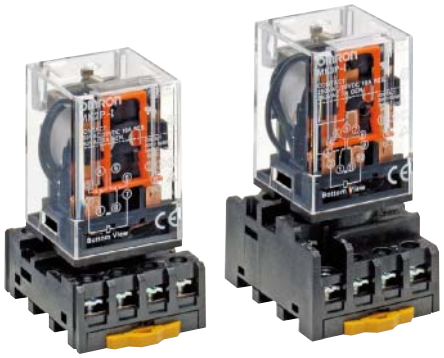
General-purpose Relay

MK-I/-S

Exceptionally Reliable General-purpose Relay Features Mechanical Indicator/Push Button

- Breaks relatively large load currents despite small size.
- Long life (minimum 100,000 electrical operations) assured by silver contacts.
- Built-in operation indicator (Mechanical, LED), push button, diode surge suppression, varistor surge suppression.
- Standard models are UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV (IEC), and VDE.
- Conforming to CENELEC standards.



Model Number Structure

■ Model Number Legend

Standard Models

MK □ □ □ - □ - □ □
1 2 3 4 5 6

1. **Contact Form**
   2: DPDT
   3: 3PDT
2. **Cover**
   P: Dust cover
3. **Internal Connection Construction**
   Blank: Standard
   2 or 5: Non-standard connection
   (Refer to *Terminal Arrangement/ Internal Connections)*
4. **Mechanical Indicator Push Button**
   S: Mechanical indicator and push button
   I: Mechanical indicator
5. **Approved Standards**
   Blank: UL, CSA, DEMKO, NEMKO SEMKO, SEV, TÜV
   VD: VDE
6. **Rated Voltage**
   (Refer to *Coil Ratings*)

Special Accessories

MK □ □ □ □ - □ - □ - □ □
1 2 3 4 5 6 7 8

1. **Contact Form**
   2: DPDT
   3: 3PDT
2. **Cover**
   P: Dust cover
3. **Classification**
   N: LED indicator
   D: Diode
   V: Varistor
   ND: LED indicator and diode
   NV: LED indicator and varistor
4. **Coil Polarity**
   Blank: Standard
   1: Reverse
   (Refer to *Terminal Arrangement/ Internal Connections)*
5. **Internal Connection Construction**
   Blank: Standard
   2 or 5: Non-standard connection
   (Refer to *Terminal Arrangement/ Internal Connections)*
6. **Mechanical Indicator Push Button**
   S: Mechanical indicator and push button
   I: Mechanical indicator
7. **Approved Standards**
   Blank: UL and CSA only
   VD: VDE (N and D models only)
8. **Rated Voltage**
   (Refer to *Coil Ratings*)

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Ordering Information

■ List of Models

Type	Terminal	Contact form	Internal connection (see note 3)	With mechanical indicator	With mechanical indicator and pushbutton	Coil ratings	Approved standards
Standard	Plug-in	DPDT	Standard	MK2P-I	MK2P-S	AC (∿), DC (⎓)	UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV
			Non-standard	MK2P2-I	MK2P2-S		
		3PDT	Standard	MK3P-I	MK3P-S		
			Non-standard	MK3P2-I MK3P5-I	MK3P2-S MK3P5-S		
LED Indicator (see note 2)		DPDT	Standard	MK2PN□-I	MK2PN□-S	AC (∿), DC (⎓)	UL, CSA
			Non-standard	MK2PN□-2-I	MK2PN□-2-S		
		3PDT	Standard	MK3PN□-I	MK3PN□-S		
			Non-standard	MK3PN□-2-I MK3PN□-5-I	MK3PN□-2-S MK3PN□-5-S		
Diode (see note 2)		DPDT	Standard	MK2PD□-I	MK2PD□-S	DC (⎓)	UL, CSA
			Non-standard	MK2PD□-2-I	MK2PD□-2-S		
		3PDT	Standard	MK3PD□-I	MK3PD□-S		
			Non-standard	MK3PD□-2-I MK3PD□-5-I	MK3PD□-2-S MK3PD□-5-S		
Varistor		DPDT	Standard	MK2PV-I	MK2PV-S	AC (∿)	UL, CSA
			Non-standard	MK2PV-2-I	MK2PV-2-S		
		3PDT	Standard	MK3PV-I	MK3PV-S		
			Non-standard	MK3PV-2-I MK3PV-5-I	MK3PV-2-S MK3PV-5-S		
VDE approved		DPDT	Standard	MK2P-I-VD	MK2P-S-VD	AC (∿), DC (⎓)	UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV, VDE
			Non-standard	MK2P2-I-VD	MK2P2-S-VD		
		3PDT	Standard	MK3P-I-VD	MK3P-S-VD		
			Non-standard	MK3P2-I-VD MK3P5-I-VD	MK3P2-S-VD MK3P5-S-VD		
LED Indicator VDE approved		DPDT	Standard	MK2PN-I-VD	MK2PN-S-VD	AC (∿), DC (...)	UL, CSA, VDE
			Non-standard	MK2PN-2-I-VD	MK2PN-2-S-VD		
		3PDT	Standard	MK3PN-I-VD	MK3PN-S-VD		
			Non-standard	MK3PN-2-I-VD	MK3PN-2-S-VD		
				MK3PN-5-I-VD	MK3PN-5-S-VD		
Diode VDE approved		DPDT	Standard	MK2PD-I-VD	MK2PD-S-VD	DC (...)	UL, CSA, VDE
			Non-standard	MK2PD-2-I-VD	MK2PD-2-S-VD		
		3PDT	Standard	MK3PD-I-VD	MK3PD-S-VD		
			Non-standard	MK3PD-2-I-VD	MK3PD-2-S-VD		
				MK3PD-5-I-VD	MK3PD-5-S-VD		

Note: **1.** When ordering, add the rated voltage to the model number. Rated voltages are given in the coil ratings table in *Specifications*.

Example: MK3P5-S 230 VAC
└ Rated voltage

2. This DC coil comes in two types: standard coil polarity and reversed coil polarity. Refer to *Terminal Arrangement/Internal Connections*.

Example: MK2PN1-I 24 VDC
└ Reverse polarity

3. Refer to *Terminal Arrangement/Internal Connections* for non-standard internal connection.

4. The gold plating thickness depends on the request.

Example: MK3P-I AP3 24 VAC
└ Gold plating thickness: 3 μm

■ Accessories (Order Separately)

Item		Model
Track-mounted Socket	8-pin type	PF083A-E
	11-pin type	PF113A-E
Hold-down Clip		PFC-A1

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Specifications

■ Coil Ratings

UL, CSA, DEMKO, NEMKO, SEMKO, SEV, TÜV

Rated voltage		Rated current		Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		60 Hz	50 Hz					
AC (∿)	6 V	360 mA	404 mA	3.9 Ω	80% max. of rated voltage	30% min. of rated voltage	90% to110% of rated voltage	Approx. 2.3 VA (at 60 Hz) Approx. 2.7 VA (at 50 Hz)
	12 V	180 mA	202 mA	16.9 Ω				
	24 V	88.0 mA	98.0 mA	62.0 Ω				
	50 V	39.0 mA	46.3 mA	330 Ω				
	100 V	24.8 mA	28.4 mA	1,010 Ω				
	110 V	21.0 mA	24.7 mA	1,240 Ω				
	120 V	18.0 mA	20.2 mA	1,520 Ω				
	200 V	12.1 mA	14.2 mA	4,520 Ω				
	220 V	11.0 mA	12.9 mA	5,130 Ω				
	230 V	10.5 mA	12.3 mA	6,170 Ω				
	240 V	9.2 mA	10.3 mA	6,450 Ω				
DC (⎓)	6 V	255 mA		23.5 Ω		15% min. of rated voltage		Approx. 1.5 W
	12 V	126 mA		95 Ω				
	24 V	56 mA		430 Ω				
	48 V	29.5 mA		1,630 Ω				
	100 V	14.7 mA		6,800 Ω				
	110 V	15.1 mA		7,300 Ω				

VDE

Rated voltage		Rated current		Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		50 Hz	60 Hz					
AC (∿)	6 V	380 mA	325 mA	4.4 Ω	80% max. of rated voltage	30% min. of rated voltage	90% to110% of rated voltage	Approx. 2.0 VA (at 60 Hz) Approx. 2.4 VA (at 50 Hz)
	12 V	175 mA	145 mA	19.0 Ω				
	24 V	91.0 mA	76.5 mA	70.7 Ω				
	50 V	42.0 mA	36.0 mA	330 Ω				
	100 V	24.0 mA	20.5 mA	1,150 Ω				
	110 V	21.5 mA	18.0 mA	1,400 Ω				
	120 V	20.0 mA	17.0 mA	1,600 Ω				
	200 V	11.2 mA	9.4 mA	5,110 Ω				
	220 V	10.2 mA	8.7 mA	5,800 Ω				
	230 V	9.6 mA	8.1 mA	6,990 Ω				
	240 V	9.4 mA	7.9 mA	7,400 Ω				
DC (⎓)	6 V	225 mA		26.7 Ω		15% min. of rated voltage		Approx. 1.3 W
	12 V	116 mA		107 Ω				
	24 V	56.0 mA		440 Ω				
	48 V	29.0 mA		1,660 Ω				
	100 V	13.1 mA		7,660 Ω				
	110 V	12.5 mA		8,720 Ω				

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. ∿ indicates AC and ⎓ indicates DC (IEC417 publications).

4. For 200 VDC applications, a 100-VDC Relay is supplied with a fixed 6.8 kΩ, 30 W resistor. Be sure to connect the resistor in series with the coil.

5. For models with the LED indicator built in, add an LED current of approximately 0 through 5 mA to the rated current.

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■ Contact Ratings

Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)
Contact mechanism	Single	
Contact material	Ag	
Rated load	10 A at 250 VAC 10A at 28 VDC	7 A at 250 VAC
Rated carry current	10 A	
Max. switching voltage	250 VAC, 250 VDC	
Max. switching current	10 A	
Max. switching power	2,500 VA, 280 W	1,750 VA

■ Characteristics

Contact resistance	50 mΩ max.
Operate time	AC: 20 ms max. DC: 30 ms max.
Release time	20 ms max.
Max. operating frequency	Mechanical:18,000 operations/hr Electrical:1,800 operations/hr (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min between coil and contacts; 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity, terminals of the same polarity; 2,500 VAC, 50/60 Hz fro 1 min between current-carrying parts, non-current-carrying parts, and terminals of opposite polarity
Vibration resistance	Destruction:10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction:10 to 55 to 10 Hz, 0.5-mm single amplitude (1.0-mm double amplitude)
Shock resistance	Destruction:1,000 m/s^2 (approx. 100G) Malfunction:100 m/s^2 (approx. 10G);
Endurance	Mechanical:10,000,000 operations min. (at operating frequency of 18,000 operations/hour) Electrical:Refer to *Engineering Data*.
Error rate (reference value)	10 mA at 1 VDC
Ambient temperature	Operating:–10°C to 40°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 85 g

Note: The data shown are initial values.

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■ Approved Standards

The following ratings apply to all models.

UL 508 (File No. E41515)/CSA 22.2 No.0/14 (File No. LR35535)

Coil ratings	Contact ratings	Operations
6 to 110 VDC 6 to 240 VAC	10 A, 28 VDC (resistive) 10 A, 250 VAC (resistive) 7 A, 250 VAC (general use)	100,000 cycles

SEV, DEMKO, NEMKO

Coil ratings	Contact ratings	Operations
6 to 110 V⎓ 6 to 240 V∿	10 A, 250 V∿ (NO) (cosϕ = 1) 5 A, 250 V∿ (NC) (cosϕ = 1) 10 A, 28 V⎓ (NO) 5 A, 28 V⎓ (NC) 7 A, 250 V∿ (cosϕ = 0.4)	100,000 cycles

SEMKO

Coil ratings	Contact ratings	Operations
6 to 110 V⎓ 6 to 240 V∿	10 A, 250 V∿ (NO) (cosϕ = 1) 5 A, 250 V∿ (NC) (cosϕ = 1)	100,000 cycles

TÜV (VDE 0435 Teil 201/05'90, IEC 255 Teil 1-00/'75, EN 60950/'88

(TÜV File No.: R9051410)

Coil ratings	Contact ratings	Conditions	Operations
6, 12, 24, 48, 100 110 V⎓ 6, 12, 24, 50, 100, 110 115, 120, 200, 220 230, 240 V∿	10 A, 250 V∿ (cosϕ = 1) 10 A, 28 V⎓ 7 A, 250 V∿ (cosϕ = 0.4)	IEC 255-1-00 Item 3.1.4 Pollution Degree 3, Overvoltage Category II Pick up class - class 2 Temperature class - class b	100,000 cycles

VDE (VDE 0435 Teil 201/05'83, IEC 255 Teil 1-00/'75)

(VDE File No.: NR 5340)

Coil ratings	Contact ratings	Conditions	Operations
6, 12, 24, 48, 100 110 V⎓ 6, 12, 24, 50, 100, 110 115, 120, 200, 220 230, 240 V∿	10 A, 250 V∿ (cosϕ = 1) 10 A, 28 V⎓ 7 A, 250 V∿ (cosϕ ⎓ 0.4)	C/250 - class 1, class C	100,000 cycles

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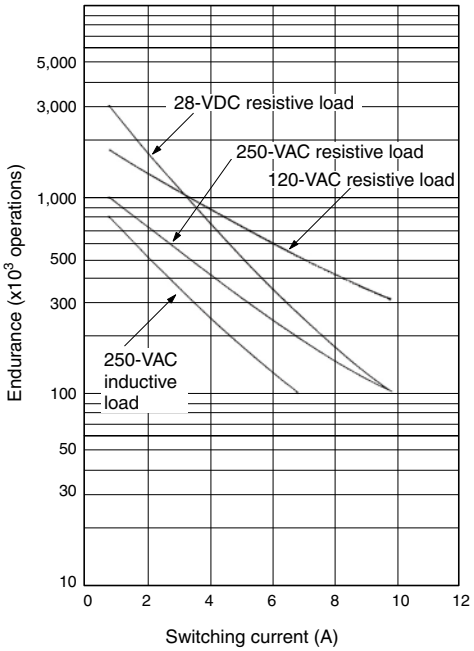
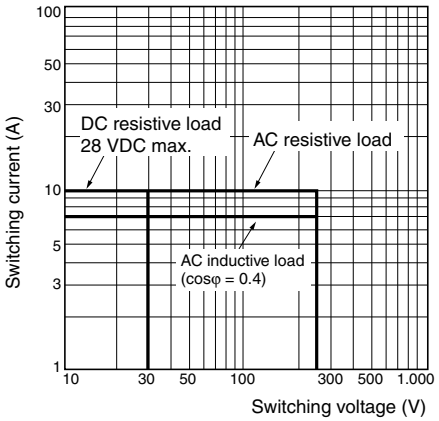
Engineering Data

■ Electrical Endurance



■ Maximum Switching Power



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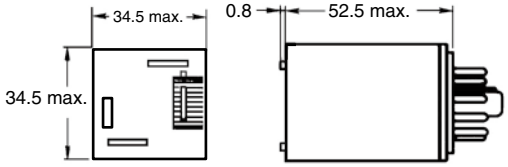
Dimensions

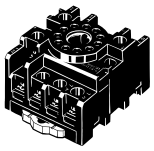
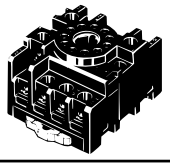
Note: All units are in millimeters unless otherwise indicated.

■ Relays



Sockets

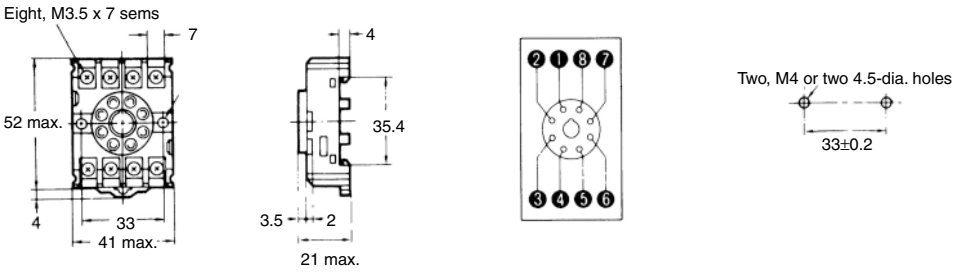
See below for Socket dimensions.

Socket	Surface-mounting Socket (for track or screw mounting)	
	Finger-protection models	---
Maximum carry current	10 A	5 A
2 poles	PF083A-E	PF083A
3 poles	PF113A-E 	PF113A 

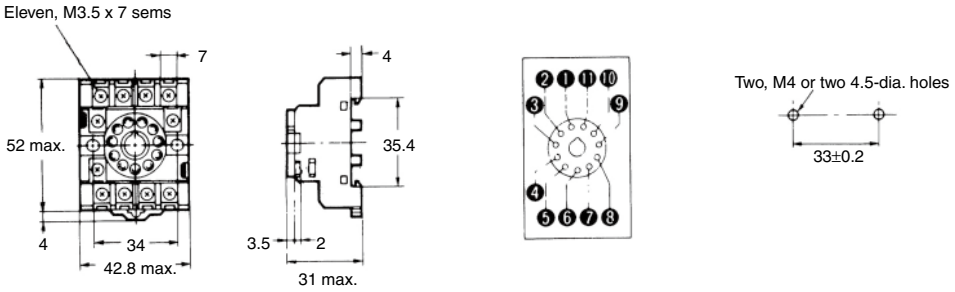
Note: Use the Surface-mounting Sockets (i.e., finger-protection models) with "-E" at the end of the model number. When using the PF083A and PF113A, be sure not to exceed the Socket's maximum carry current of 5 A. Using at a current exceeding 5 A may lead to burning. Round terminals cannot be used for finger-protection models. Use Y-shaped terminals.

PF083A-E (Conforming to EN 50022)

Terminal Arrangement **Mounting Holes**



PF113A-E (Conforming to EN 50022)



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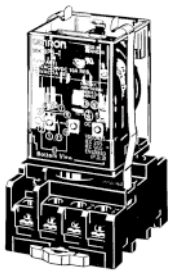
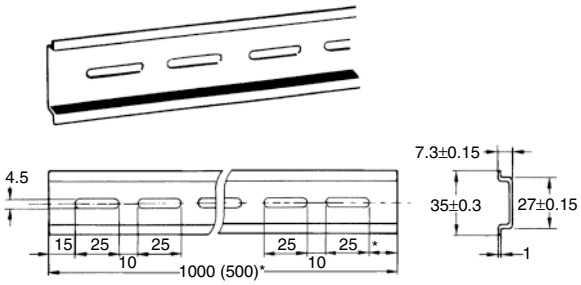
Hold-down Clips

PFC-A1



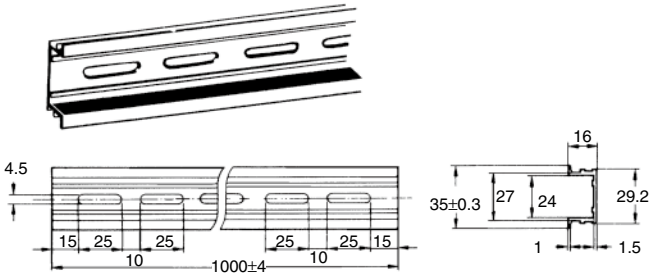
Mounting Tracks

PFP-100N, PFP-50N
(Conforming to EN 50022)



* This dimension applies to the PFP-50N Mounting Track.

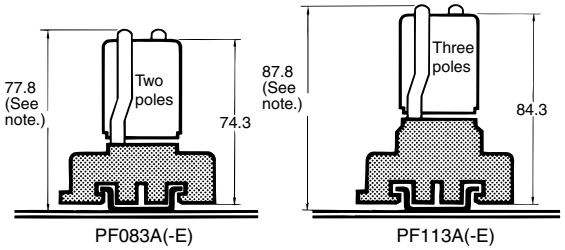
PFP-100N2
(Conforming to EN 50022)



* A total of twelve 25 x 4.5 elliptic holes is provided with six holes cut from each track end at a pitch of 10 mm.

Mounting Height with Sockets

Surface-mounting Sockets



PF083A(-E) PF113A(-E)

Note: PF083A(-E) and PF113A(-E) allow either track or screw mounting.

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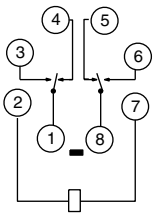
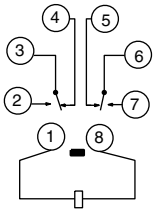
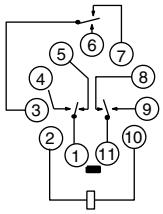
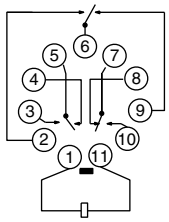
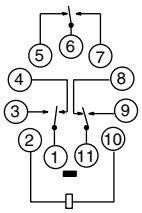
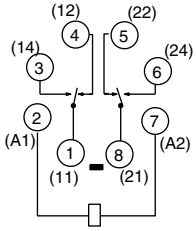
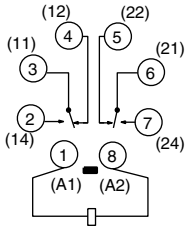
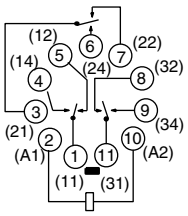
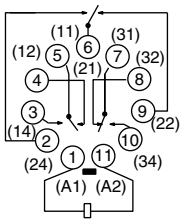
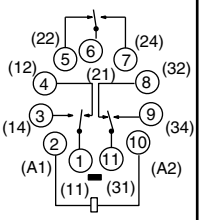
Terminal Arrangement/Internal Connection (Bottom View)

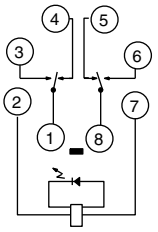
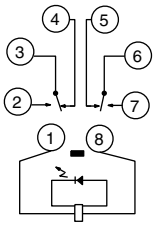
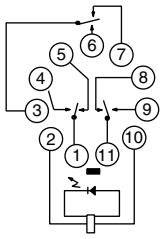
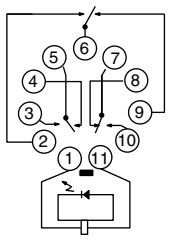
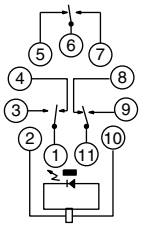
Standard (AC/DC Coil)

MK2P-I, -S	MK2P2-I, -S	MK3P-I, -S	MK3P2-I, -S	MK3P5-I, -S
				

VDE-approved Type (AC/DC Coil) ( ): Dual Numbering

MK2P-I-VD, -S-VD	MK2P2-I-VD, -S-VD	MK3P-I-VD, -S-VD	MK3P2-I-VD, -S-VD	MK3P5-I-VD, -S-VD
				

LED Indicator Type (AC Coil)

MK2PN-I, -S	MK2PN-2-I, -S	MK3PN-I, -S	MK3PN-2-I, -S	MK3PN-5-I, -S
				

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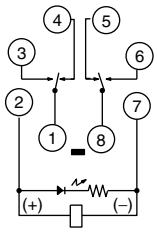
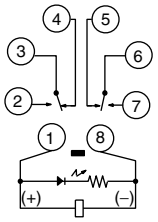
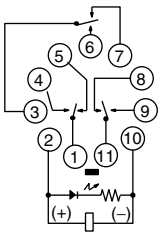
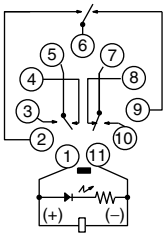
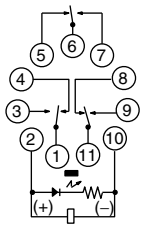
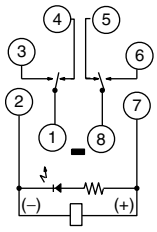
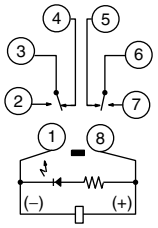
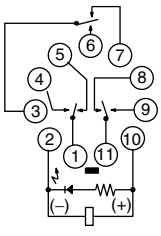
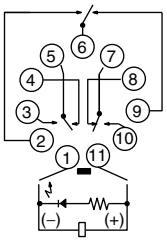
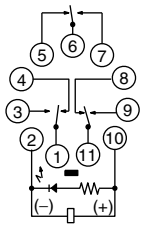
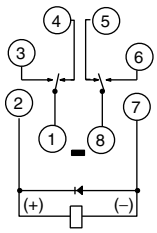
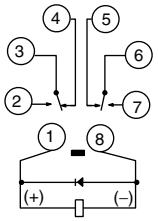
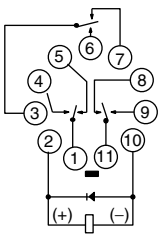
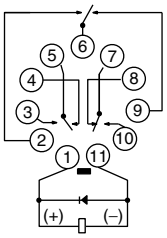
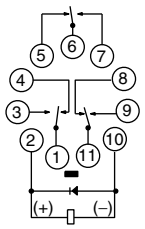
LED Indicator Type (DC Coil: Standard Polarity)

MK2PN-I, -S	MK2PN-2-I, -S	MK3PN-I, -S	MK3PN-2-I, -S	MK3PN-5-I, -S
				

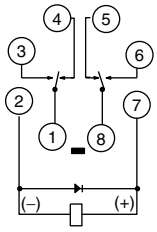
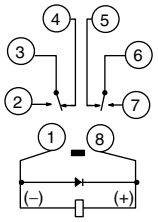
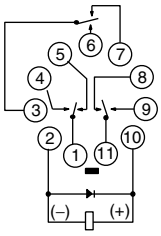
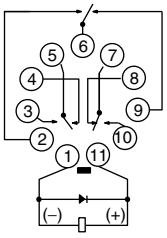
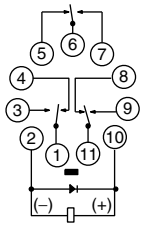
LED Indicator Type (DC Coil: Reverse Polarity)

MK2PN1-I, -S	MK2PN1-2-I, -S	MK3PN1-I, -S	MK3PN1-2-I, -S	MK3PN1-5-I, -S
				

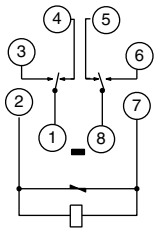
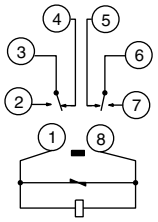
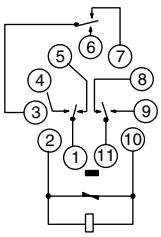
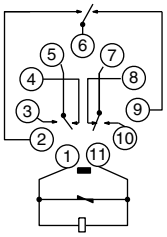
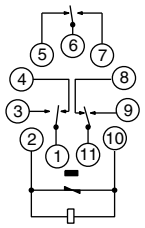
Diode Type (DC Coil: Standard Polarity)

MK2PD-I, -S	MK2PD-2-I, -S	MK3PD-I, -S	MK3PD-2-I, -S	MK3PD-5-I, -S
				

Diode Type (DC Coil: Reverse Polarity)

MK2PD1-I, -S	MK2PD1-2-I, -S	MK3PD1-I, -S	MK3PD1-2-I, -S	MK3PD1-5-I, -S
				

Varistor Type (AC Coil)

MK2PV-I, -S	MK2PV-2-I, -S	MK3PV-I, -S	MK3PV-2-I, -S	MK3PV-5-I, -S
				

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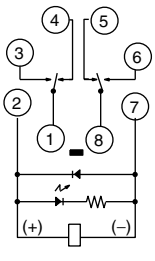
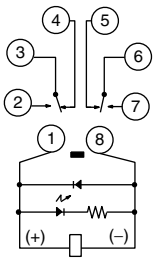
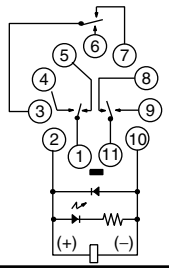
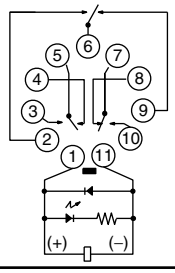
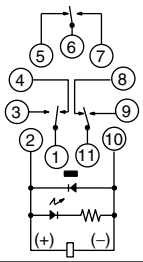
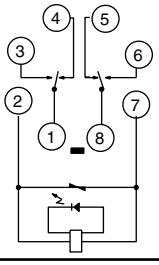
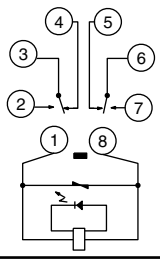
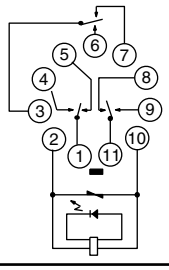
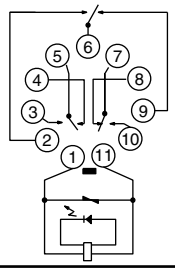
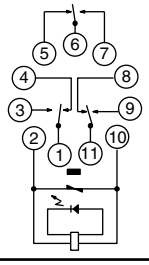
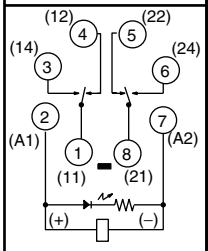
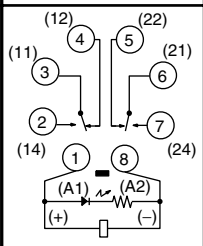
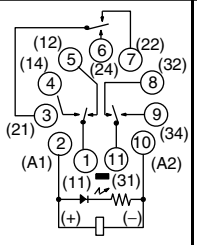
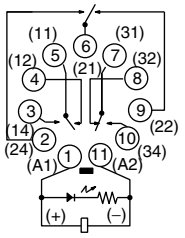
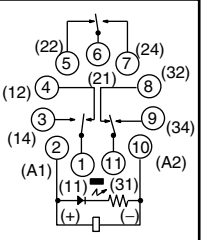
LED Indicator and Diode Type (DC Coil)

MK2PND-I, -S	MK2PND-2-I, -S	MK3PND-I, -S	MK3PND-2-I, -S	MK3PND-5-I, -S
				

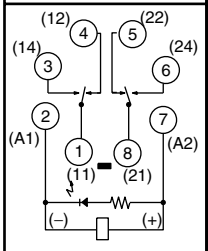
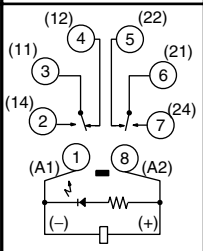
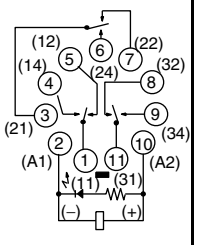
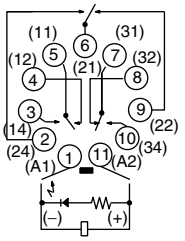
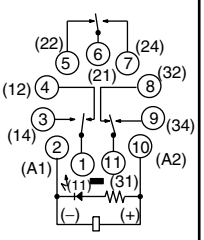
LED Indicator and Varistor Type (AC Coil)

MK2PNV-I, -S	MK2PNV-2-I, -S	MK3PNV-I, -S	MK3PNV-2-I, -S	MK3PNV-5-I, -S
				

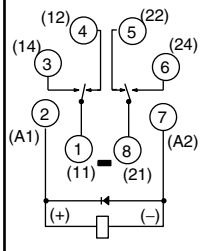
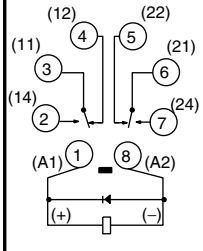
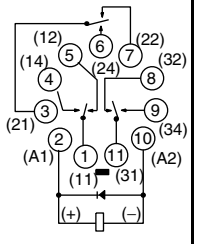
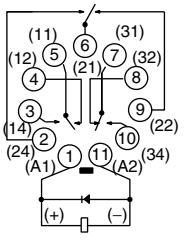
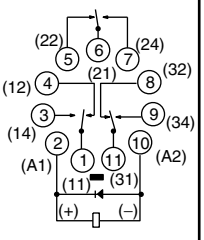
VDE Approved Type LED Indicator Type (DC Coil: Standard Polarity) ( ): Dual Numbering

MK2PN-I-VD, -3-VD	MK2PN-2-I-VD, -3-VD	MK3PN-I-VD, -S-VD	MK3PN-2-I-VD, -S-VD	MK3PN-5-I-VD, -S-VD
				

VDE Approved Type LED Indicator Type (DC Coil: Reverse Polarity)

MK2PN1-I-VD, -S-VD	MK2PN1-2-I-VD, -S-VD	MK3PN1-I-VD, -S-VD	MK3PN1-2-I-VD, -S-VD	MK3PN1-5-I-VD, -S-VD
				

VDE Approved Type Diode Type (DC Coil: Standard Polarity)

MK2PD-I-VD, -S-VD	MK2PD-2-I-VD, -S-VD	MK3PD-I-VD, -S-VD	MK3PD-2-I-VD, -S-VD	MK3PD-5-I-VD, -S-VDS
				

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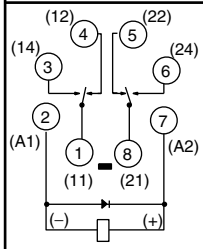
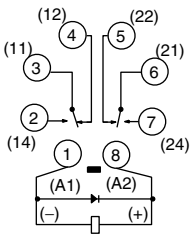
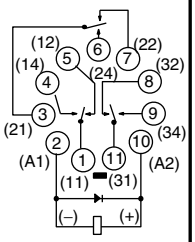
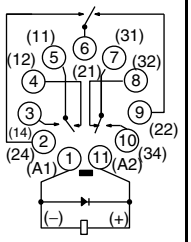
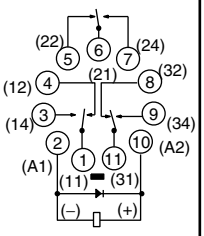
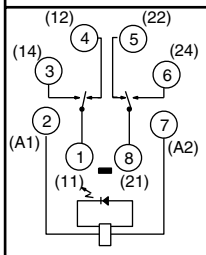
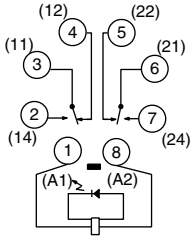
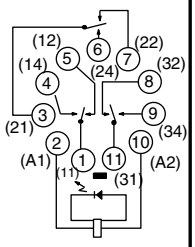
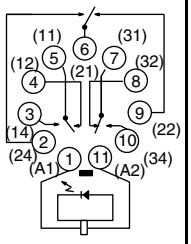
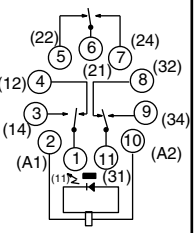
VDE Approved Type
Diode Type
(DC Coil:
Reverse Polarity)

MK2PD1-I-VD, -S-VD	MK2PD1-2-I-VD, -S-VD	MK3PD1-I-VD, -S-VD	MK3PD1-2-I-VD, -S-VD	MK3PD1-5-I-VD, -S-VD
				

VDE Approved Type
LED Indicator Type
(AC Coil)

MK2PN-I-VD, -S-VD	MK2PN-2-I-VD, -S-VD	MK3PN-I-VD, -S-VD	MK3PN-2-I-VD, -S-VD	MK3PN-5-I-VD, -S-VD
				

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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