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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

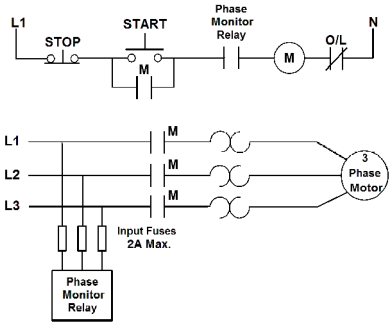
Depending on the unit selected, it will protect three phase equipment against:

- **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

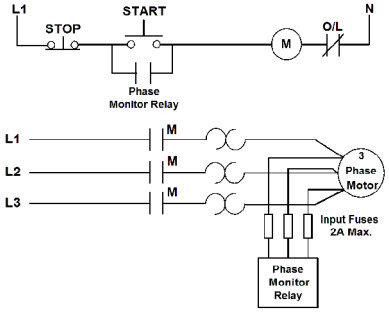
Line Side Monitoring

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

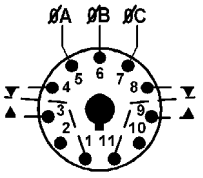
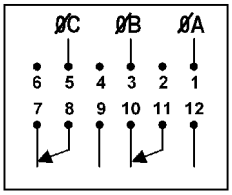
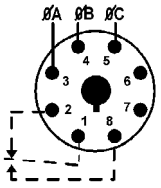
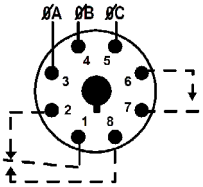
www.macromatic.com

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:

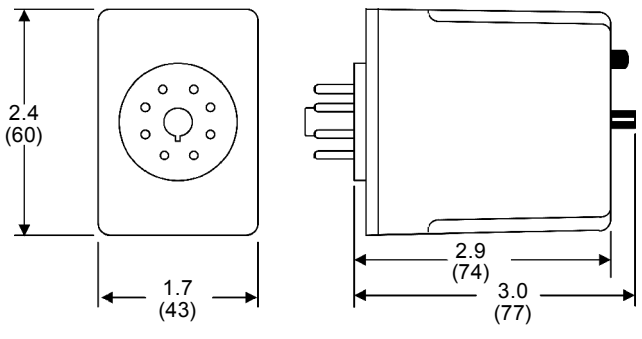
LED Status	Indicator
Green Steady	Normal / Relay ON
Green Flashing	Power Up / Restart Delay
Red Steady	Unbalance
Red Flashing	Undervoltage / Overvoltage
Amber Steady	Reversal
Amber Flashing	Loss
Green / Red Alternating	Undervoltage / Overvoltage Trip Pending
Red / Amber Alternating	Nominal Voltage Set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

Reset:
Reset is automatic upon correction of fault.

Approvals:
c UL us
File #E109466

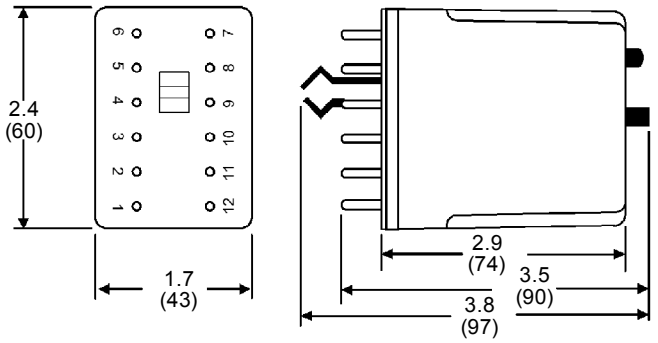
UL LISTED IND. CONT. EQUIP. 5U07
with appropriate socket
File #E109466

Dimensions



8 & 11 Pin Products Only

All Dimensions in Inches (Millimeters)



12 Pin Products Only

SOCKETS & ACCESSORIES

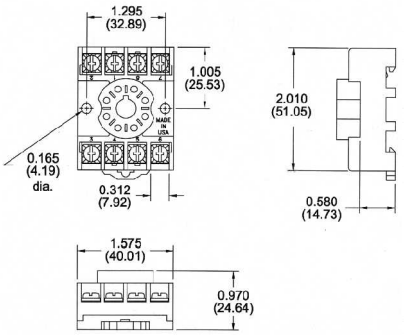
8 Pin Octal Socket--
Surface or DIN Rail-Mounted

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





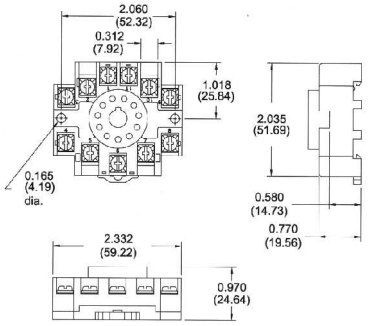
11 Pin Octal Socket--
Surface or DIN Rail-Mounted

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





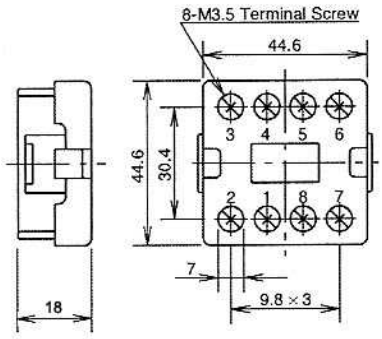
8 Pin Octal Socket--
Back-Mounted

10A @ 300V
Pressure Wire Clamp Terminations

File #E62437

Product Number SR6P-M08G





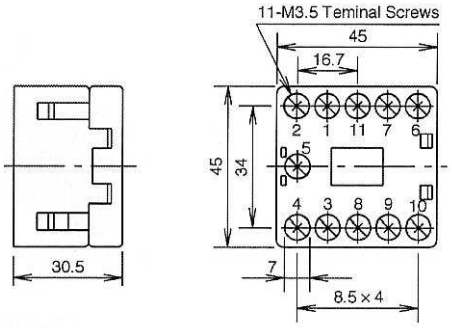
11 Pin Octal Socket--
Back-Mounted

10A @ 300V
Pressure Wire Clamp Terminations

File #E62437

Product Number SR6P-M11G





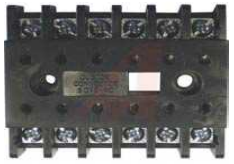
12 Pin Socket--
Surface-Mounted

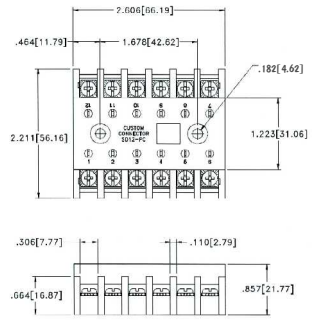
10A @ 600V
#12-20 AWG Wire
Pressure Wire Clamp Terminations

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





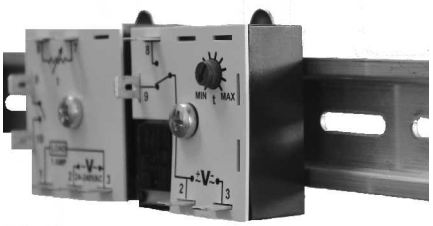
Can be used for:

- 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



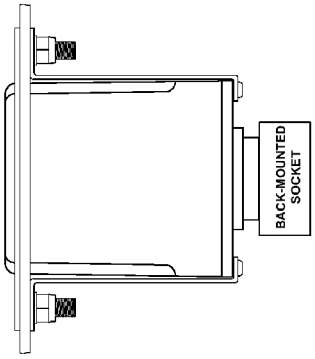


Quick & Economical Way to Install Any THx Series 2" x 2" Encapsulated Time Delay Relays on 35mm DIN Track

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

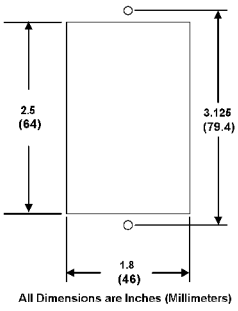
Panel Mount Assembly
For Panel Mounting Standard Plug-in Products
Product Number 70400





(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

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ARP012A3R	34	ARP120A6	32	CMKP01A22	18	CMP05A68	18	COKP10A68	19	CUP01A68	20
ARP012A5	34	ARP120A6R	32	CMKP01A28	18	CMP10A22	18	COP01A22	19	CUP05A22	20
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* 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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PMPU	10	TD-83122-xx	67	THR-11662-xx	45	THR-16568-xx	45	TR-51761-xx	60	TR-61922	63
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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
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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
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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	VWKPU	30
TD-71521	70	THR-11362-xxT	47	THR-14168-xxT	47	TR-50828-xx	56	TR-60821	62	VWP012D	28
TD-71522	70	THR-11366-xx	45	THR-15161-xx	43	TR-51321-xx	57	TR-60822	62	VWP024A	28
TD-71526	70	THR-11366-xxJ	46	THR-15161-xxJ	44	TR-51322-xx	57	TR-60826	62	VWP024D	28
TD-71528	70	THR-11366-xxJT	48	THR-15162-xx	43	TR-51326-xx	57	TR-60828	62	VWP048D	28
TD-71621	70	THR-11366-xxT	47	THR-15162-xxJ	44	TR-51328-xx	57	TR-60921	62	VWP110D	28
TD-71622	70	THR-11368-xx	45	THR-15166-xx	43	TR-51361-xx	60	TR-60922	62	VWP120A	28
TD-71626	70	THR-11368-xxJ	46	THR-15166-xxJ	44	TR-51362-xx	60	TR-60926	62		
TD-71628	70	THR-11368-xxJT	48	THR-15168-xx	43	TR-51366-xx	60	TR-60928	62		
TD-78121	69	THR-11368-xxT	47	THR-15168-xxJ	44	TR-51368-xx	60	TR-61321	63		

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

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