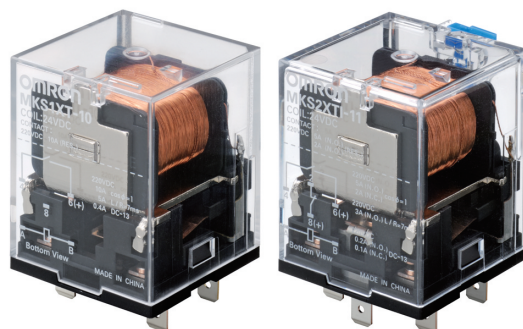


General Purpose Power Relays MKS-X

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

Type	Contact form	Models for DC Loads		Models for AC Loads	
		SPST-NO	SPST-NO/SPST-NC	SPST-NO	SPST-NO/SPST-NC
		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 mount 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 voltage (V)	Rated current (mA)		Coil resistance (Ω)	Must operate voltage (V)	Must release voltage (V)	Max. voltage (V)	Power consumption (VA, W)
		50 Hz	60 Hz					
AC	24	110	96.3	48.4	80% max. of rated voltage	30% min. of rated voltage at 60 Hz	110% of rated voltage	Approx. 2.3 VA at 60 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		25% min. of rated voltage at 50 Hz		
	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: $\lambda_{60}=0.1 \times 10^{-6}/\text{operations}$

■ Approved Standards

UL Recognized  US
 CSA Certified  US

Model	Coil ratings	Contact ratings		Operations
MKS1XT□-□	12 to 220 VDC 24 to 240 VAC	NO contacts	10 A, 220 VDC (Resistive)	6,000
			5 A, 220 VDC L/R ($T_{0.632}$) = 7 ms 0.4 A, 220 VDC L/R ($T_{0.95}$) = 300 ms	
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)	

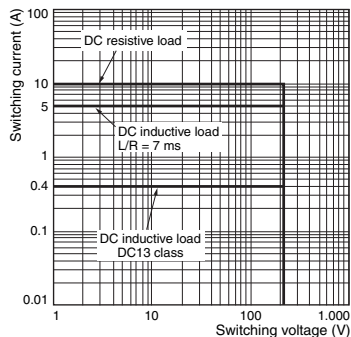
IEC Standard/TÜV Certification: IEC61810-1 (Certification No. R50104853)

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	100,000
			5 A, 220 VDC L/R ($T_{0.632}$) = 7 ms DC-13: 0.4 A, 220 VDC	
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	

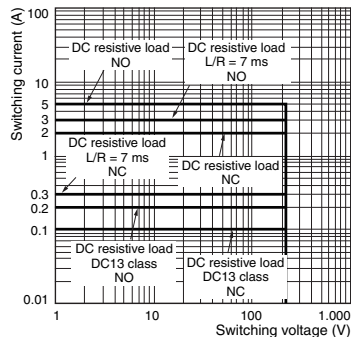
Engineering Data

Maximum Switching Power

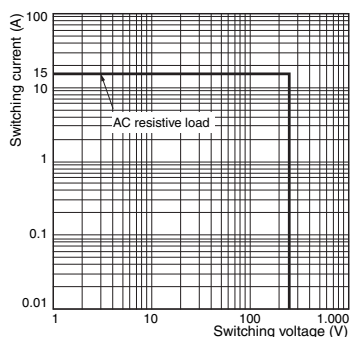
MKS1XT□-10



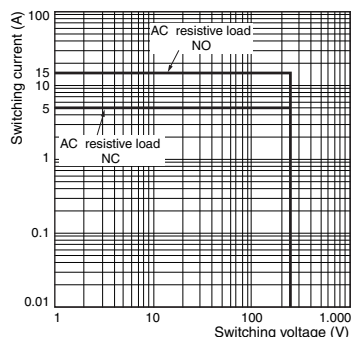
MKS2XT□-11



MKS1T□-10

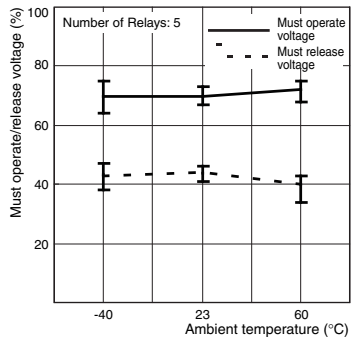


MKS2T□-11

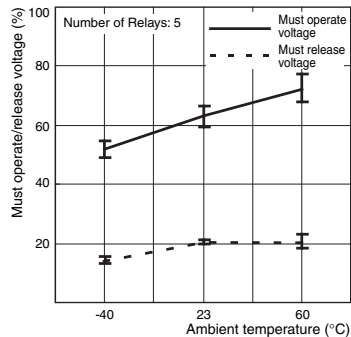


Ambient Temperature vs. Pick-up and Drop out Voltage

**MKS2XT-11
AC Specification (60 Hz)**

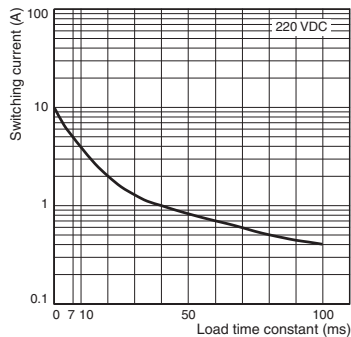


**MKS2XT-11
DC Specification**

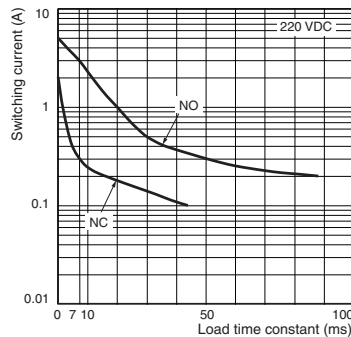


Inductive Load Switching Power (Models for DC Loads)

MKS1XT□-10



MKS2XT□-11



Dimensions

(Unit: mm)

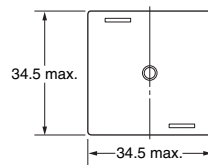
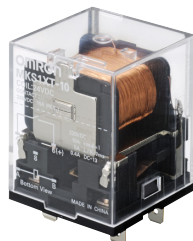
Models for DC Loads

Standard Models

MKS1XT-10 MKS2XT-11

Models with Built-in Operation Indicators

MKS1XTN-10 MKS2XTN-11



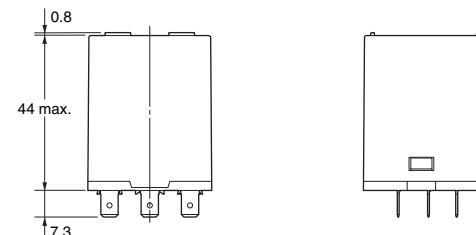
Models for AC Loads

Standard Models

MKS1T-10 MKS2T-11

Models with Built-in Operation Indicators

MKS1TN-10 MKS2TN-11



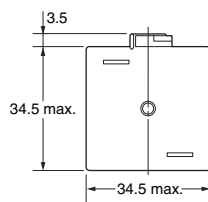
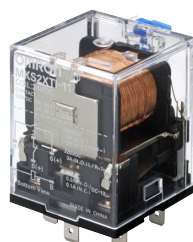
Models for DC Loads

Models with Test Button

MKS1XTI-10 MKS2XTI-11

Models with Test Button and Built-in Operation Indicators

MKS1XTIN-10 MKS2XTIN-11



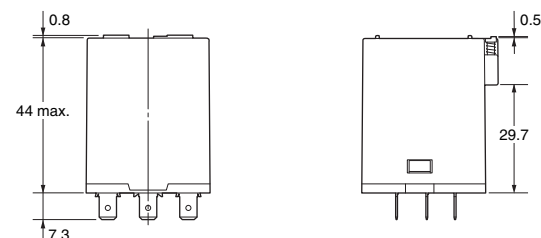
Models for AC Loads

Models with Test Button

MKS1TI-10 MKS2TI-11

Models with Test Button and Built-in Operation Indicators

MKS1TIN-10 MKS2TIN-11

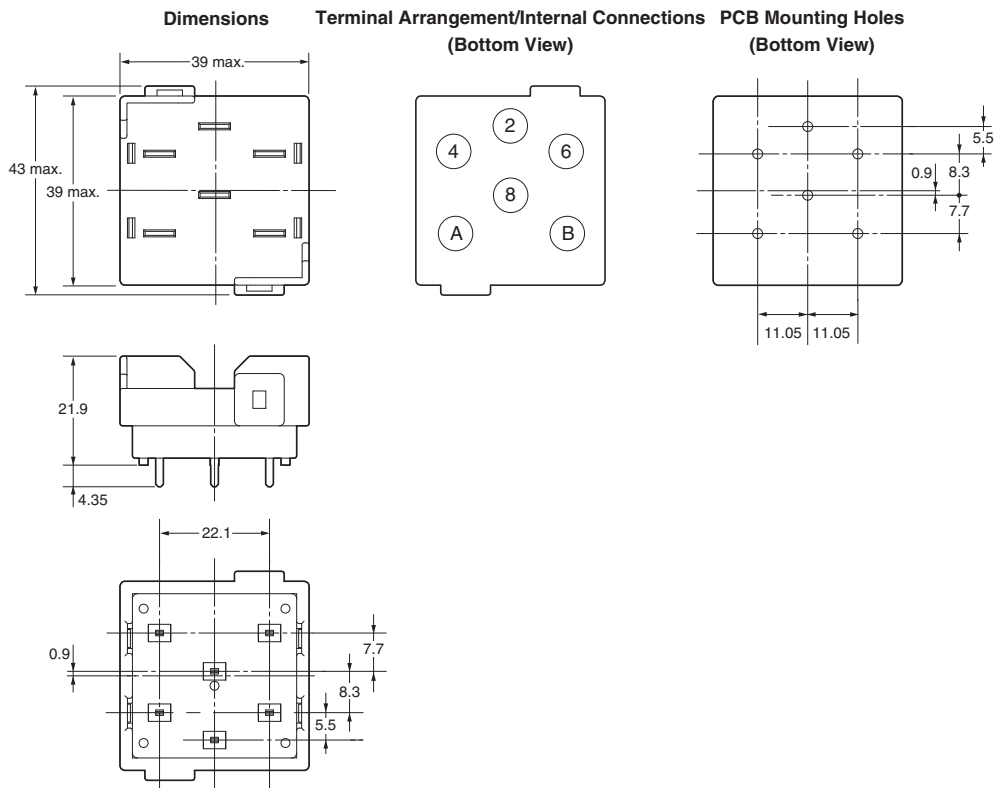
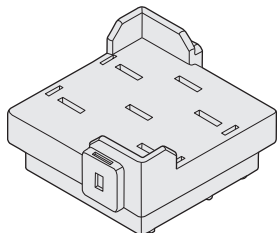


Terminal Arrangement and Internal Connection (Bottom View)

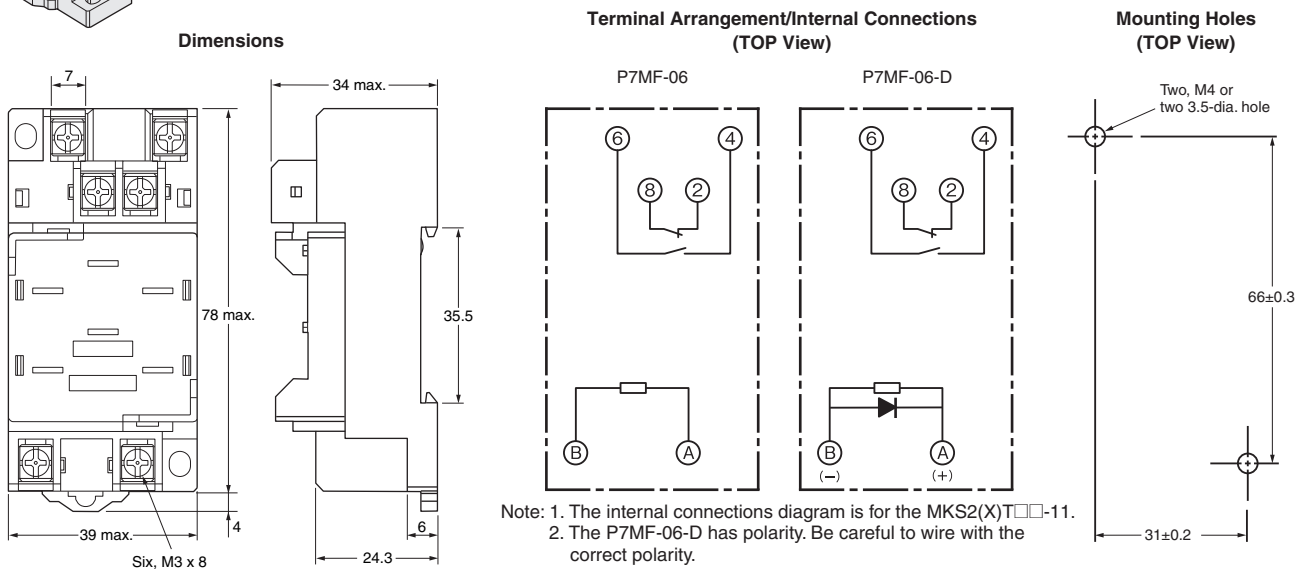
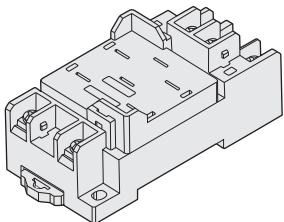
MKS1XT-10 MKS1XTI-10	MKS1XTN-10 MKS1XTIN-10		MKS2XT-11 MKS2XTI-11	MKS2XTN-11 MKS2XTIN-11	
	DC specification	AC specification		DC specification	AC specification
MKS1T-10 MKS1TI-10	MKS1TN-10 MKS1TIN-10		MKS2T-11 MKS2TI-11	MKS2TN-11 MKS2TIN-11	
	DC specification	AC specification		DC specification	AC specification

- 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

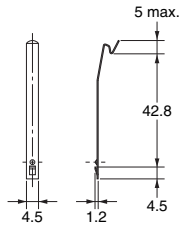


Front-connecting Socket
P7MF-06
P7MF-06-D



Hold-down Clip

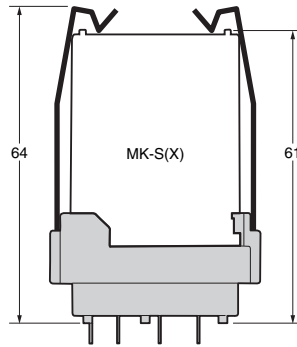
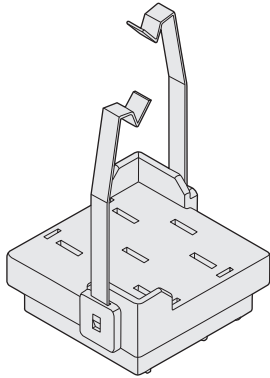
PYC-A2
One Set (Two Clips)



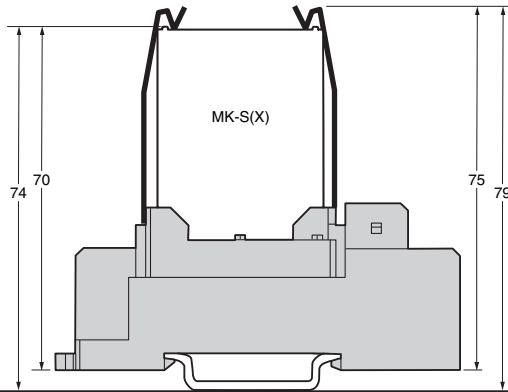
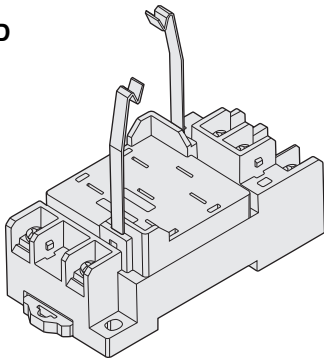
Note: The minimum order for the PYC-A2 is ten clips.

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

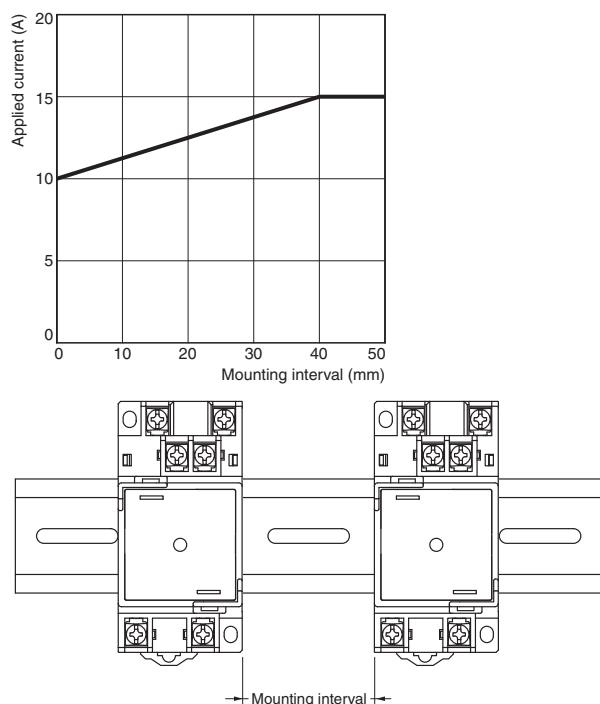
- Models for DC loads (i.e., models with "X" in the model number) have permanent magnets built into the insulating block. If a permanent magnet or other magnetic body comes near the Relay, magnetic interference will occur with the built-in permanent magnet and the contact switching capacity will be decreased.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

Relay	Rated current of Relay	Socket	
		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 polarity 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.

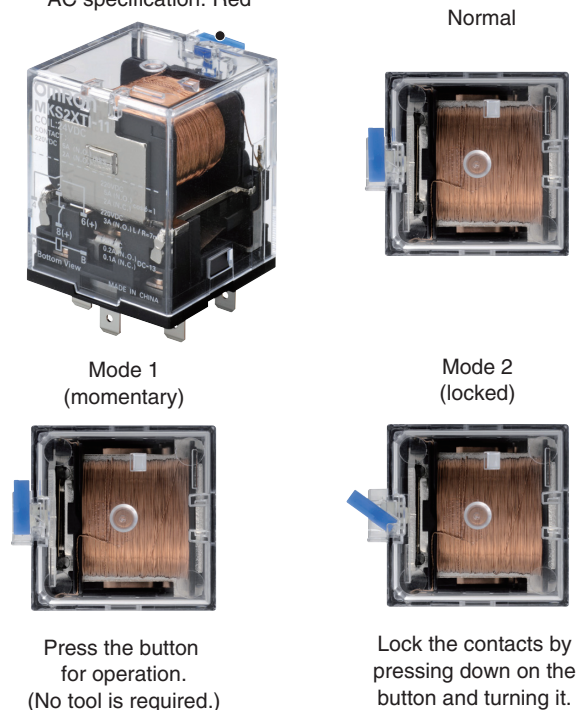
Test Button

- 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



Test Button Applications

Example: Checking operation of Relays and sequence circuits.

MEMO

A large grid of dashed lines for taking notes, consisting of 20 columns and 30 rows of small squares.

Terms and Conditions of Sale

- Offer; Acceptance.** These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
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- Discounts.** Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.
- Interest.** Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
- Orders.** Omron will accept no order less than \$200 net billing.
- Governmental Approvals.** Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
- Taxes.** All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.
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- Cancellation; Etc.** Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
- Force Majeure.** Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
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 - Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
 - Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
 - All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
 - Delivery and shipping dates are estimates only; and
 - Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
- Claims.** Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
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- Export Controls.** Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (ii) sale of products to "forbidden" or other proscribed persons; and (iii) disclosure to non-citizens of regulated technology or information.
- Miscellaneous.** (a) **Waiver.** No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) **Assignment.** Buyer may not assign its rights hereunder without Omron's written consent. (c) **Law.** These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) **Amendment.** These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) **Severability.** If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) **Setoff.** Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (g) **Definitions.** As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

Certain Precautions on Specifications and Use

- Suitability of Use.** Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
 - Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
 - Use in consumer products or any use in significant quantities.
 - Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
 - Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO
- ADDRESS THE RISKS, AND THAT THE OMRON'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
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- Change in Specifications.** Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.
- Errors and Omissions.** Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

Note: This datasheet is provided as a guideline for selecting products. Do not use this document to operate the Unit.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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