

# THREE-PHASE MONITOR RELAYS

## PRODUCT SUMMARY

Macromatic Three-Phase Monitor Relays provide protection against premature equipment failure caused by voltage faults on three-phase systems. They are designed to be compatible with most Wye or Delta systems with no connection to Neutral required. All Macromatic Series protect against single phasing regardless of any regenerative voltages except the PCP Series, which offers Phase Reversal only.

The Reference Guide below provides general information on the different versions of Three-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 •		✓					cULus CE	6
PLP	Plug-in •	✓	✓					cULus CE	■
PAP	Plug-in •	✓	✓		✓ (adj.)		4 seconds fixed	cULus CE	8
PMP	Plug-in •	✓	✓	✓ (adj.)	✓ (adj.)	✓ (fixed)	0.1 - 30 sec.	cULus CE	10
PMP-FA	Plug-in •	✓	✓	✓ (fixed)	✓ (fixed)	✓ (fixed)	4 seconds fixed	cULus CE	12
PMD	Surface	✓	✓	✓ (adj.)	✓ (adj.)	✓ (fixed)	0.1 - 20 sec.	cULus CE	14

- In addition to the above approvals, all Plug-in Products are also cULus Listed when used with the appropriate Macromatic socket.
- See online catalog at [www.macromatic.com](http://www.macromatic.com).

### PROTECTION

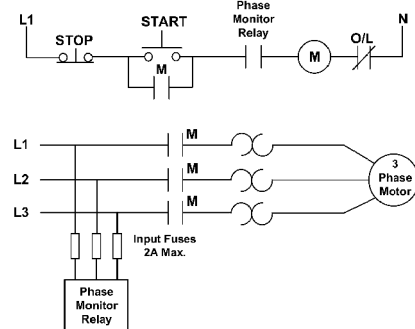
Depending on the unit selected, it will protect three-phase equipment against:

- ◆ **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. This could result in an increase in current & motor heating and a reduction in motor performance.
- ◆ **overvoltage** - when voltage in all three lines of a three-phase system increase simultaneously. Could cause a decrease in load current & poor power factor.

### TYPICAL CONNECTIONS

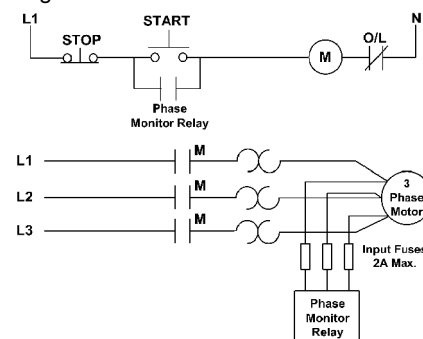
#### Line Side Monitoring

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. However, this connection should not be used with reversing motors.



# THREE-PHASE MONITOR RELAYS

PHASE LOSS, PHASE REVERSAL, PHASE UNBALANCE,  
UNDERVOLTAGE AND OVERVOLTAGE  
PMP SERIES PLUG-IN



- ◆ Protects against phase loss, phase reversal, phase unbalance, undervoltage, overvoltage & rapid cycling
- ◆ Universal voltage range of 190-500V on PMPU—greater range that covers more global applications
- ◆ True RMS voltage measurement ensures accurate sensing across more applications
- ◆ Retains fault indication and continues monitoring all voltages even with a lost phase
- ◆ Ultimate three-phase protection with a variety of user-selectable and adjustable settings
- ◆ Full fault indication on top of unit for easy troubleshooting
- ◆ Manual reset option works with external switch to reset the relay from outside the enclosure
- ◆ Compact plug-in case utilizing industry-standard 8 pin octal socket
- ◆ 10A SPDT output contacts
- ◆ (with appropriate socket)



800-238-7474

www.macromatic.com  
sales@macromatic.com

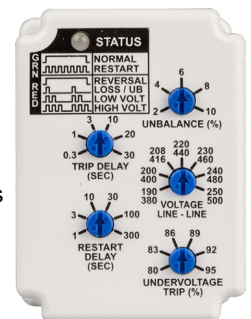
**PMP Series Three-Phase Monitor Relays** continuously monitor all voltages of a three-phase system. They are used to protect motors and equipment from expensive damage due to phase loss, phase reversal, phase unbalance, undervoltage and overvoltage faults as well as rapid cycling. These products detect single phasing and unbalanced voltages regardless of regenerative voltages.

The PMP Series incorporate a microprocessor-based design capable of advanced signal processing including *True RMS voltage measurement*. Innovative analog-to-digital sensing circuitry allows for true full-wave monitoring of all three phases, delivering the highest level of protection possible.

True RMS voltage measurement ensures accurate sensing in most generator and other applications with non-sinusoidal wave forms, eliminating nuisance tripping. Full wave monitoring provides a more accurate method to measure the voltages, regardless of load type or wave shape, resulting in improved protection across more applications.

Unlike similar three-phase monitor relays, the PMP Series will *continue to function even with a lost phase*. They are the only line-powered units in their class to retain fault indication and continuous monitoring of all voltages during a phase loss, increasing the ease of troubleshooting and the level of protection.

The *PMPU* is a *true universal voltage product* that works on any three-phase line-line voltage of 190-500V. The Voltage Line-Line knob on the PMPU has two ranges: a 190-250V low voltage scale and a 380-500V high voltage scale. The unit auto senses the three-phase line-line voltage when applied and automatically selects the appropriate range. The PMP120 and PMP575 have a single adjustable range (see table below).



## Operation:

When the proper three-phase line voltage is applied to the unit and the phase sequence (rotation) is correct, the relay is energized after the Restart Delay is completed. Any one of five fault conditions will de-energize the relay after a delay. As standard, re-energization is automatic upon correction of the fault condition. Manual reset is available if an external momentary N.C. switch is connected to pins 6 and 7. A bi-color status LED indicates normal condition and also provides specific fault indication to simplify troubleshooting.

## PMP Series

PROTECTS AGAINST	LINE-LINE VOLTAGE▲ 50/60 Hz	CATALOG NUMBER	WIRING/SOCKET
Phase Loss, Phase Reversal, Phase Unbalance, Undervoltage & Overvoltage	102-138V	PMP120	8 Pin Octal 70169-D  DIAGRAM 104
	190-500V	PMPU •	
	460-600V	PMP575 •	

▲ Phase-to-Phase (Line-to-Line).

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

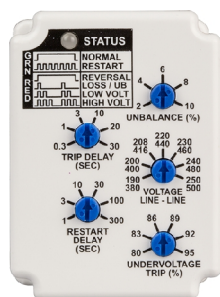
# THREE-PHASE MONITOR RELAYS

## PMP SERIES PLUG-IN APPLICATION DATA & DIMENSIONS

### APPLICATION DATA

#### Three-Phase Line-Line Voltage:

Catalog No.	Range (50/60Hz $\pm 5\%$ )	MIN VOLTAGE	MAX VOLTAGE
PMPU	190-500V AC (see below)	156V AC	550V AC
PMP120	102-138V AC	77V AC	152V AC
PMP575	460-600V AC	345V AC	660V AC



The Voltage Line-Line knob on the PMPU has two ranges (left): a 190-250V low voltage scale and a 380-500V high voltage scale. The unit auto senses the three-phase line-line voltage when applied and automatically selects the appropriate range.

The PMP120 has a single adjustable range of 102-138V and the PMP575 has a single adjustable range of 460-600V.

**Power Consumption:** Less than 40VA.

#### Phase Loss:

Unit trips on loss of any Phase A, B or C, regardless of any regenerative voltages.

#### Phase Reversal (Out-of-Sequence):

Unit trips if sequence (rotation) of the three phases is anything other than A-B-C. It will not work on C-B-A.

#### Undervoltage:

Adjustable from 80-95% of the line voltage setting. Unit trips when the average of all three lines is less than the adjusted set point for a period longer than the adjustable trip delay. It will reset at +3% of the Undervoltage trip setting.

#### Overvoltage:

Fixed at 110% of the line voltage setting. Unit trips when the average of all three lines is greater than the fixed set point for a period longer than the adjustable trip delay. It will reset at 107% of the line voltage setting.

#### Phase Unbalance:

Adjustable from 2 - 10% 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 a period longer than the adjustable trip delay.

#### Response Times:

Restart:	1 - 300 seconds adjustable
Drop-out Due to Fault:	
Phase Loss and Reversal:	100ms fixed
Undervoltage and Overvoltage:	0.3 - 30 seconds adjustable
Unbalance:	
Normal:	0.3 - 30 seconds adjustable
Severe (Twice Knob Setting):	0.3-2 seconds

**Output Contacts:** 10 A @ 277V AC / 7A @ 30V DC;  
1HP @ 250V AC, 1/2HP @ 125V AC,  
C300 Pilot Duty

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

**Temperature:** Operating: -28° to 65°C (-18° to 149°F)  
Storage: -40° to 85°C (-40° to 185°F)

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

#### Status LED:

	LED STATUS	STATUS
GREEN	[Pulse]	NORMAL / RELAY ON
	[Sawtooth]	RESTART DELAY
RED	[Pulse]	REVERSAL
	[Pulse]	LOSS / UNBALANCE
	[Pulse]	UNDERVOLTAGE
	[Pulse]	OVERVOLTAGE

#### Reset:

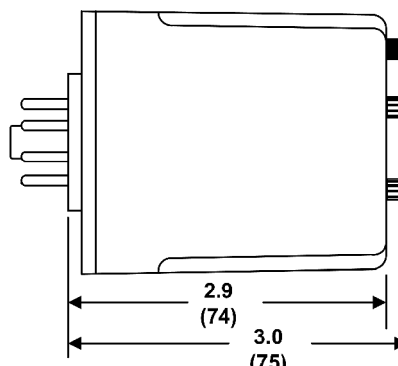
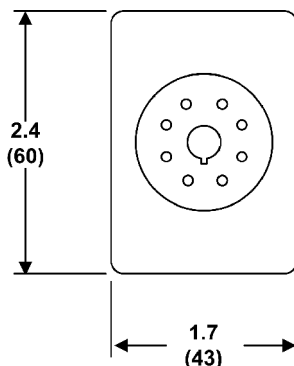
As standard, the PMP Series relays are in the Automatic Reset mode. However, they can be set in the Manual Reset mode by connecting an external N.C. switch across terminals 6 and 7. Upon application of line voltage, the PMP Series will go into Manual Reset mode if it recognizes a closure across terminals 6 and 7. After a fault clears, the relay will not reset until the N.C. switch is opened.

#### Approvals:



Low Voltage & EMC Directives  
EN60947-1, EN60947-5-1

### DIMENSIONS



All Dimensions in  
Inches (Millimeters)

# SOCKETS & ACCESSORIES

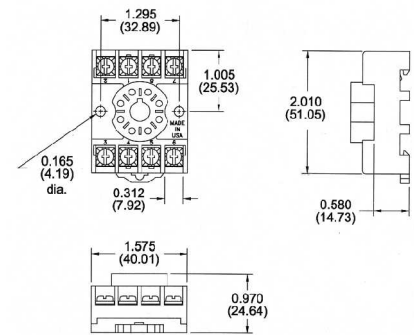
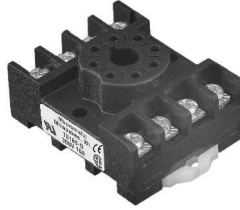
## 8 Pin Octal Socket-- Surface or DIN Rail-Mounted

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

### Catalog Number 70169-D



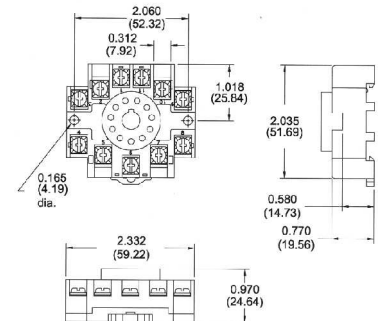
## 11 Pin Octal Socket-- Surface or DIN Rail-Mounted

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

### Catalog Number 70170-D



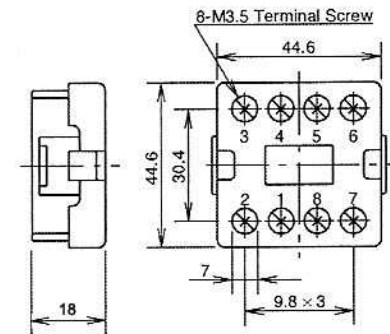
## 8 Pin Octal Socket-- Back-Mounted

10A @ 300V  
Pressure Wire Clamp Terminations



File #E62437

### Catalog Number SR6P-M08G



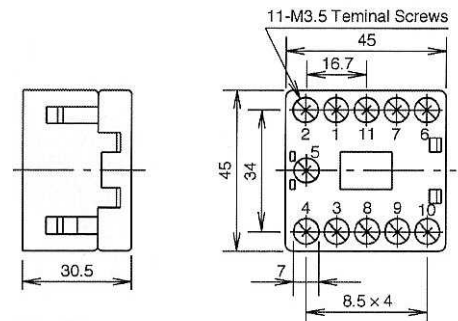
## 11 Pin Octal Socket-- Back-Mounted

10A @ 300V  
Pressure Wire Clamp Terminations



File #E62437

### Catalog Number SR6P-M11G



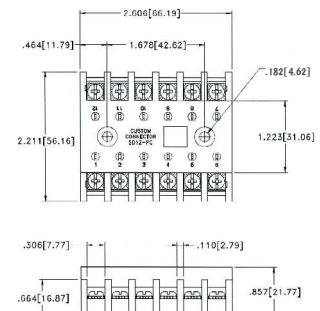
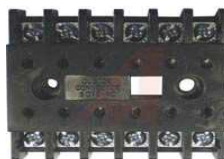
## 12 Pin Socket-- Surface-Mounted

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



File #E60008 File #LR29513

### Catalog 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.



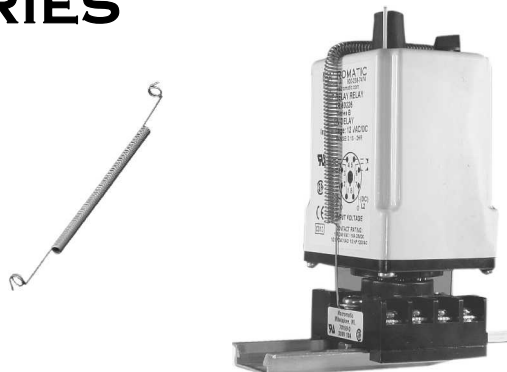
# SOCKETS & ACCESSORIES

## Hold Down Spring Catalog Number 70166

Can be used for:

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

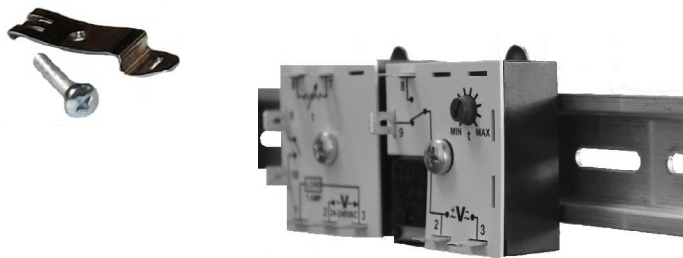
\* Requires two machine screws with washers & nuts--  
contact Macromatic or [www.macromatic.com/70166](http://www.macromatic.com/70166)  
for more information.



## DIN Rail Adaptor Kit Catalog Number 70500

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

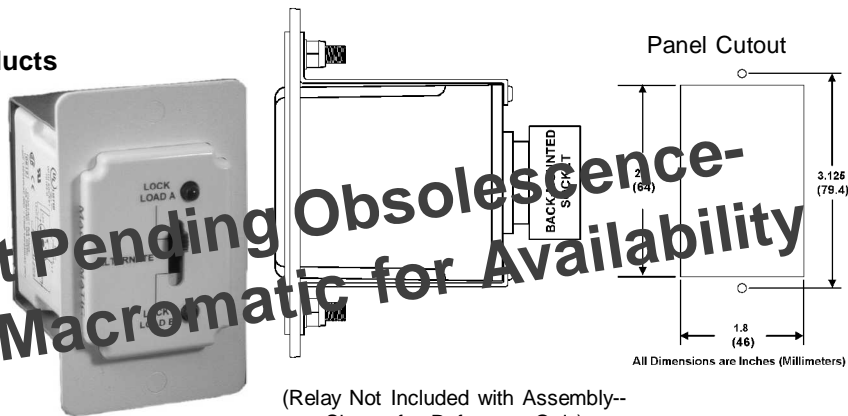
- ◆ Clip Comes with a Threaded Hole to Eliminate Need  
for a Washer & Nut
- ◆ All Mounting Hardware Included



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

This assembly provides a simple & economi-  
cal 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)

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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	Continued on Page 82	
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.

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PAP240	8	TD-80222-xx	67	THR-11562-xx	45	THR-16166-xx	43	TR-51561-xx	60	TR-61522	63
PAP400	8	TD-80226-xx	67	THR-11562-xxJ	46	THR-16166-xxJ	44	TR-51562-xx	60	TR-61526	63
PAP480	8	TD-80228-xx	67	THR-11562-xxJT	48	THR-16168-xx	43	TR-51566-xx	60	TR-61528	63
PCP1	6	TD-80521-xx	67	THR-11562-xxT	47	THR-16168-xxJ	44	TR-51568-xx	60	TR-61621	63
PCP2	6	TD-80522-xx	67	THR-11566-xx	45	THR-16561-xx	45	TR-51621-xx	57	TR-61622	63
PLP120	6	TD-80526-xx	67	THR-11566-xxJ	46	THR-16561-xxJ	46	TR-51622-xx	57	TR-61626	63
PLP208	6	TD-80528-xx	67	THR-11566-xxJT	48	THR-16561-xxJT	48	TR-51626-xx	57	TR-61628	63
PLP240	6	TD-81521-xx	67	THR-11566-xxT	47	THR-16561-xxT	47	TR-51628-xx	57	TR-61721	63
PLP400	6	TD-81522-xx	67	THR-11568-xx	45	THR-16562-xx	45	TR-51661-xx	60	TR-61722	63
PLP480	6	TD-81526-xx	67	THR-11568-xxJ	46	THR-16562-xxJ	46	TR-51662-xx	60	TR-61726	63
PMD120	14	TD-81528-xx	67	THR-11568-xxJT	48	THR-16562-xxJT	48	TR-51666-xx	60	TR-61728	63
PMD600	14	TD-81621-xx	67	THR-11568-xxT	47	THR-16562-xxT	47	TR-51668-xx	60	TR-61821	63
PMDU	14	TD-81622-xx	67	THR-11661-xx	45	THR-16566-xx	45	TR-51721-xx	57	TR-61822	63
PMP120	10	TD-81626-xx	67	THR-11661-xxJ	46	THR-16566-xxJ	46	TR-51722-xx	57	TR-61826	63
PMP208-FA11	12	TD-81628-xx	67	THR-11661-xxJT	48	THR-16566-xxJT	48	TR-51726-xx	57	TR-61828	63
PMP240-FA11	12	TD-83121-xx	67	THR-11661-xxT	47	THR-16566-xxT	47	TR-51728-xx	57	TR-61921	63
PMPU	10	TD-83122-xx	67	THR-11662-xx	45	THR-16568-xx	45	TR-51761-xx	60	TR-61922	63
PMPU-FA12	12	TD-83126-xx	67	THR-11662-xxJ	46	THR-16568-xxJ	46	TR-51762-xx	60	TR-61926	63
PMPU-FA8	12	TD-83128-xx	67	THR-11662-xxJT	48	THR-16568-xxJT	48	TR-51766-xx	60	TR-61928	63
PMPU-FA8X	12	TD-85121-xx	67	THR-11662-xxT	47	THR-16568-xxT	47	TR-51768-xx	60	TR-63121	64
SD12-PC	80	TD-85122-xx	67	THR-11666-xx	45	THS-1024A-xx	50	TR-51821-xx	57	TR-63122	64
SFP120A025	38	TD-85126-xx	67	THR-11666-xxJ	46	THS-1024D-xx	50	TR-51822-xx	57	TR-63126	64
SFP120A100	38	TD-85128-xx	67	THR-11666-xxJT	48	THS-1054A-xx	50	TR-51826-xx	57	TR-63128	64
SFP120A250	38	TD-88121	66	THR-11666-xxT	47	THS-1054D-xx	50	TR-51828-xx	57	TR-65121	64
SFP120B025	38	TD-88122	66	THR-11668-xx	45	THS-1094A-xx	50	TR-51861-xx	60	TR-65122	64
SFP120B100	38	TD-88126	66	THR-11668-xxJ	46	THS-1094D-xx	50	TR-51862-xx	60	TR-65126	64
SFP120B250	38	TD-88128	66	THR-11668-xxJT	48	THS-1134A-xx	51	TR-51866-xx	60	TR-65128	64
SFP120C025	38	THL-1024U-xx	54	THR-11668-xxT	47	THS-1134A-xxT	52	TR-51868-xx	60	TR-66121	64
SFP120C100	38	THR-10261-xx	43	THR-12261-xx	45	THS-1134D-xx	51	TR-51921-xx	57	TR-66122	64
SFP120C250	38	THR-10261-xxJ	44	THR-12261-xxJ	46	THS-1134D-xxT	52	TR-51922-xx	57	TR-66126	64
SFP240A025	38	THR-10262-xx	43	THR-12261-xxJT	48	THS-1154A-xx	51	TR-51926-xx	57	TR-66128	64
SFP240A100	38	THR-10262-xxJ	44	THR-12261-xxT	47	THS-1154A-xxT	52	TR-51928-xx	57	TR-66521	64
SFP240A250	38	THR-10266-xx	43	THR-12262-xx	45	THS-1154D-xx	51	TR-51961-xx	60	TR-66522	64
SFP240B025	38	THR-10266-xxJ	44	THR-12262-xxJ	46	THS-1154D-xxT	52	TR-51962-xx	60	TR-66526	64
SFP240B100	38	THR-10268-xx	43	THR-12262-xxJT	48	THS-1164A-xx	51	TR-51966-xx	60	TR-66528	64
SFP240B250	38	THR-10268-xxJ	44	THR-12262-xxT	47	THS-1164A-xxT	52	TR-51968-xx	60	VAKP012D	24
SFP240C025	38	THR-10561-xx	43	THR-12266-xx	45	THS-1164D-xx	51	TR-53121-xx	58	VAKP024A	24
SFP240C100	38	THR-10561-xxJ	44	THR-12266-xxJ	46	THS-1164D-xxT	52	TR-53122-xx	58	VAKP024D	24
SFP240C250	38	THR-10562-xx	43	THR-12266-xxJT	48	THS-1224A-xx	51	TR-53126-xx	58	VAKP048D	24
SR6P-M08G	80	THR-10562-xxJ	44	THR-12266-xxT	47	THS-1224A-xxT	52	TR-53128-xx	58	VAKP110D	24
SR6P-M11G	80	THR-10566-xx	43	THR-12268-xx	45	THS-1224D-xx	51	TR-54121-xx	58	VAKP120A	24
SS-6262-xx	76	THR-10566-xxJ	44	THR-12268-xxJ	46	THS-1224D-xxT	52	TR-54122-xx	58	VAKPU	26
SS-6266-xx	76	THR-10568-xx	43	THR-12268-xxJT	48	THS-1314A-xx	50	TR-54126-xx	58	VAP012D	24
SS-6268-xx	76	THR-10568-xxJ	44	THR-12268-xxT	47	THS-1314D-xx	50	TR-54128-xx	58	VAP024A	24
SS-8062-xx	76	THR-10861-xx	43	THR-13161-xx	43	THS-1414A-xx	51	TR-55121-xx	58	VAP024D	24
SS-8066-xx	76	THR-10861-xxJ	44	THR-13161-xxJ	44	THS-1414A-xxT	52	TR-55122-xx	58	VAP048D	24
SS-8068-xx	76	THR-10862-xx	43	THR-13162-xx	43	THS-1414D-xx	51	TR-55126-xx	58	VAP110D	24
SS-8562-xx	76	THR-10862-xxJ	44	THR-13162-xxJ	44	THS-1414D-xxT	52	TR-55128-xx	58	VAP120A	24
SS-8566-xx	76	THR-10866-xx	43	THR-13166-xx	43	THS-1514A-xx	50	TR-56121-xx	58	VMKP012D	23
SS-8568-xx	76	THR-10866-xxJ	44	THR-13166-xxJ	44	THS-1514D-xx	50	TR-56122-xx	58	VMKP024A	23
SS-8762-xx	76	THR-10868-xx	43	THR-13168-xx	43	THS-1614A-xx	50	TR-56126-xx	58	VMKP024D	23
SS-8766-xx	76	THR-10868-xxJ	44	THR-13168-xxJ	44	THS-1614D-xx	50	TR-56128-xx	58	VMKP048D	23
SS-8768-xx	76	THR-10961-xx	43	THR-14161-xx	45	THS-1654A-xx	51	TR-56521-xx	58	VMKP110D	23
TAA1U	74	THR-10961-xxJ	44	THR-14161-xxJ	46	THS-1654A-xxT	52	TR-56522-xx	58	VMKP120A	23
TAA2U	74	THR-10962-xx	43	THR-14161-xxJT	48	THS-1654D-xx	51	TR-56526-xx	58	VMP012D	23
TD-70221	70	THR-10962-xxJ	44	THR-14161-xxT	47	THS-1654D-xxT	52	TR-56528-xx	58	VMP024A	23
TD-70222	70	THR-10966-xx	43	THR-14162-xx	45	TR-50221-xx	56	TR-60221	62	VMP024D	23
TD-70226	70	THR-10966-xxJ	44	THR-14162-xxJ	46	TR-50222-xx	56	TR-60222	62	VMP048D	23
TD-70228	70	THR-10968-xx	43	THR-14162-xxJT	48	TR-50226-xx	56	TR-60226	62	VMP110D	23
TD-70521	70	THR-10968-xxJ	44	THR-14162-xxT	47	TR-50228-xx	56	TR-60228	62	VMP120A	23
TD-70522	70	THR-11361-xx	45	THR-14166-xx	45	TR-50521-xx	56	TR-60521	62	VWKP012D	28
TD-70526	70	THR-11361-xxJ	46	THR-14166-xxJ	46	TR-50522-xx	56	TR-60522	62	VWKP024A	28
TD-70528	70	THR-11361-xxJT	48	THR-14166-xxJT	48	TR-50526-xx	56	TR-60526	62	VWKP024D	28
TD-70821	70	THR-11361-xxT	47	THR-14166-xxT	47	TR-50528-xx	56	TR-60528	62	VWKP048D	28
TD-70822	70	THR-11362-xx	45	THR-14168-xx	45	TR-50821-xx	56	TR-60621	62	VWKP110D	28
TD-70826	70	THR-11362-xxJ	46	THR-14168-xxJ	46	TR-50822-xx	56	TR-60622	62	VWKP120A	28
TD-70828	70	THR-11362-xxJT	48	THR-14168-xxJT	48	TR-50826-xx	56	TR-60628	62	VWKP120A	28
TD-71521	70	THR-11362-xxT	47	THR-14168-xxT	47	TR-50828-xx	56	TR-60821	62	VWKP120A	28
TD-71522	70	THR-11366-xx	45	THR-15161-xx	43	TR-51321-xx	57	TR-60822	62	VWKP120A	28
TD-71526	70	THR-11366-xxJ	46	THR-15161-xxJ	44	TR-51322-xx	57	TR-60826	62	VWKP120A	28
TD-71528	70	THR-11366-xxJT	48	THR-15162-xx	43	TR-51326-xx	57	TR-60828	62	VWKP120A	28
TD-71621	70	THR-11366-xxT	47	THR-15162-xxJ	44	TR-51328-xx	57	TR-60921	62	VWKP120A	28
TD-71622	70	THR-11368-xx	45	THR-15166-xx	43	TR-51361-xx	60	TR-60922	62	VWKP120A	28
TD-71626	70	THR-11368-xxJ	46	THR-15166-xxJ	44	TR-51362-xx	60	TR-60926	62	VWKP120A	28
TD-71628	70	THR-11368-xxJT	48	THR-15168-xx	43	TR-51366-xx	60	TR-60928	62	VWKP120A	28
TD-78121	69	THR-11368-xxT	47	THR-15168-xxJ	44	TR-51368-xx	60	TR-61321	63	VWKP120A	28

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