

PHASE MONITOR RELAYS

PRODUCT SUMMARY



Phase Monitor Relays provide protection against premature equipment failure caused by voltage faults on 3 Phase systems. All Macromatic Phase Monitor Relays are designed to be compatible with most Wye or Delta systems with no connection to Neutral required. Phase Monitor Relays protect against single phasing regardless of any regenerative voltages.

The Reference Guide below provides general information on the different versions of Phase Monitor Relays offered by Macromatic (see Product Selection on the following pages for further details):

| Series | Mounting Style | Phase Loss | Phase Reversal | Phase Unbalance | Under Voltage | Over Voltage | Time Delay on Undervoltage | Approvals * | See Page |
|--------|----------------|------------|----------------|-----------------|---------------|--------------|----------------------------|-------------|----------|
| PCP | Plug-in * | | ✓ | | | | | cRU US | 6 |
| PLP | Plug-in * | ✓ | ✓ | | | | | cRU US | 6 |
| PAP | Plug-in * | ✓ | ✓ | | ✓ (adj.) | | 50ms fixed | cRU US | 8 |
| PMP | Plug-in * | ✓ | ✓ | ✓ (adj.) | ✓ (adj.) | ✓ (fixed) | 0.1 - 20 sec. | cRU US CE | 10 |
| PMP-FA | Plug-in * | ✓ | ✓ | ✓ (fixed) | ✓ (fixed) | ✓ (fixed) | 4 seconds fixed | cRU US CE | 12 |
| PMD | Surface | ✓ | ✓ | ✓ (adj.) | ✓ (adj.) | ✓ (fixed) | 0.1 - 20 sec. | cUL US CE | 14 |

* In addition to the above approvals, all Plug-in Products are also UL Listed when used with the appropriate Macromatic socket.

PROTECTION

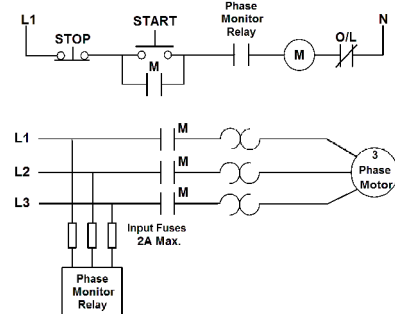
Depending on the unit selected, it will protect three phase equipment against:

- ◆ **phase loss** - total loss of one or more of the three phases. Also known as "single phasing." Typically caused by a blown fuse, broken wire, or worn contact. This condition would result in a motor drawing locked rotor current during start-up. In addition, a three phase motor will continue to run after losing a phase, resulting in possible motor burn-out.
- ◆ **phase reversal** - reversing any two of the three phases will cause a three phase motor to run in the opposite direction. This may cause damage to driven machinery or injury to personnel. The condition usually occurs as a result of mistakes made during routine maintenance or when modifications are made to the circuit.
- ◆ **phase unbalance** - unbalance of a three phase system occurs when single phase loads are connected such that one or two of the lines (phases) carry more or less of the load. This could cause motors to run at temperatures above published ratings.
- ◆ **undervoltage** - when voltage in all three lines of a three phase system drop simultaneously.
- ◆ **overvoltage** - when voltage in all three lines of a three phase system increase simultaneously.

TYPICAL CONNECTIONS

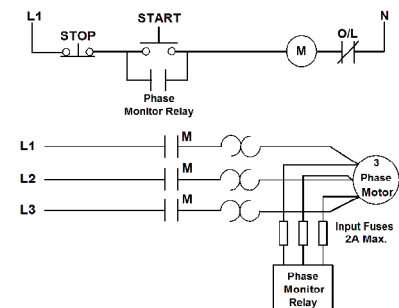
Line Side Monitoring

With the relay connected before the motor starter, the motor can be started in the reverse direction. However, the motor is unprotected against phase failures between the relay and the motor.



Load Side Monitoring

With the relay connected directly to the motor, the total feed lines are monitored. This connection should not be used with reversing motors.




PHASE MONITOR RELAYS

PCP SERIES PHASE REVERSAL

PLP SERIES PHASE LOSS & PHASE REVERSAL

PLUG-IN



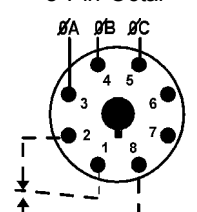
- ◆ PCP Series protects against phase reversal only
- ◆ PLP Series protects against phase loss & phase reversal
- ◆ LED indicates both normal and fault conditions
- ◆ Compact plug-in case utilizing industry-standard 8 pin octal socket
- ◆ 10A SPDT output contacts
- ◆  (with appropriate socket)

The PCP Series Phase Monitor Relays provide protection against phase reversal in a compact plug-in design. One version will work on any 3 phase system from 208V to 480V (a separate 120V-only version is also available). The relay is energized and the LED on when the sequence is correct. Any fault will de-energize the relay and turn off the LED. Re-energization is automatic upon correction of the fault condition.

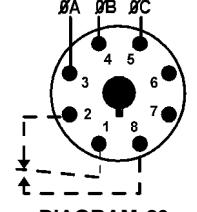
The PLP Series Phase Monitor Relays provide protection against phase loss & phase reversal in a compact plug-in design. The relay is energized and the LED on when all three phases are present and in the correct sequence. Any fault will instantaneously de-energize the relay and turn off the LED. Re-energization is automatic upon correction of the fault condition.

These devices are designed to be compatible with most Wye or Delta systems with no connection to Neutral required.

PCP SERIES

| PROTECTS AGAINST | NOMINAL VOLTAGE▲ (50/60 Hz) | PRODUCT NUMBER | WIRING/SOCKET■ |
|------------------|-----------------------------|----------------|---|
| Phase Reversal | 120V | PCP1 | 8 Pin Octal  DIAGRAM 23 |
| | 208-480V | PCP2 * | |

PLP SERIES

| PROTECTS AGAINST | NOMINAL VOLTAGE▲ (50/60 Hz) | PRODUCT NUMBER | WIRING/SOCKET■ |
|-----------------------------|-----------------------------|----------------|---|
| Phase Reversal & Phase Loss | 120V | PLP120 | 8 Pin Octal 70169-D  DIAGRAM 23 |
| | 208V | PLP208 | |
| | 240V | PLP240 | |
| | 400V | PLP400 * | |
| | 480V | PLP480 * | |

▲ Phase-to-Phase (Line-to-Line).

* Requires a 600V-rated socket when used on system voltages above 300V.

■ See Pages 80 & 81 for **Sockets & Accessories**.



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PHASE MONITOR RELAYS

PCP SERIES PHASE REVERSAL ONLY

PLP SERIES PHASE LOSS & PHASE REVERSAL

APPLICATION DATA & DIMENSIONS

APPLICATION DATA

Phase Loss (PLP Series Only):

Unit trips on loss of any Phase A, B or C

Phase Reversal:

Unit trips if sequence of the three phases is anything other than A-B-C.

Output Contacts:

10A Resistive SPDT @ 240V AC, 1/3HP @ 120/240V AC (N.O.), 1/6HP @ 120/240V AC (N.C.)

Life:

Full Load: 100,000 operations

Response Times:

Operate: 50ms

Release: 50ms

Load (Burden):

3VA

Temperature:

-28° to 65°C (-18° to 149°F)

Transient Protection:

10,000 volts for 20 microseconds

Mounting:

Uses an 8 pin octal socket. Requires a 600V-rated socket when used on system voltages greater than 300V (Macromatic Product Number 70169-D--see Page 80).

Indicator LED:

Red LED on when all conditions are normal, and off when a fault condition has occurred.

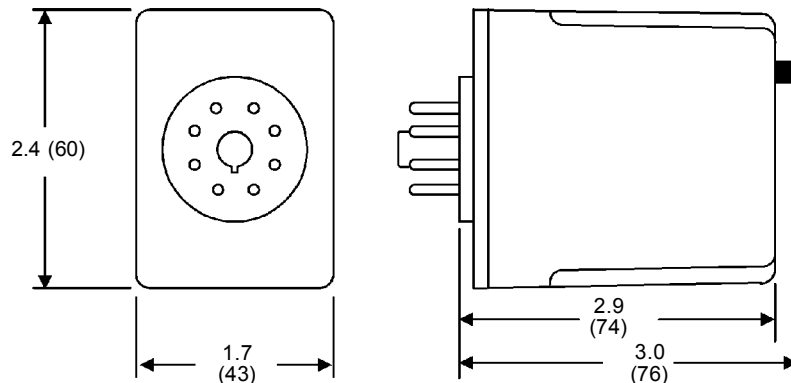
Reset:

Automatic upon correction of fault

Approvals:



DIMENSIONS



All Dimensions in
Inches (Millimeters)

SOCKETS & ACCESSORIES

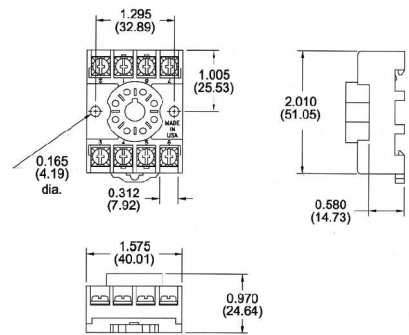
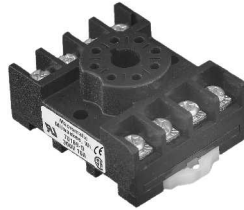
8 Pin Octal Socket-- Surface or DIN Rail-Mounted

10A @ 600V *
1 or 2 #12-22 AWG Wire
Recommended Tightening Torque
of 6-7 in-lbs. (12 in-lbs maximum)
Pressure Wire Clamp Terminations



File #E169693 File #LR701114

Product Number 70169-D



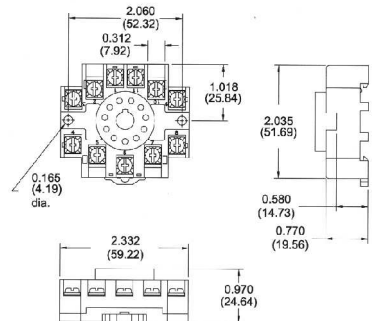
11 Pin Octal Socket-- Surface or DIN Rail-Mounted

10A @ 300V
1 or 2 #12-22 AWG Wire
Recommended Tightening Torque
of 6-7 in-lbs. (12 in-lbs maximum)
Pressure Wire Clamp Terminations



File #E169693 File #LR701114

Product Number 70170-D



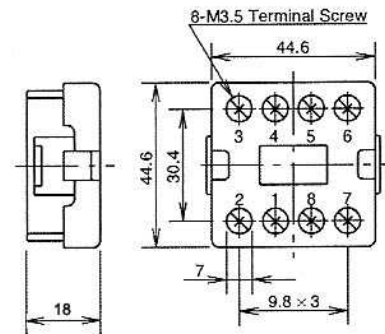
8 Pin Octal Socket-- Back-Mounted

10A @ 300V
Pressure Wire Clamp Terminations



File #E62437

Product Number SR6P-M08G



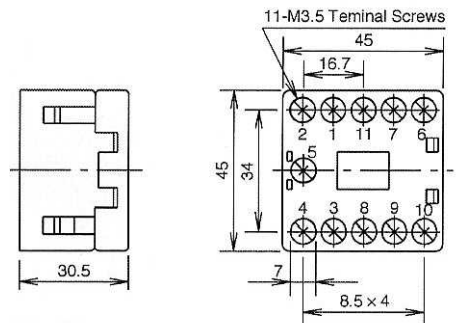
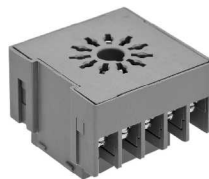
11 Pin Octal Socket-- Back-Mounted

10A @ 300V
Pressure Wire Clamp Terminations



File #E62437

Product Number SR6P-M11G



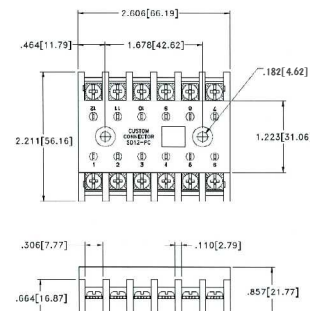
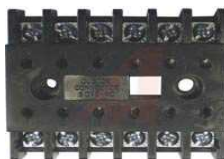
12 Pin Socket-- Surface-Mounted

10A @ 600V
#12-20 AWG Wire
Pressure Wire Clamp Terminations



File #E60008 File #LR29513

Product Number SD12-PC



NOTE: if a 12 Pin Socket is required for DIN-rail mounting, please contact Macromatic.

* Plug-in Three-Phase Monitor Relays require a 600V-rated socket when used on system voltages greater than 300V.

SOCKETS & ACCESSORIES

Hold Down Spring Product Number 70166

Can be used for:

- ◆ Panel-Mounted Sockets
- ◆ Sockets Mounted to 35mm DIN Track *

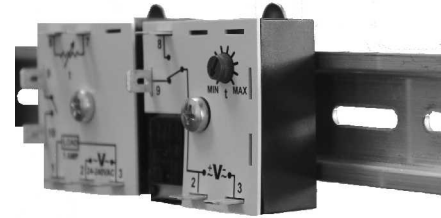
* Requires two machine screws with washers & nuts-- contact Macromatic or www.macromatic.com/70166 for more information.



DIN Rail Adaptor Kit Product Number 70500

Quick & Economical Way to Install Any THx Series 2" x 2" Encapsulated Time Delay Relays on 35mm DIN Track

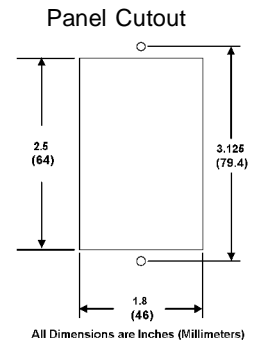
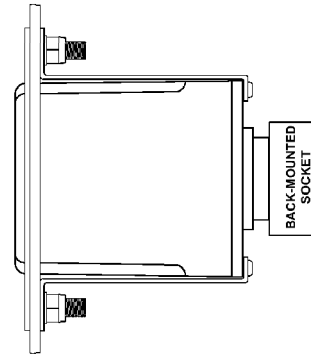
- ◆ Clip Comes with a Threaded Hole to Eliminate Need for a Washer & Nut
- ◆ All Mounting Hardware Included



Panel Mount Assembly For Panel Mounting Standard Plug-in Products Product Number 70400

This assembly provides a simple & economical method to mount plug-in products to the deadfront of an enclosure/panel:

- ◆ Sturdy Aluminum Construction
- ◆ Stainless Steel Studs
- ◆ All Mounting Hardware Included
- ◆ White Textured Painted Finish
- ◆ 2 3/16" W x 3 7/16" H



(Relay Not Included with Assembly--
Shown for Reference Only)

INDEX BY PRODUCT NUMBER

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| 70166 | 81 | ARP024A6 | 32 | ATP024A1R | 36 | CMKP10A68 | 18 | COKP01A68 | 19 | COP10A62 | 19 |
| 70169-D | 80 | ARP024A6R | 32 | ATP024A7R | 36 | CMP01A22 | 18 | COKP05A22 | 19 | COP10A68 | 19 |
| 70170-D | 80 | ARP120A2 | 32 | ATP120A1 | 36 | CMP01A28 | 18 | COKP05A28 | 19 | CUH05Ayyy *** | 16 |
| 70400 | 81 | ARP120A2R | 32 | ATP120A1R | 36 | CMP01A62 | 18 | COKP05A62 | 19 | CUH20Ayyy *** | 16 |
| 70500 | 81 | ARP120A3 | 34 | ATP120A7R | 36 | CMP01A68 | 18 | COKP05A68 | 19 | CUH50Ayyy *** | 16 |
| ARP012A2 | 32 | ARP120A3R | 34 | CAH05Ayyy | 16 | CMP05A22 | 18 | COKP10A22 | 19 | CUP01A22 | 20 |
| ARP012A2R | 32 | ARP120A5 | 34 | CAH20Ayyy | 16 | CMP05A28 | 18 | COKP10A28 | 19 | CUP01A28 | 20 |
| ARP012A3 | 34 | ARP120A5R | 34 | CAH50Ayyy | 16 | CMP05A62 | 18 | COKP10A62 | 19 | CUP01A62 | 20 |
| ARP012A3R | 34 | ARP120A6 | 32 | CMKP01A22 | 18 | CMP05A68 | 18 | COKP10A68 | 19 | CUP01A68 | 20 |
| ARP012A5 | 34 | ARP120A6R | 32 | CMKP01A28 | 18 | CMP10A22 | 18 | COP01A22 | 19 | CUP05A22 | 20 |
| ARP012A5R | 34 | ARP240A2 | 32 | CMKP01A62 | 18 | CMP10A28 | 18 | COP01A28 | 19 | CUP05A28 | 20 |
| ARP012A6 | 32 | ARP240A2R | 32 | CMKP01A68 | 18 | CMP10A62 | 18 | COP01A62 | 19 | CUP05A62 | 20 |
| ARP012A6R | 32 | ARP240A3 | 34 | CMKP05A22 | 18 | CMP10A68 | 18 | COP01A68 | 19 | CUP05A68 | 20 |
| ARP024A2 | 32 | ARP240A3R | 34 | CMKP05A28 | 18 | COH05Ayyy | 16 | COP05A22 | 19 | CUP10A22 | 20 |
| ARP024A2R | 32 | ARP240A5 | 34 | CMKP05A62 | 18 | COH20Ayyy | 16 | COP05A28 | 19 | CUP10A28 | 20 |
| ARP024A3 | 34 | ARP240A5R | 34 | CMKP05A68 | 18 | COH50Ayyy | 16 | COP05A62 | 19 | CUP10A62 | 20 |
| ARP024A3R | 34 | ARP240A6 | 32 | CMKP10A22 | 18 | COKP01A22 | 19 | COP05A68 | 19 | CUP10A68 | 20 |
| ARP024A5 | 34 | ARP240A6R | 32 | CMKP10A28 | 18 | COKP01A28 | 19 | COP10A22 | 19 | | |
| ARP024A5R | 34 | ATP024A1 | 36 | CMKP10A62 | 18 | COKP01A62 | 19 | COP10A28 | 19 | | |

* The "-xx" suffix denotes the time range for time delay relays with adjustable time delay. Contact Macromatic for any product not listed.

*** The "-yyy" suffix denotes the input voltage, trip delay & sensing delay for CxH Series encapsulated current sensing relays.

Continued on
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