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ALTERNATING RELAYS



CATALOG OF PRODUCTS

ALTERNATING RELAYS

TYPICAL INSTALLATIONS

Alternating Relays are used in special applications where the optimization of load usage is required by equalizing the run time of multiple loads. Identical loads are used for the same job—a standby unit is available in case the first load fails. However, an idle load might deteriorate due to lack of use and provide no safety margin. Alternating relays prevent this by assuring that multiple loads get equal run time. In addition, there are situations where a need arises to have multiple loads on at the same time for additional capacity if one load cannot keep up with demand.

This alternating action is normally initiated by a control switch such as a float switch or pressure switch. Each time the initiating switch is opened, turning off a load, the alternating relay will change state, thus alternating the multiple loads.

Typical applications include pumps with float switches as the initiating contact or compressors with pressure switches or thermostats as the initiating contact.

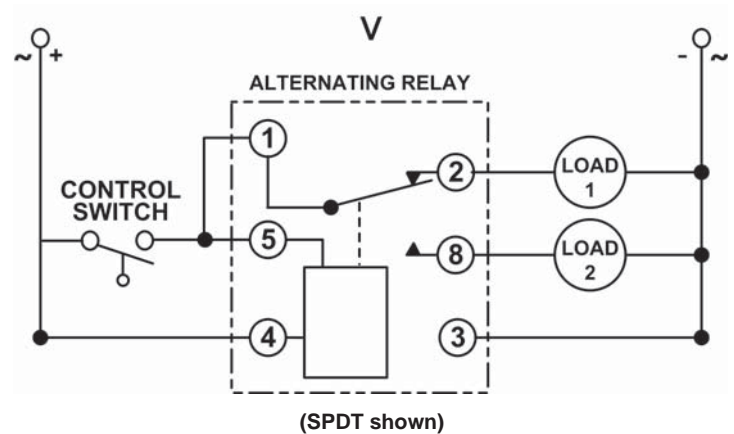
Macromatic offers two types of Alternating Relays:

- **Duplex:** For controlling two loads, both plug-in & inner-door mounting, in SPDT, DPDT and DPDT Cross-Wired output configurations
- **Triplex:** For controlling three loads, plug-in mounting

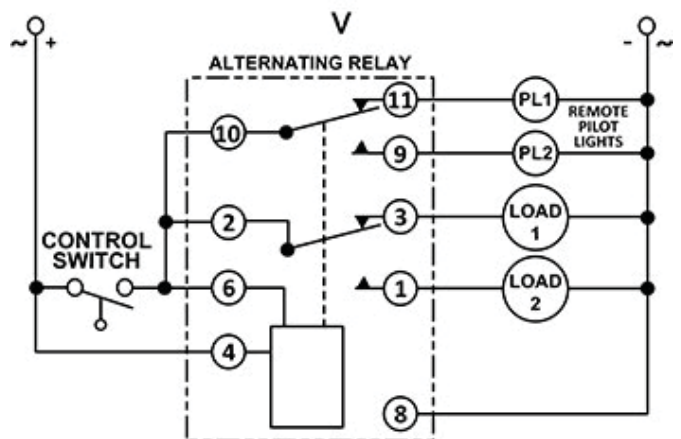
TYPICAL INSTALLATIONS

Duplex SPDT & DPDT

In the off state, the Control Switch is open, the Alternating Relay is in the LOAD 1 position, and both LOAD 1 & LOAD 2 are off. The red LED marked "LOAD 1" is ON. When the Control Switch closes, it energizes LOAD 1. As long as the Control Switch remains closed, LOAD 1 remains energized. When the Control Switch opens, LOAD 1 is turned off and the Alternating Relay toggles to the LOAD 2 position. The red LED marked "LOAD 2" is ON. When the Control Switch closes again, it energizes LOAD 2. When the Control Switch opens, LOAD 2 is turned off, the Alternating Relay toggles back to the LOAD 1 position, the red LED marked "LOAD 1" is ON, and the process can be repeated.



A DPDT Alternating Relay is the same as a SPDT but with an extra set of NO & NC contacts. As shown in to right, these extra contacts can be used for pilot lights or other indications.



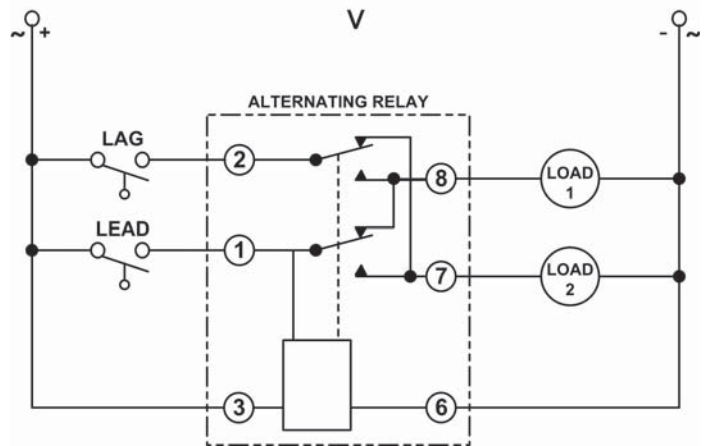
ALTERNATING RELAYS

TYPICAL INSTALLATIONS

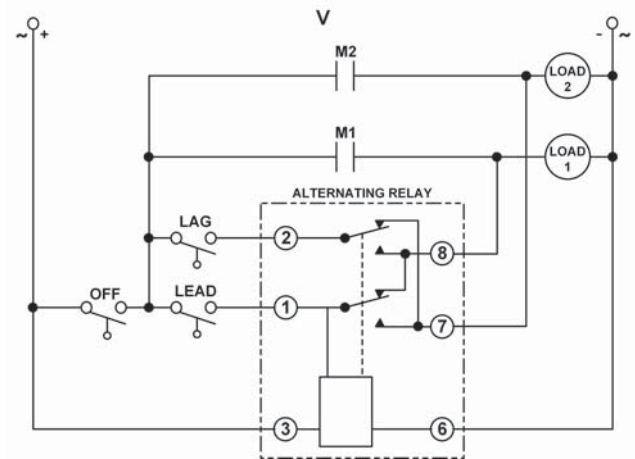
TYPICAL INSTALLATIONS

Duplex DPDT Cross-Wired

In the off state, both the LEAD Switch and the LAG Switch are open, the Alternating Relay is in the LOAD 1 position, and both LOAD 1 & LOAD 2 are off. The red LED marked "LOAD 1" is ON. When the LEAD Switch closes, it energizes LOAD 1. As long as the LEAD Switch remains closed, LOAD 1 remains energized. If the LAG Switch closes, it energizes LOAD 2. When the LAG Switch opens, LOAD 2 is turned off. When the LEAD Switch opens, LOAD 1 is turned off and the Alternating Relay toggles to the LOAD 2 position. The red LED marked "LOAD 2" is ON. When the LEAD Switch closes, it turns on LOAD 2. If the LAG Switch closes, it will energize LOAD 1. When the LAG Switch opens, LOAD 1 is turned off. When the LEAD Switch opens, LOAD 2 is turned off, the Alternating Relay toggles back to the LOAD 1 position, the red LED marked "LOAD 1" is ON, and the process can be repeated. **NOTE:** the LEAD switch must always close before the LAG switch and must always open after the LAG switch.



The diagram at right illustrates a type of operation known as "Sequence On - Simultaneously Off (S.O.S.O.)"-the two loads are energized sequentially, but remain on together until the OFF switch is opened. In the initial OFF state, all three switches are open, the Alternating Relay is in the LOAD 1 position, and both loads are off. No action happens with the Alternating Relay or either load when the OFF Switch closes. When the LEAD Switch closes, Load M1 turns on. When the LAG Switch closes, Load M2 turns on. Both loads remain on as long as all three switches are closed. When the LAG Switch opens, Load M2 remains on because the OFF Switch is still closed. When the LEAD Switch opens, Load M1 remains on because the OFF Switch is still closed. When the OFF Switch opens, both Load M1 and Load M2 are turned off simultaneously. The Alternating Relay toggles to the LOAD 2 position. The entire cycle is then repeated, but with Load M2 energized first followed by Load M1.



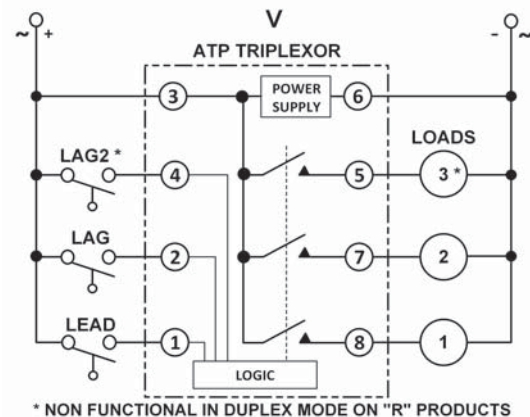
NOTE:

Both drawings shown are for DPDT Cross-Wired units with input voltage connected to Pins 3 & 6. For DPDT Cross-Wired units with input voltage connected to Pins 5 & 6, visit www.macromatic.com/ar-apps.

Triplexor

All three switches are open and all loads are off. When the LEAD Switch closes, it energizes LOAD 1. As long as the LEAD Switch remains closed, LOAD 1 remains energized. If the LAG Switch closes, LOAD 2 is energized. If the LAG2 Switch closes, it energizes LOAD 3. Each load is turned off in sequence as the switches are opened. The entire cycle is then repeated, but with LOAD 2 energized first followed by LOAD 3 and then LOAD 1. **NOTE:** Power for outputs is supplied from L connection, not through input switches.

Drawing references terminal numbers on 8 pin products



* NON FUNCTIONAL IN DUPLEX MODE ON "R" PRODUCTS

SPDT & DPDT DUPLEXOR

ARP SERIES



- ◆ For Duplex Control of two loads
- ◆ Control voltages of 12, 24 & 120V AC/DC and 240V AC
- ◆ Compact plug-in design utilizing industry-standard 8 or 11 pin octal socket
- ◆ 10A SPDT or DPDT Output Configuration
- ◆ Optional low profile selector switch to lock in one load
- ◆ 2 LEDs indicate load to energize next
- ◆ Pilot Duty Rating



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Alternating Relays are used in special applications where the optimization of load usage is required by equalizing the run time of two loads. This alternating action is initiated by a control switch, such as a float switch, manual switch, timing relay, pressure switch, or other isolated contact. Each time the initiating switch is opened, the output relay contacts will change state, thus alternating the two loads. Two LEDs indicate which load is the next to energize.

These Alternating Relays are available in either SPDT or DPDT output configurations and typically are used to control two loads, with only one on at a time. For products used when additional capacity is required (ability to turn both loads on at the same time), see Alternating Relays with DPDT Cross-Wired output configurations.

Each version is available with an optional three-position selector switch. This allows the unit to alternate the two loads as normal or select one or the other load to be the only one energized when the control switch closes. A load that has fewer hours than the other load could be used more often to eventually balance the run time of both loads. The selector switch has a low-profile to prevent any accidental changes in status.

For typical applications and detailed connection diagrams, visit: www.macromatic.com/ar-apps.

| OUTPUT CONTACTS | CONTROL VOLTAGE | CATALOG NUMBER | WIRING/SOCKET |
|------------------------------------|---|--|---|
| SPDT w/o Selector Switch | 12V AC/DC 24V AC/DC 120V AC/DC 240V AC | ARP012A6 ARP024A6 ARP120A6 ARP240A6 | 8 Pin Octal 70169-D DIAGRAM 17 |
| SPDT w/ Selector Switch | 12V AC/DC 24V AC/DC 120V AC/DC 240V AC | ARP012A6R ARP024A6R ARP120A6R ARP240A6R | |
| DPDT w/o Selector Switch | 12V AC/DC 24V AC/DC 120V AC/DC 240V AC | ARP012A2 ARP024A2 ARP120A2 ARP240A2 | 11 Pin Octal 70170-D DIAGRAM 18 |
| DPDT w/ Selector Switch | 12V AC/DC 24V AC/DC 120V AC/DC 240V AC | ARP012A2R ARP024A2R ARP120A2R ARP240A2R | |

Sockets & Accessories available

SPDT & DPDT DUPLEXOR

ARP SERIES

APPLICATION DATA

Voltage Tolerances: AC Operation: +10/-15% of nominal at 50/60 Hz; DC Operation: +10/-15% of nominal.

Load (Burden): Less than 3VA

Output Contacts:

10A @ 240V AC/30V DC,
1/2HP @ 120/240V AC (N.O.), 1/3HP @ 120/240VAC (N.C.)
B300, R300 (N.O.) 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)

Transient Protection: 10,000 volts for 20 microseconds

Indicator LEDs: 2 LEDs marked LOAD 1 and LOAD 2

Optional Selector Switch Settings:

LOAD 1
ALTERNATE
LOAD 2

Approvals:



File #LR45565

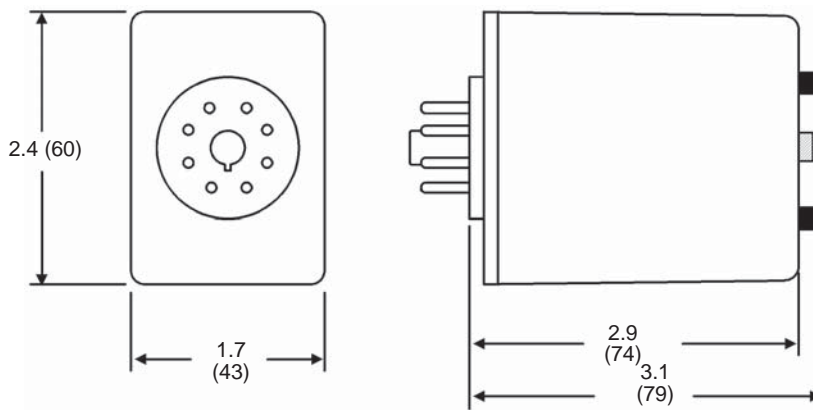


Low Voltage &
EMC Directives
EN60947-1,
EN60947-5-1



File #E109466
with
appropriate
socket

DIMENSIONS



All Dimensions in
Inches (Millimeters)

DPDT CROSS-WIRED DUPLEXOR

ARP SERIES



- ◆ For Duplex Control of two loads
- ◆ 10A DPDT Cross-Wired Output Configuration when additional capacity is required
- ◆ Control voltages of 12, 24 & 120V AC/DC and 240V AC
- ◆ Compact plug-in design utilizing industry-standard 8 pin octal socket
- ◆ Optional low profile selector switch to lock either load ON first
- ◆ 2 LEDs indicate load to energize first
- ◆ Pilot Duty Rating



with appropriate socket



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Alternating Relays with DPDT cross-wired outputs are used in applications requiring both (a) the optimization of load usage by equalizing the run time of two loads and (b) additional capacity in case of excess load requirements. This alternating action is initiated by a control switch, such as a float switch, manual switch, timing relay, pressure switch, or other isolated contact. Each time the initiating switch is opened, the output relay contacts will change state, thus alternating the two loads. Two LEDs indicate which load will energize first.

Alternating Relays with DPDT cross-wired output configurations are typically used to control two loads when the need to have both loads on at the same time for additional capacity is required. For products where only one load needs to be on at a time, see Alternating Relays with SDPT & DPDT output configurations.

An optional three position selector switch is offered. This allows a DPDT cross-wired unit to alternate the two loads as normal, or lock the relay to always operate the same load first each time. A load that has fewer hours of operation than the other load could be used more often to eventually balance the run time of both loads. The selector switch has a low-profile to prevent any accidental changes in status.

For typical applications and detailed connection diagrams, visit: www.macromatic.com/ar-apps.

| OUTPUT CONTACTS | CONTROL VOLTAGE | CATALOG NUMBER | WIRING/SOCKET |
|--|---|--|---|
| DPDT CROSS-WIRED w/o Selector Switch | 12V AC/DC 24V AC/DC 120V AC/DC 240V AC | ARP012A3 ARP024A3 ARP120A3 ARP240A3 | 8 Pin Octal 70169-D DIAGRAM 19 |
| DPDT CROSS-WIRED w/ Selector Switch | 12V AC/DC 24V AC/DC 120V AC/DC 240V AC | ARP012A3R ARP024A3R ARP120A3R ARP240A3R | DIAGRAM 147 |
| DPDT CROSS-WIRED w/o Selector Switch | 12V AC/DC 24V AC/DC 120V AC/DC 240V AC | ARP012A5 ARP024A5 ARP120A5 ARP240A5 | 8 Pin Octal 70169-D DIAGRAM 147 |
| DPDT CROSS-WIRED w/ Selector Switch | 12V AC/DC 24V AC/DC 120V AC/DC 240V AC | ARP012A5R ARP024A5R ARP120A5R ARP240A5R | DIAGRAM 147 |

Sockets & Accessories available

DPDT CROSS-WIRED DUPLEXOR

ARP SERIES

APPLICATION DATA

Voltage Tolerances: AC Operation: +10/-15% of nominal at 50/60 Hz; DC Operation: +10/-15% of nominal.

Load (Burden): Less than 3VA

Output Contacts:

10A @ 240V AC/30V DC,
1/2HP @ 120/240V AC (N.O.), 1/3HP @ 120/240VAC (N.C.)
B300, R300 (N.O.) 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)

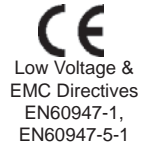
Transient Protection: 10,000 volts for 20 microseconds

Indicator LEDs: 2 LEDs marked LOAD 1 and LOAD 2

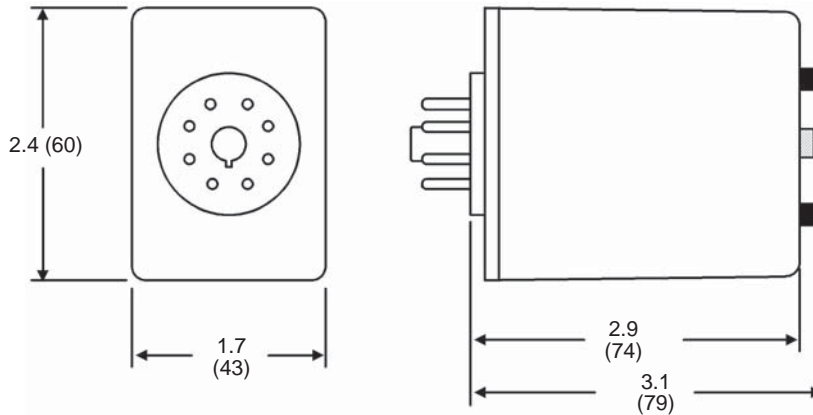
Optional Selector Switch Settings:

LOAD 1 (always energizes first)
ALTERNATE
LOAD 2 (always energizes first)

Approvals:



DIMENSIONS



All Dimensions in Inches (Millimeters)

SPDT & DPDT CROSS-WIRED DUPLEXOR

ARF SERIES

ALTERNATING RELAYS | INNER DOOR MOUNTING



- ◆ For Duplex Control of two loads
- ◆ Both SPDT Output & DPDT Cross-Wired Output
- ◆ Control voltages of 12, 24 & 120V AC/DC and 240V AC
- ◆ Flange-enclosure designed for deadfront door-mounting
- ◆ Low profile selector switch to lock in one sequence
- ◆ Selector switch accessible without opening inner door
- ◆ 2 LEDs indicate relay status
- ◆ 8 Pin Back-Mounted socket provided with relay
- ◆ Pilot Duty Rating



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Alternating Relays are used in applications requiring the optimization of load usage by equalizing the run time of two loads. A version with DPDT Cross-Wired output is also used for additional capacity in case of excess load requirements. This alternating action is initiated by a control switch, such as a float switch, manual switch, timing relay, pressure switch, or other isolated contact. Each time the initiating switch is opened, the output relay contacts will change state, thus alternating the two loads.

A three-position selector switch is included. For SPDT versions, this allows the unit to alternate the two loads as normal or select one or the other load to be the only one energized when the control switch closes. For DPDT cross-wired versions, the switch provides the option to alternate the two loads as normal or select which load always comes on first when the LEAD switch closes. In either case, a load that has fewer hours of operation than the other load could be used more often to eventually balance the run time of both loads. The low-profile selector switch prevents any accidental changes in status.

These products utilize a flange-enclosure designed to be deadfront-mounted on an inner door and used with back-mounted sockets. Everything needed for setup, use and troubleshooting is on the top of the unit: LED status indication and low-profile selector switch. With this product, the selector switch can be moved to any position without having to open the inner door.

For typical applications and detailed connection diagrams, visit: www.macromatic.com/ar-apps.

| OUTPUT CONTACTS | CONTROL VOLTAGE | CATALOG NUMBER | WIRING/SOCKET ■ |
|---|---|--|--|
| SPDT w/ Selector Switch | 12V AC/DC 24V AC/DC 120V AC/DC 240V AC | ARF012A6R ARF024A6R ARF120A6R ARF240A6R | 8 Pin Octal OR08-PC ■ LOAD 1: PIN 2 LOAD 2: PIN 8 DIAGRAM 17 |
| DPDT CROSS-WIRED w/ Selector Switch | 12V AC/DC 24V AC/DC 120V AC/DC 240V AC | ARF012A3R ARF024A3R ARF120A3R ARF240A3R | 8 Pin Octal OR08-PC ■ DIAGRAM 19 |

■ 8 Pin Back-Mounted Socket provided with relay

Sockets & Accessories available

SPDT & DPDT CROSS-WIRED DUPLEXOR

ARF SERIES

APPLICATION DATA

Voltage Tolerance:

AC Operation: +10/-15% of nominal at 50/60 Hz.

DC Operation: +10/-15% of nominal.

Load (Burden): Less than 3VA

Output Contacts:

10A @ 240V AC/30V DC,

1/2HP @ 120/240V AC (N.O.), 1/3HP @ 120/240VAC (N.C.)

B300, R300 (N.O.) 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)

Indicator LEDs: 2 LEDs marked LOAD 1 and LOAD 2

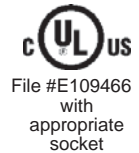
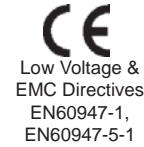
Optional Selector Switch Settings:

LOAD 1

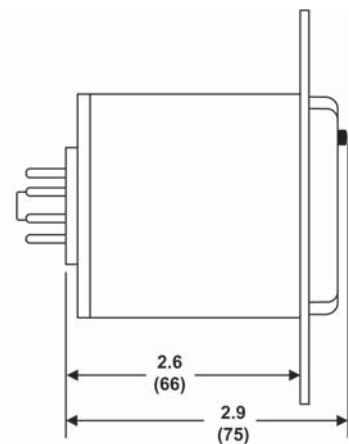
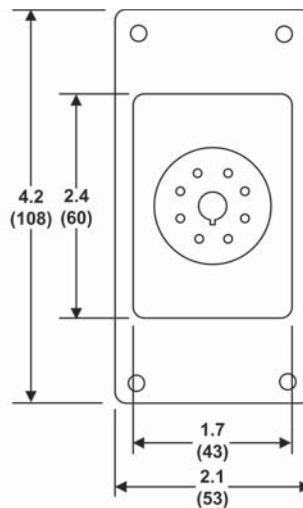
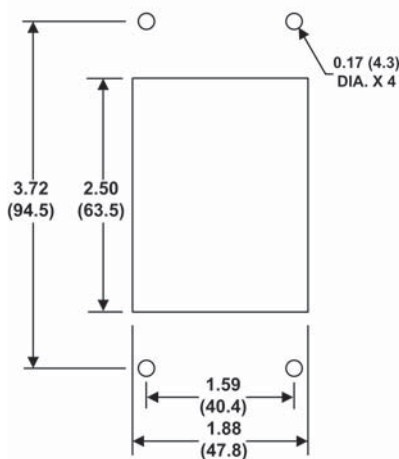
ALTERNATE

LOAD 2

Approvals:



DIMENSIONS



All Dimensions in Inches (Millimeters)

TRIPLEXOR

ATP SERIES



- ◆ For Triplex Control of three loads
- ◆ Works with 3 Switch inputs- LEAD, LAG & LAG2
- ◆ Optional top-mounted switch allows use as standard Triplexor or as Duplexor until system expansion requires additional third Load
- ◆ Control voltages of 120V AC or 24V AC/DC
- ◆ Plug-in enclosure utilizes industry-standard 8 Pin octal or 12 Pin square sockets
- ◆ Input Switch Failure Indication
- ◆ Pilot Duty Rating



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Macromatic ATP Series Triplexors are used in three load applications requiring both the optimization of load usage by equalizing the run time of multiple loads and additional capacity in case of excess load requirements.

As standard, these products operate as a normal Triplexor with three inputs. An optional version with an 8-position rotary switch is offered. This allows the unit to operate as either a:

- (a) standard Triplexor
- (b) Triplexor locking Load 1, 2 or 3 as the first to be energized (Lead Load)
- (c) standard Duplexor until system expansion requires control for a third Load
- (d) Duplexor locking Load 1 or 2 as the first to be energized (Lead Load)



All versions offer an indication of a switch failure (out-of-sequence) - LEDs will flash if any switch closes out of sequence. Also, if power is lost and returns with more than just the LEAD Switch closed, there is a fixed 10 second delay between energization of the first output and subsequent outputs to prevent all Loads from coming on at the same time.

| FUNCTION | CONTROL VOLTAGE | CATALOG NUMBER | WIRING/SOCKET |
|--------------------------------------|----------------------|------------------------|---|
| TRIPLEXOR/ DUPLEXOR w/o Switch | 120V AC 24V AC/DC | ATP120A1 ATP024A1 | 8 Pin Octal 70169-D DIAGRAM 184 |
| TRIPLEXOR/ DUPLEXOR w/ Switch | 120V AC 24V AC/DC | ATP120A1R ATP024A1R | DIAGRAM 184 |
| TRIPLEXOR/ DUPLEXOR w/ Switch | 120V AC 24V AC/DC | ATP120A7R ATP024A7R | 12 Pin Square SD12-PC DIAGRAM 185 |

TRIPLEXOR ATP SERIES

APPLICATION DATA

Voltage Tolerances: +10%/-15% at 50/60Hz. (AC);
+10%/-15% of control voltage (DC)

Load (Burden): Less than 2VA for all voltages

Output Contacts: (3) SPNO 3A @ 24/120V AC General Purpose;
C300 Pilot Duty; 1/6HP @ 24/120VAC

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)

Time Delay: If power is lost & returns with more than just the LEAD Switch closed, there is a fixed 10 second delay between energization of the second output (Triplex & Duplex mode) & third output (Triplex mode only) to prevent all Loads from coming on at the same time.

LED Indication: One of the Red LEDs will be steady ON to indicate which Load will be energized first; all will flash (3 in Triplex mode or 2 only in Duplex mode) to indicate a switch out-of-sequence error.

Optional Selector Switch Settings:

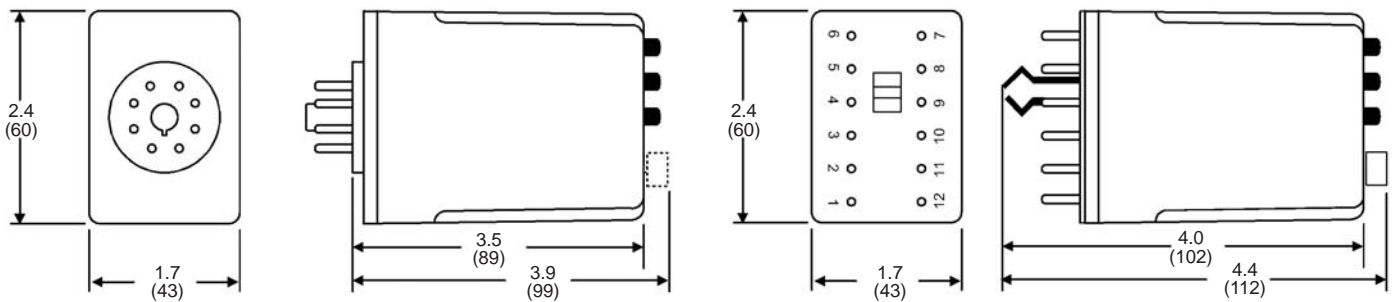
Allows unit to operate as standard Triplexor or Duplexor, or lock selected Loads to operate first (Lead Load) each time:

| | |
|-----------------|----------------|
| Triplex | Duplex |
| Triplex--Lead 1 | Duplex--Lead 1 |
| Triplex--Lead 2 | Duplex--Lead 2 |
| Triplex--Lead 3 | |

Approvals:  File #E109466

 with appropriate socket
File #E109466

DIMENSIONS



8 Pin Products Only

12 Pin Products Only

All Dimensions in Inches (Millimeters)

SOCKETS & ACCESSORIES

8 Pin Octal Socket- Surface or DIN Rail-Mounted

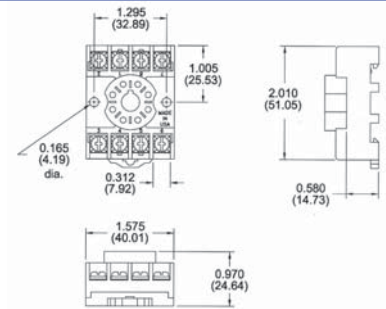
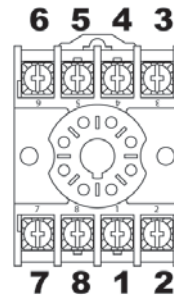
- ◆ 10A @ 600V
- ◆ 1 or 2 #12-20 AWG Wire
- ◆ Pressure Wire Clamp Terminations
- ◆ Recommended Tightening Torque
12 in-lbs



File #E169693 File #LR701114



Catalog Number:
70169-D



11 Pin Octal Socket Surface or DIN Rail-Mounted

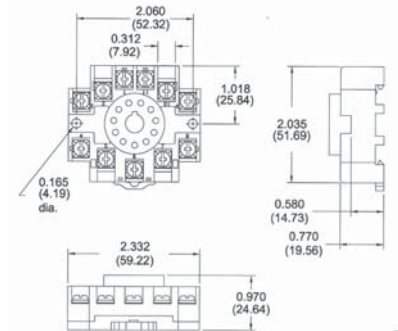
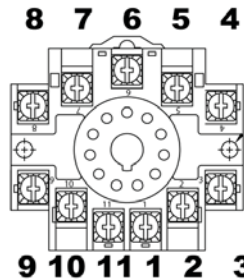
- ◆ 10A @ 300V
- ◆ 1 or 2 #12-20 AWG Wire
- ◆ Pressure Wire Clamp Terminations
- ◆ Recommended Tightening Torque
12 in-lbs



File #E169693 File #LR701114



Catalog Number:
70170-D



8 Pin Octal Socket- Back-Mounted

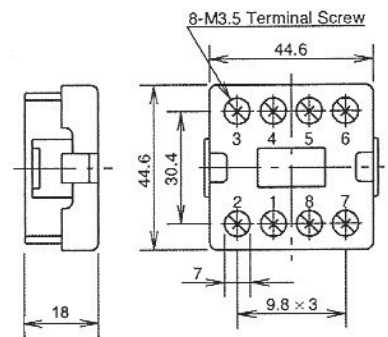
- ◆ 10A @ 300V
- ◆ Pressure Wire Clamp Terminations
- ◆ Recommended Tightening Torque
of 10 in-lbs



File #E62437



Catalog Number:
OR08-PC



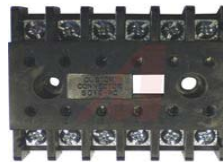
12 Pin Socket Surface-Mounted

- ◆ 10A @ 600V
- ◆ #12-20 AWG Wire
- ◆ Pressure Wire Clamp Terminations
- ◆ Recommended Tightening Torque
12 in-lbs

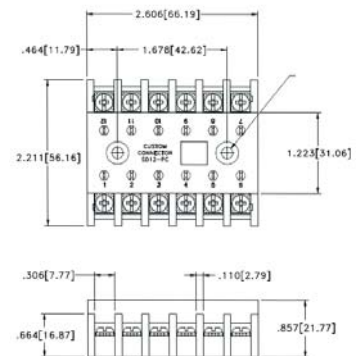
NOTE: If a 12 Pin Socket is required for DIN-rail mounting, please contact Macromatic.



File #LR29513



Catalog Number:
SD12-PC



Hold Down Spring

Can be used for:

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

* Requires two #8, 3/4" length machine screws with washers & nuts--contact Macromatic or www.macromatic.com/70166 for more information.



Catalog Number:
70166



MACROMATIC INDUSTRIAL CONTROLS

Located in Menomonee Falls, Wisconsin, Macromatic Industrial Controls engineers and manufactures industrial relays that control electrical processes and monitor power for damaging fault conditions.

Macromatic provides solutions for almost any application in any industry. Macromatic's products are used in the HVACR, pump control, material handling, motor control, generator, and lift and elevator industries, plus more.

As an independently-owned manufacturer of state-of-the-art control and monitoring products for over 40 years, Macromatic takes pride in its short lead-time, flexible product design, and exceptional technical support.

Visit www.macromatic.com today.



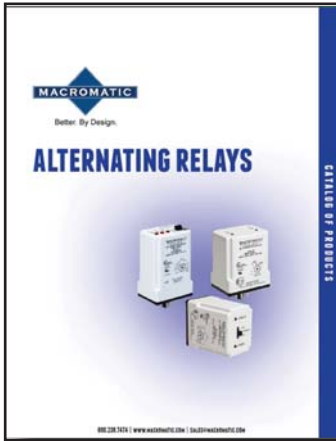
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