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 *		✓					c UL us	6
PLP	Plug-in *	✓	✓					c UL us	6
PAP	Plug-in *	✓	✓		✓ (adj.)		50ms fixed	c UL us	8
PMP	Plug-in *	✓	✓	✓ (adj.)	✓ (adj.)	✓ (fixed)	0.1 - 20 sec.	c UL us CE	10
PMP-FA	Plug-in *	✓	✓	✓ (fixed)	✓ (fixed)	✓ (fixed)	4 seconds fixed	c UL us CE	12
PMD	Surface	✓	✓	✓ (adj.)	✓ (adj.)	✓ (fixed)	0.1 - 20 sec.	c UL 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

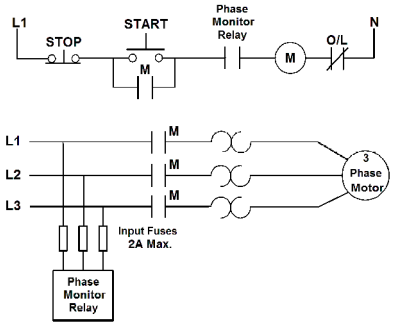
Depending on the unit selected, it will protect three phase equipment against:

- **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

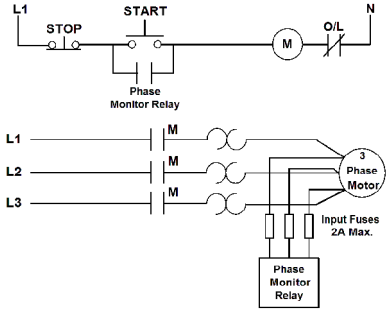
Line Side Monitoring

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

Phase Loss, Phase Reversal, Phase Unbalance, and Under/Over Voltage
PMP-FA Series Plug-in

- Universal voltage range of 208-480V (208 or 240V on 11 pin) provides the flexibility to cover a variety of applications with one unit
- Protects against phase loss, phase reversal, phase unbalance, undervoltage and overvoltage
- Choose between 11 Pin DPDT, 12 Pin DPDT, 8 Pin SPDT & 8 Pin SPDT/SPNO output configurations
- Automatic Reset
- Multi-Color LED indicates normal condition and provides specific fault indication to simplify troubleshooting
- Compact plug-in case utilizing industry-standard 8 or 11 pin octal or 12 pin square sockets
- c UL us LISTED (with appropriate socket)

MACROMATIC

800-238-7474

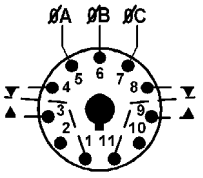
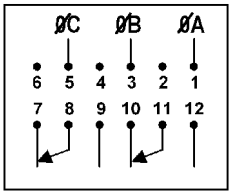
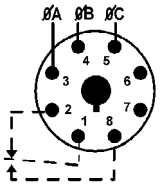
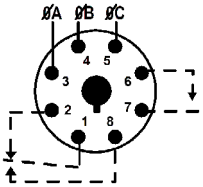
www.macromatic.com

sales@macromatic.com

The PMP-FA Series Phase Monitor Relays utilize a microprocessor-based design to provide protection against phase loss, phase reversal, phase unbalance, undervoltage and overvoltage, and are compatible with most Wye or Delta systems with no connection to Neutral required. They protect against unbalanced voltages or single phasing regardless of any regenerative voltages.

The relay is energized when the phase sequence and all voltages are correct. Any one of five fault conditions will de-energize the relay. Re-energization is automatic upon correction of the fault condition. A multi-color LED indicates normal condition and also provides specific fault indication to simplify troubleshooting.

These products offer a universal voltage design that works on any three-phase system voltage from 208-480V (208 or 240V only on the 11 pin DPDT version). The undervoltage drop-out is fixed at 90% & the overvoltage drop-out is fixed at 110% of operating voltage. The time delay drop-out on undervoltage is fixed at 4 seconds. The percent phase unbalance is fixed at 6%. The time delay on both power up and restart after a fault has been cleared is fixed at 2 seconds.

OUTPUT CONFIGURATION	NOMINAL VOLTAGE▲ 50/60 Hz	PRODUCT NUMBER *	WIRING/SOCKET ■
11 Pin DPDT	208V 240V	PMP208-FA11 PMP240-FA11	11 Pin Octal / **70170-D** 
12 Pin DPDT	208-480V	PMPU-FA12 *	12 Pin / **SD12-PC** 
8 Pin SPDT	208-480V	PMPU-FA8 *	8 Pin / **70169-D** 
8 Pin SPDT/ SPNO	208-480V	PMPU-FA8X *	8 Pin / **70169-D** 

▲ 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**.

PHASE MONITOR RELAYS

Phase Loss, Phase Reversal, Phase Unbalance, and Under/Over Voltage

PMP-FA Series Plug-In

Application Data & Dimensions

Application Data

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

Phase Reversal:
Unit trips if rotation (sequence) of the three phases is anything other than A-B-C.

Undervoltage:
Fixed at 90% of nominal voltage. Unit trips when the average of all three lines is less than the adjusted set point for longer than the fixed 4 second time delay.

Overvoltage:
Fixed at 110% of nominal voltage. Unit trips when the average of all three lines is greater than the fixed set point for a period longer than the time delay drop-out.

Phase Unbalance:
Fixed at 6% unbalance. Unit trips when any one of the three lines deviates from the average of all three lines by more than the adjusted set point for longer than the fixed 2 second time delay.

Output Contacts:
10A @ 240V AC/30V DC,
1/2HP @ 120/240V AC (N.O.), 1/3HP @ 120/240V AC (N.C.)
B300 & R300; AC15 & DC13

Life:
Mechanical: 10,000,000 operations
Full Load: 100,000 operations

Response Times:

Power Up & Restart After Fault:	Fixed at 2 seconds
Drop-out Due to Fault:	
Phase Loss & Reversal	100ms fixed
Phase Unbalance	2 seconds fixed
Undervoltage	Fixed at 4 seconds
Overvoltage	Fixed Time Based on Inverse Time Curve

Hysteresis: 2 - 3%

Load (Burden): Less than 3VA

Temperature: -28° to 65°C (-18° to 149°F)

Mounting:
Use the appropriate socket as shown in the Product Selection Table on Page 12. Requires a 600V-rated socket when used on system voltages greater than 300V. See Pages 80 & 81 for Sockets & Accessores.

Indicator LED:

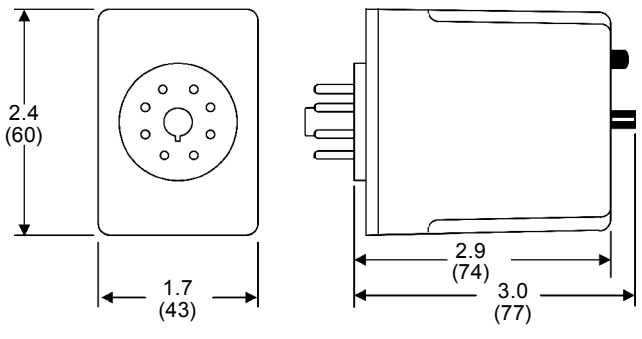
LED Status	Indicator
Green Steady	Normal / Relay ON
Green Flashing	Power Up / Restart Delay
Red Steady	Unbalance
Red Flashing	Undervoltage / Overvoltage
Amber Steady	Reversal
Amber Flashing	Loss
Green / Red Alternating	Undervoltage / Overvoltage Trip Pending
Red / Amber Alternating	Nominal Voltage Set Error

Reset:
Reset is automatic upon correction of fault.

Approvals:
c UL us
File #E109466

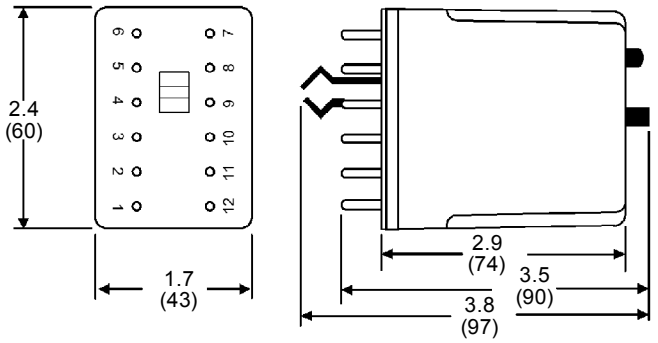
UL LISTED IND. CONT. EQUIP. 5U07
with appropriate socket
File #E109466

Dimensions



8 & 11 Pin Products Only

All Dimensions in Inches (Millimeters)



12 Pin Products Only

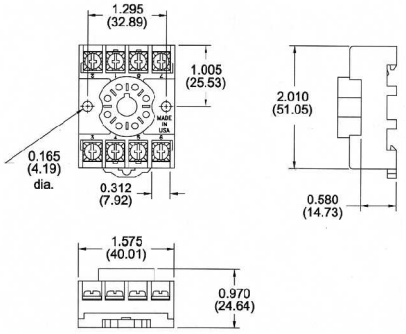
SOCKETS & ACCESSORIES

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

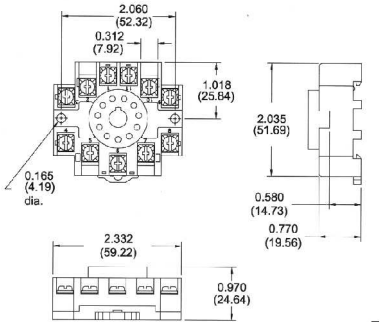


11 Pin Octal Socket--
Surface or DIN Rail-Mounted

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

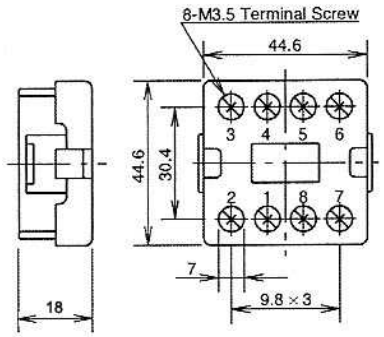


8 Pin Octal Socket--
Back-Mounted

10A @ 300V
Pressure Wire Clamp Terminations

File #E62437

Product Number SR6P-M08G

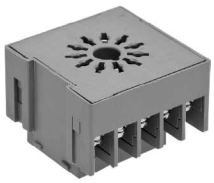


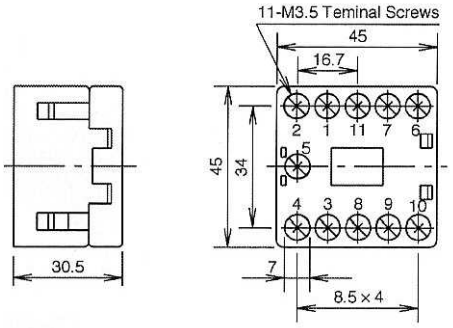
11 Pin Octal Socket--
Back-Mounted

10A @ 300V
Pressure Wire Clamp Terminations

File #E62437

Product Number SR6P-M11G





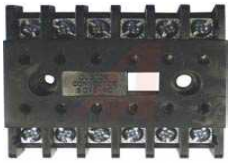
12 Pin Socket--
Surface-Mounted

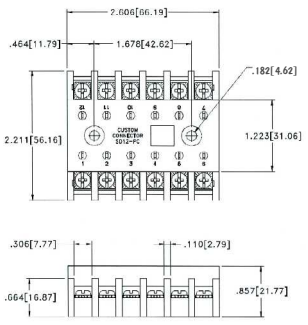
10A @ 600V
#12-20 AWG Wire
Pressure Wire Clamp Terminations

File #E60008 File #LR29513

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

Product Number SD12-PC





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

SOCKETS & ACCESSORIES

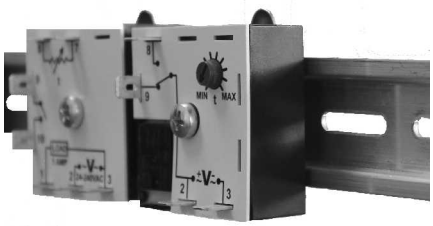
Hold Down Spring
Product Number 70166

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.

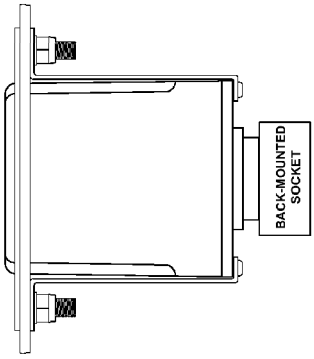
DIN Rail Adaptor Kit
Product Number 70500



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

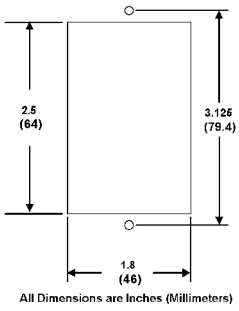
- Clip Comes with a Threaded Hole to Eliminate Need for a Washer & Nut
- All Mounting Hardware Included

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



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

Panel Cutout



All Dimensions are Inches (Millimeters)

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

INDEX BY PRODUCT NUMBER

* 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.