model number. Rated voltages are given in the coil ratings table in the specifications.
Example: MKS2XTIN-11 AC240
Rated voltage

2. Refer to *Terminal Arrangement and Internal Connections* for all wiring diagrams.

■ Accessory (Order Separately)

Connecting Socket and Hold-down Clips

Classifications		Built-in diode	Socket	Hold-down Clip
Back-connecting Socket	PCB Mount	No	**P7M-06P**	**PYC-A2**
Front-connecting Socket	DIN Track or Panel Mount	No	**P7MF-06**	
		Yes	**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* in the *Safety Precautions* section for the conditions required to gang mounti multiple relays side-by-side.

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

Specifications

■ Contact Ratings

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: 1. 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.

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

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

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

■ Coil Ratings

Item		Rated current (mA)		Coil resistance (Ω)	Must operate voltage (V)	Must release voltage (V)	Max. voltage (V)	Power consumption (VA, W)
Rated voltage (V)		50 Hz	60 Hz					
AC	24	110	96.3	48.4	80% max. of rated voltage	30% min. of rated voltage at 60 Hz 25% min. of rated voltage at 50 Hz	110% of rated voltage	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. of rated voltage		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 Voltage is the highest voltage that can be applied to the coil temporarily, not continuously.

4. The rated current is approximately 5 mA higher for Models with Built-in Operation Indicators (DC operating coils).

■ Characteristics

Contact resistance (See note 2)		100 mΩ max.
Operate time (See note 3)		AC: 20 ms max. DC: 30 ms max.
Release time (See note 3)		20 ms max.
Max. operating frequency	**Mechanical**	18,000 operations/h
	Electrical	Models for DC loads: 1,800 times/hour Models for AC loads: 1,200 times/hour
Insulation resistance (See note 4)		100 MΩ min.
Dielectric strength		2,500 VAC 50/60 Hz for 1 min. between coil and contacts
		2,500 VAC 50/60 Hz for 1 min. between contacts of different polarity
		1,000 VAC 50/60 Hz for 1 min. between contacts of same polarity
Vibration resistance		Destruction: 10 to 55 Hz, 1.0-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance		Destruction: 1,000 m/s^2 when relay is properly mounted into P7M-06P PCB socket 500m/s^2 when relay is properly mounted into P7MF-06(-D) socket Malfunction 100 m/s^2
Life expectancy	**Mechanical**	1,000,000 operations min. (at 18,000 operations/hr)
	Electrical (See note 5)	100,000 operations min. (at rated load and maximum switching frequency)
Minimum permissible load (Reference value. See note 6)		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: 1. The values given above are initial values.

2. The contact resistance was measured for 1 A at 5 VDC using the voltage drop method.

3. The operate time was measured with the rated voltage imposed and any contact bounce ignored at an ambient temperature of 23°C.

4. The insulation resistance was measured with a 500-VDC insulation resistance tester at the same places as those used for checking the dielectric strength.

5. The electrical endurance was measured at an ambient temperature of 23°C.

6. P level: λ_{60}=0.1 x 10^{-6}/operations

■ Approved Standards

UL Recognized
CSA Certified

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)	

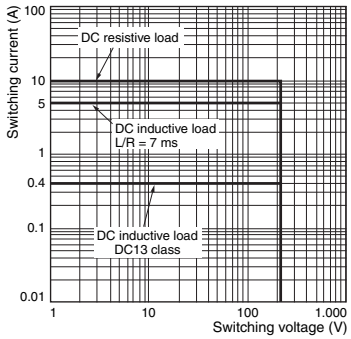
IEC Standard/TÜV Certification: IEC61810-1 (Certification No. R50104853)

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	

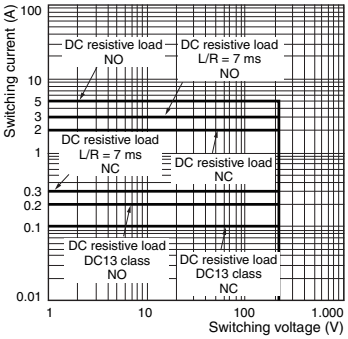
Engineering Data

Maximum Switching Power

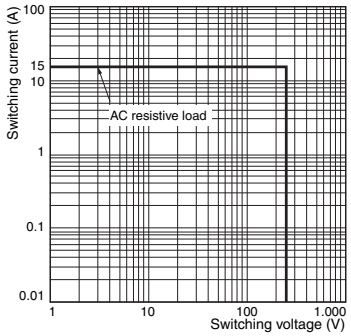
MKS1XT□-10



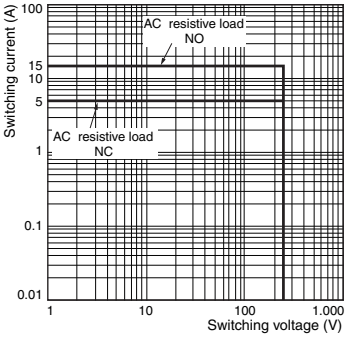
MKS2XT□-11



MKS1T□-10

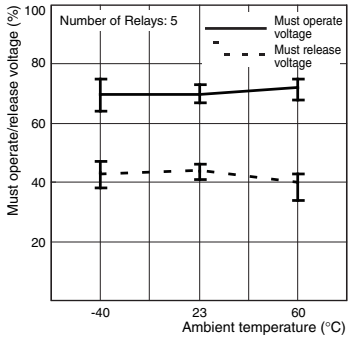


MKS2T□-11

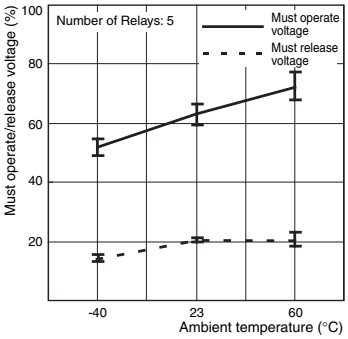


Ambient Temperature vs. Pick-up and Drop out Voltage

MKS2XT-11
AC Specification (60 Hz)

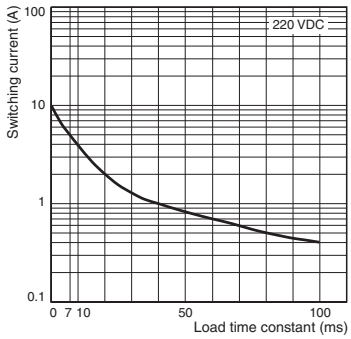


MKS2XT-11
DC Specification

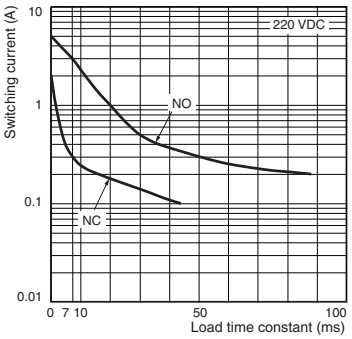


Inductive Load Switching Power (Models for DC Loads)

MKS1XT□-10



MKS2XT□-11



Dimensions

(Unit: mm)

Models for DC Loads

Standard Models

MKS1XT-10 **MKS2XT-11**

Models with Built-in Operation Indicators

MKS1XTN-10 **MKS2XTN-11**

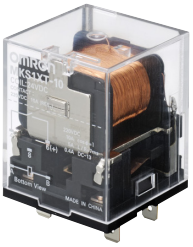
Models for AC Loads

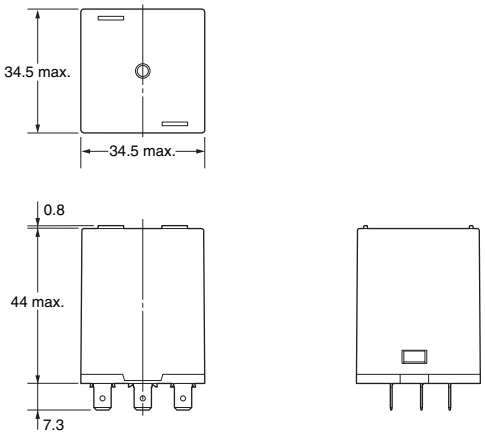
Standard Models

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**

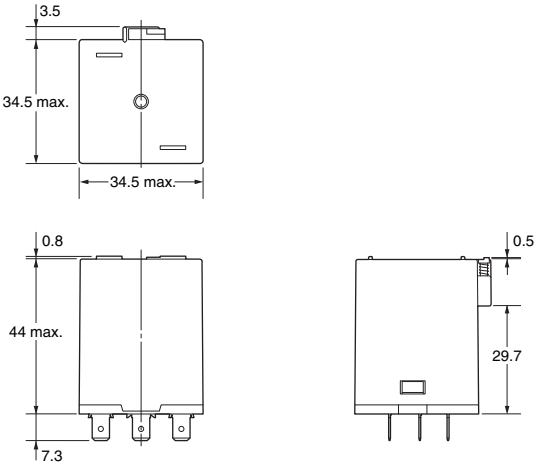
Models for AC Loads

Models with Test Button

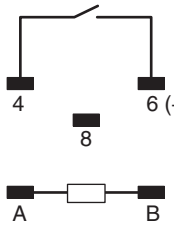
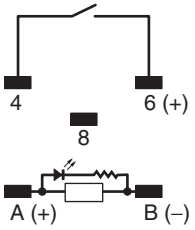
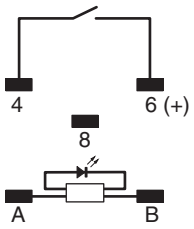
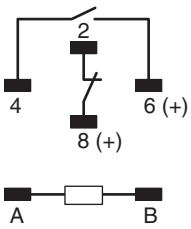
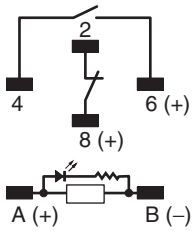
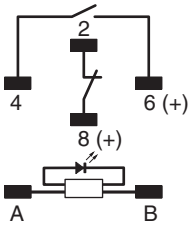
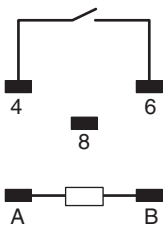
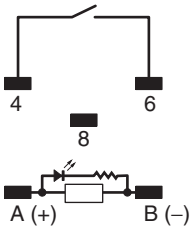
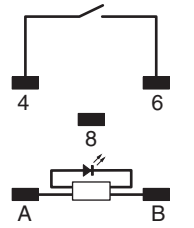
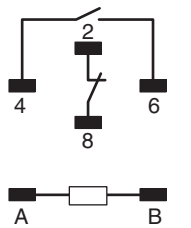
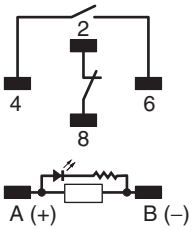
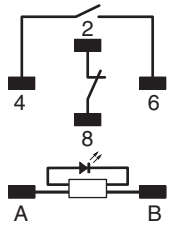
MKS1TI-10 **MKS2TI-11**

Models with Test Button and Built-in Operation Indicators

MKS1TIN-10 **MKS2TIN-11**



Terminal Arrangement and 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
					

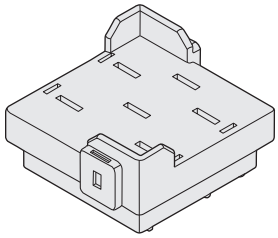
Note: 1. Wire properly using the correct coil polarity.

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

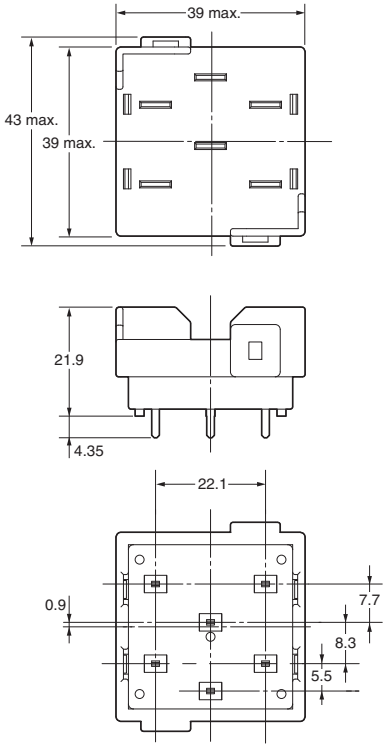
Connecting Socket

Back-connecting Socket

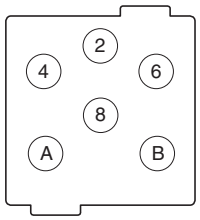
P7M-06P



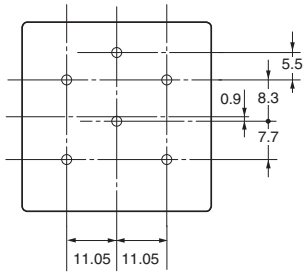
Dimensions



Terminal Arrangement/Internal Connections (Bottom View)

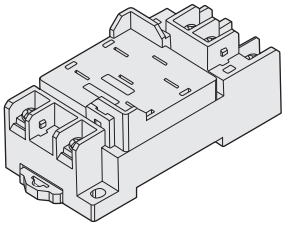


PCB Mounting Holes (Bottom View)

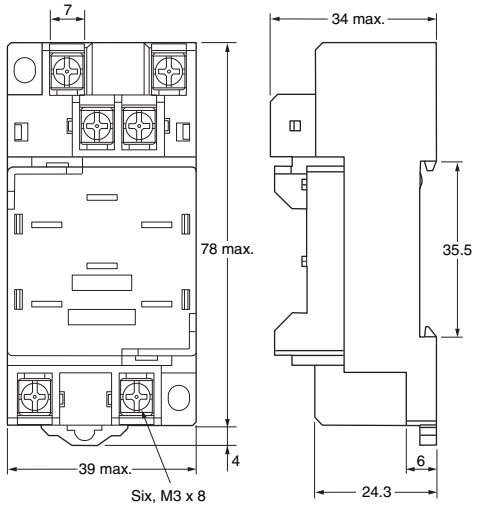


Front-connecting Socket

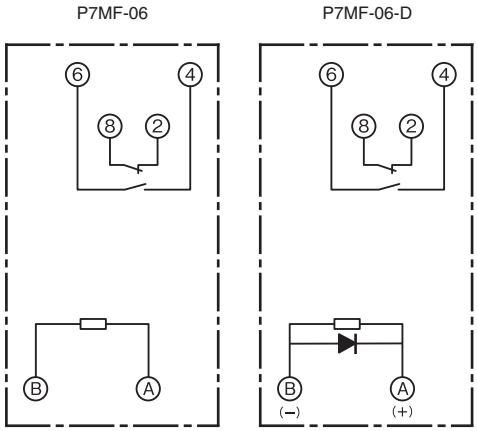
P7MF-06
P7MF-06-D



Dimensions

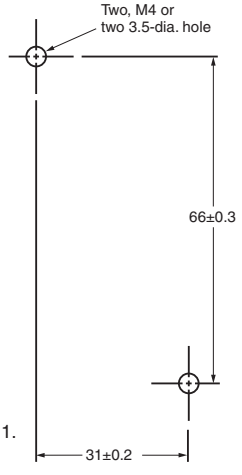


Terminal Arrangement/Internal Connections (TOP View)



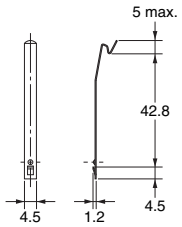
Note: 1. The internal connections diagram is for the MKS2(X)T□□-11.
2. The P7MF-06-D has polarity. Be careful to wire with the correct polarity.

Mounting Holes (TOP View)



Hold-down Clip

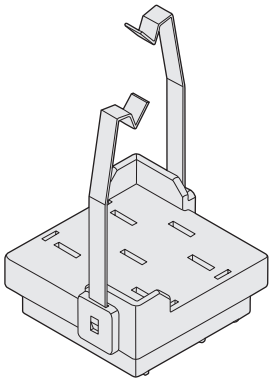
PYC-A2
One Set (Two Clips)

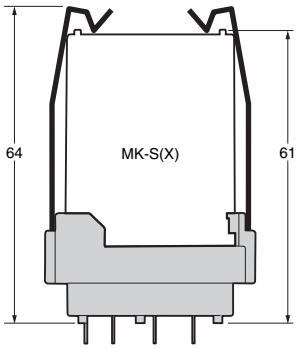


Note: The minimum order for the PYC-A2 is ten clips.

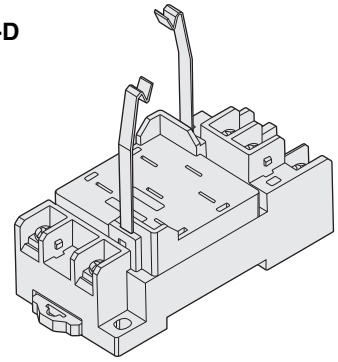
Socket Mounting Height

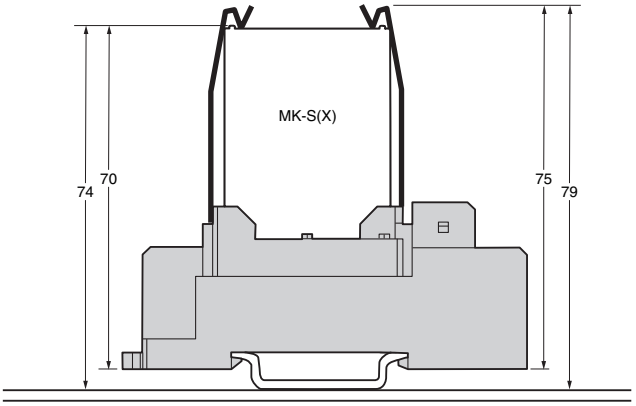
P7M-06P





P7MF-06
P7MF-06-D





Safety Precautions

Be sure to read the precautions and information common to all electromechanical relays, contained in the Technical User's Guide, "Electromechanical Relays, Technical Information" for correct use.

Precautions for Correct Use

Installation

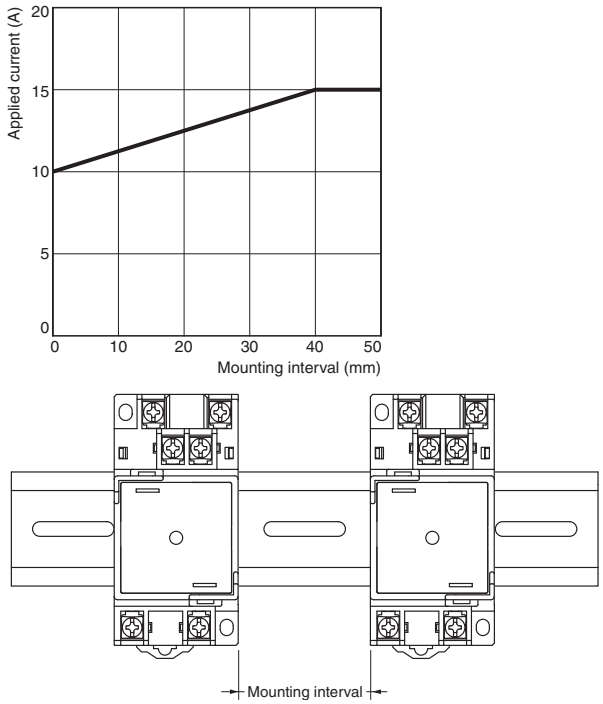
- Models for DC loads (i.e., models with "X" in the model number) have permanent magnets built into the insulating block. If a permanent magnet or other magnetic body comes near the Relay, magnetic interference will occur with the built-in permanent magnet and the contact switching capacity will be decreased.
- 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 mounting multiple MKS-X relays on the same DIN rail.

		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.
- Be sure to check plarity when wiring DC coil MKS-X relays with built-in operation indicators.

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.

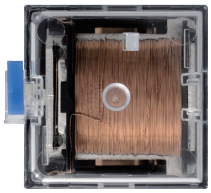
Test Button

- 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.

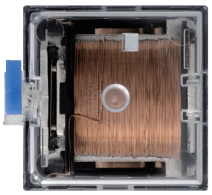
The circuit can be checked using either of two modes.

Test Button
DC specification: Blue
AC specification: Red

Normal

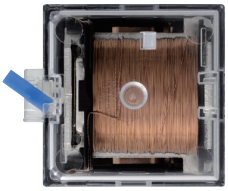


Mode 1
(momentary)



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

Mode 2
(locked)

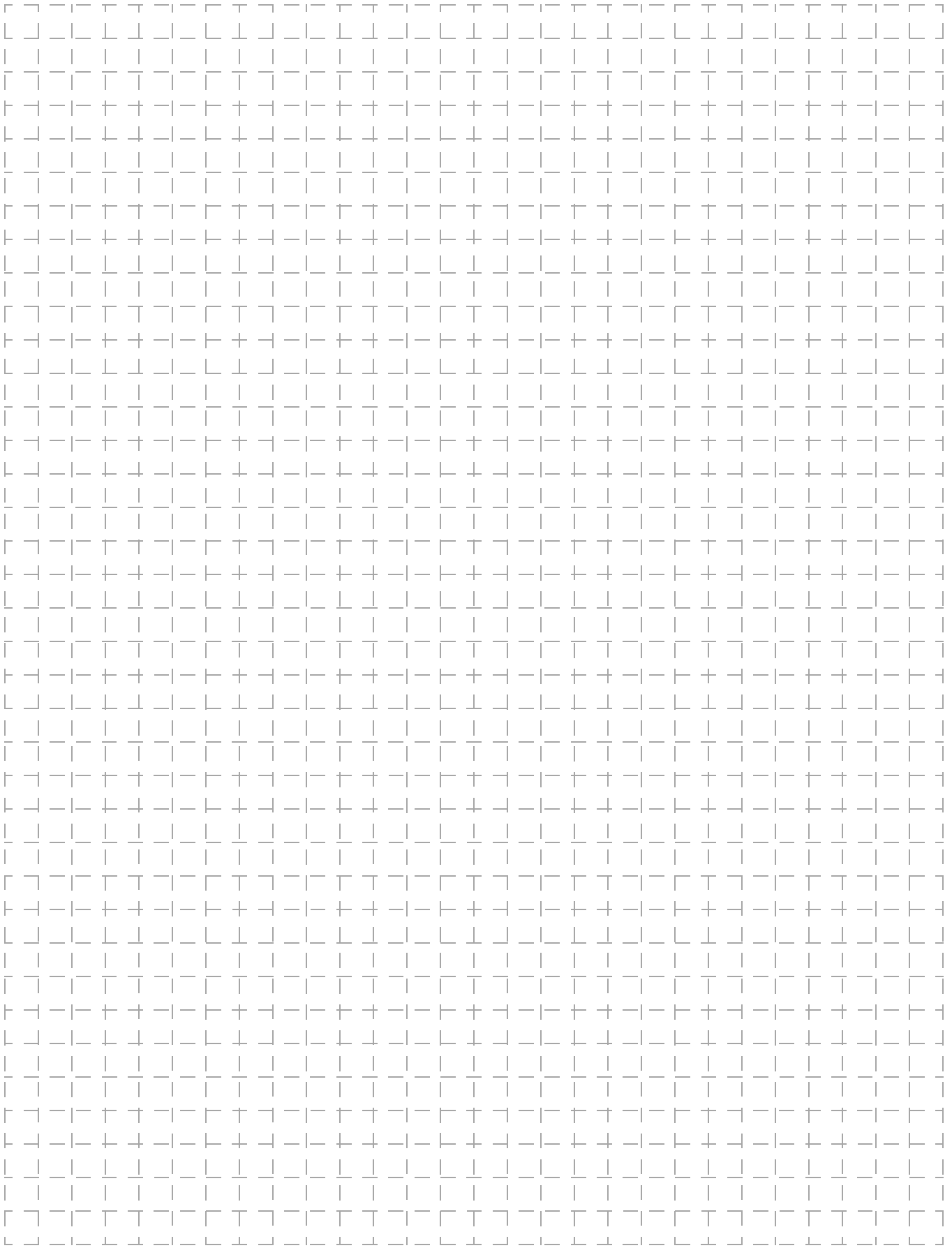


Lock the contacts by pressing down on the button and turning it.

Test Button Applications

Example: Checking operation of Relays and sequence circuits.

MEMO



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