Control Relays and Timers

D1 Series General Purpose Relay

D96 Series Solid-State Relay

Universal TR Series Timing Relay

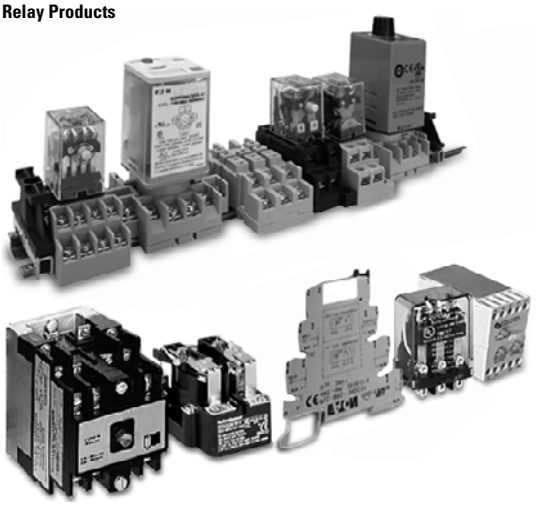
Safety Relay

3.1 Control Relays and Timers

Relay Product Overview

3

Relay Products



Contents

Control Relays and Timers Comparison

Selection Guide by Catalog Number Prefix

Relays	Type	Mounting	Contacts	Maximum Amperage (AC)		UL	CSA	CE	Page Number
9575H3	General purpose	Panel mount	Fixed	40 A	—	■	■	■	**V7-T3-82**
AR/ARD	Machine tool	Panel mount	Convertible	10 A	—	■	■	—	**V7-T3-130**
BF/BFD	Machine tool	Panel mount	Fixed	10 A	■	—	■	—	**V7-T3-125**
D1RF	Full featured plug-in	DIN rail / panel mount	Fixed	15 A	■	—	■	■	**V7-T3-23**
D1RR	Standard plug-in	DIN rail / panel mount	Fixed	15 A	■	—	■	■	**V7-T3-23**
D2RF	Full featured plug-in	DIN rail / panel mount	Fixed	6 A	■	—	■	■	**V7-T3-28**
D2RR	Standard plug-in	DIN rail / panel mount / flange	Fixed	12 A	■	—	■	■	**V7-T3-28**
D3RF	Full featured plug-in	DIN rail / panel mount	Fixed	10 A	■	—	■	■	**V7-T3-37**
D3RR	Standard plug-in	DIN rail / panel mount	Fixed	10 A	■	—	■	■	**V7-T3-37**
D4PR	Standard plug-in	DIN rail / panel mount	Fixed	10 A	■	—	■	■	**V7-T3-44**
D5RF	Full featured plug-in	DIN rail / panel mount	Fixed	10 A	■	—	■	■	**V7-T3-47**
D5RR	Standard plug-in	DIN rail / panel mount / PC board	Fixed	10 A	■	—	■	■	**V7-T3-47**
D7PF	Full featured plug-in	DIN rail / panel mount	Fixed	15 A	■	—	■	■	**V7-T3-56**
D7PR	Standard plug-in	DIN rail / panel mount / flange	Fixed	15 A	■	—	■	■	**V7-T3-56**
D8PR	Standard plug-in	DIN rail / panel mount / flange	Fixed	30 A	■	—	■	■	**V7-T3-69**
D9PR	Standard plug-in	Panel mounting	Fixed	25 A	■	—	■	—	**V7-T3-74**
D15	Machine tool	DIN rail / panel mount	Fixed	10 A	—	■	■	■	**V7-T3-74**
D26	Machine tool	Panel or channel mount	Convertible	10 A	—	■	■	—	**V7-T3-135**
D85	Alternating relays	DIN rail / panel mount	Fixed	10 A	■	■	—	■	**V7-T3-168**
TMR5	Timing relay (non-programmable)	DIN rail / panel mount	Fixed	10 A	■	■	—	■	**V7-T3-159**
TMR6	Timing relay (non-programmable)	DIN rail / panel mount	Fixed	10 A	■	■	—	■	**V7-T3-163**
TR	Timing relay (programmable)	DIN rail / panel mount	Fixed	10 A	—	■	■	—	**V7-T3-156**
Universal TR	Timing relay (programmable)	DIN rail	Fixed	8 A	—	■	■	■	**V7-T3-152**
XR	Terminal block relay	DIN rail	Fixed	6 A, 10 A	■	—	—	■	**V7-T3-5**
XTRE									**V7-T3-105**
XTRM									**V7-T3-105**

Terminal Block Relays

Contents

Catalog Number Selection

XR Series—Overview

XR U 1 D 12 G

Description
XR = ***XR*** terminal block relay

Connection Type
U = Screw
R = Replacement relay

Poles
1 = 1PDT
2 = 2PDT

Type
D = Standard relay
S = Octocoupler (solid-state)
H = High current

Voltage
12 = 12 Vdc
24 = 24 Vdc
24U = 24 Vac/Vdc
120U = 120 Vac/110 Vdc
230U = 230 Vac/220 Vdc

Gold-Flashed Contacts
Blank = No
G = Yes

Standard Terminal Block Relay

Contents

Standard Terminal Block Relays

Product Description

The ***XR*** Series Terminal Block Relays are ideal for applications that require a high switching capacity and long electrical service life. The relays are plug-in interfaces that connect to basic terminal blocks. The ***XR*** Series uses screw or spring-cage technology, as well as offers quick system wiring, superior safety features, clear labeling and a high level of modularity.

Application Description

Used in automation systems, electromechanical relays guarantee a safe connection between process I/O and electronic controls. The following functions are covered by relay coupling elements:

- Electrical isolation between the input and output circuits
- Independence of the type of switching current (AC and DC)
- High short-term overload resistance in the event of short circuits or voltage peaks
- Low switching losses
- Ease of operation

Features

- Pluggable relay allows for field replacement
- Functional plug-in bridges
- Screw connection terminals in 1PDT or DPDT configurations
- LED status indication
- DIN rail mount
- Only 6.2 mm wide for single-pole versions, 14 mm wide for double-pole
- All common input voltages between 12 Vdc to 120 Vac
- Gold-plated contacts available
- Equipped with a robust, miniature relay:
  - IP67 protection
  - Environmentally friendly, cadmium-free contact material
  - Easy, cost-effective installation and replacement using the engagement lever

Standards and Certifications

- cULus listed
- CE

c UL us Listed CE

Product Selection

XRU1D 24U

Standard Terminal Block Relays

Gold-Plated Contacts	Rated Current	Supply Voltage	Standard Pack	Catalog Number
1PDT Screw Connection				
No	6 A	12 Vdc	10	**XRU1D12**
No	6 A	120 Vac/110 Vdc	10	**XRU1D120U**
Yes	6 A	120 Vac/110 Vdc	10	**XRU1D120UG**
No	6 A	24 Vdc	10	**XRU1D24**
No	6 A	24 Vac/Vdc	10	**XRU1D24U**
Yes	6 A	24 Vac/Vdc	10	**XRU1D24UG**
No	6 A	230 Vac/220 Vdc	10	**XRU1D230U**
DPDT Screw Connection				
No	6 A	12 Vdc	10	**XRU2D12**
No	6 A	120 Vac/110 Vdc	10	**XRU2D120U**
No	6 A	24 Vdc	10	**XRU2D24**
No	6 A	24 Vac/Vdc	10	**XRU2D24U**
No	6 A	230 Vac/220 Vdc	10	**XRU2D230U**

Standard Replacement Relays

Gold-Plated Contacts	Rated Current	Supply Voltage ①	Standard Pack	Catalog Number
1PDT				
No	6 A	12 Vdc	10	**XRR1D12**
No	6 A	120 Vac/110 Vdc	10	**XRR1D120U**
Yes	6 A	120 Vac/110 Vdc	10	**XRR1D120UG**
No	6 A	24 Vdc	10	**XRR1D24**
Yes	6 A	24 Vdc	10	**XRR1D24G**
DPDT				
No	6 A	12 Vdc	10	**XRR2D12**
No	6 A	120 Vac/110 Vdc	10	**XRR2D120U**
No	6 A	24 Vdc	10	**XRR2D24**
No	6 A	230 Vac/220 Vdc	10	**XRR2D230U**

Note

① Voltage is the rating at the base. It may not match the voltage on the specific replacement relay.

Technical Data and Specifications

Standard 1PDT Screw Connection Terminal Block Relays

Catalog Number Replacement Relay	XRU1D12 XRR1D12	XRU1D24 XRR1D24	XRU1D24U XRR1D24	XRU1D120U XRR1D120U
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
Connection Data				
Rigid solid AWG (mm^2)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Flexible stranded AWG (mm^2)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Input Data for 1PDT Screw Connection Versions				
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
Permissible range	See **Page V7-T3-9**	See **Page V7-T3-9**	See **Page V7-T3-9**	See **Page V7-T3-9**
Typical input current	15.3 mA	9 mA	11 mA (24 Vac)/8.5 mA (24 Vdc)	3.5 mA (120 Vac)/3 mA (110 Vdc)
Typical response time	5 ms	5 ms	6 ms	6 ms
Typical release time	8 ms	8 ms	15 ms	15 ms
Input protection	Polarity protection diode, free-wheeling diode	Polarity protection diode, free-wheeling diode	Bridge rectifier	Bridge rectifier
Output Data				
Contact type	1PDT	1PDT	1PDT	1PDT
Contact material	AgSnO	AgSnO	AgSnO	AgSnO
Max. switching voltage	250 Vac/Vdc ①	250 Vac/Vdc ①	250 Vac/Vdc ①	250 Vac/Vdc ①
Min. switching voltage	12 Vac/Vdc	12 Vac/Vdc	12 Vac/Vdc	12 Vac/Vdc
Limiting continuous current	6 A	6 A	6 A	6 A
Min. switching current	10 mA	10 mA	10 mA	10 mA
Min. switching power	120 mW	120 mW	120 mW	120 mW
Miscellaneous Data				
Ambient temp range	–4 °F to +140 °F (–20 °C to +60 °C)	–4 °F to +140 °F (–20 °C to +60 °C)	–4 °F to +140 °F (–20 °C to +60 °C)	–4 °F to +140 °F (–20 °C to +60 °C)
Rated operating mode	100% operating factor	100% operating factor	100% operating factor	100% operating factor
Inflammability class	V0, in accordance with UL 94	V0, in accordance with UL 94	V0, in accordance with UL 94	V0, in accordance with UL 94
Mechanical service life	2 x 10^7 cycles	2 x 10^7 cycles	2 x 10^7 cycles	2 x 10^7 cycles

Note

① The separating plate, XRAPLCESK, should be installed for voltages greater than 250 V (L1, L2, L3) between identical terminal points of adjacent modules. Potential bridging is then possible with the XRAFBST bridge system.

Standard 1PDT Screw Connection Terminal Block Relays with Gold Contacts

Catalog Number Replacement Relay	XRU1D24UG XRR1D24G	XRU1D120UG XRR1D120UG
Input voltage	24 Vac/Vdc	120 Vac/110 Vdc
Connection Data		
Rigid solid AWG (mm^2)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Flexible stranded AWG (mm^2)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Input Data for 1PDT Screw Connection Versions with Gold Contacts		
Input voltage	24 Vac/Vdc	120 Vac/110 Vdc
Permissible range	See **Page V7-T3-9**	See **Page V7-T3-9**
Typical input current	11 mA (24 Vac)/8.5 mA (24 Vdc)	3.5 mA (120 Vac)/3 mA (110 Vdc)
Typical response time	6 ms	6 ms
Typical release time	15 ms	15 ms
Input protection	Bridge rectifier	Bridge rectifier
Output Data		
Contact type	1PDT	1PDT
Contact material	AgSnO, gold plated ①	AgSnO, gold plated ①
Max. switching voltage	30 Vac/36 Vdc (250 Vac/Vdc) ②	30 Vac/36 Vdc (250 Vac/Vdc) ②
Min. switching voltage	100 mV (12 Vac/Vdc) ②	100 mV (12 Vac/Vdc) ②
Limiting continuous current	50 mA (6 A) ②	50 mA (6 A) ②
Min. switching current	1 mA (10 mA) ②	1 mA (10 mA) ②
Min. switching power	100 mW (120 mW) ②	100 mW (120 mW) ②
Miscellaneous Data		
Ambient temp range	–4 °F to +140 °F (–20 °C to +60 °C)	–40 °F to +131 °F (–20 °C to +55 °C)
Rated operating mode	100% operating factor	100% operating factor
Inflammability class	V0, in accordance with UL 94	V0, in accordance with UL 94
Mechanical service life	2×10^7 cycles	2×10^7 cycles

Notes

① The separating plate, XRAPLCESK, should be installed for voltages greater than 250 V (L1, L2, L3) between identical terminal points of adjacent modules. Potential bridging is then possible with the XRAFBST bridge system.

② If the maximum values are exceeded, the gold layer is destroyed and the values in parentheses apply.

Standard DPDT Screw Connection Terminal Block Relays

Catalog Number Replacement Relay	XRU2D12 XRR2D12	XRU2D24 XRR2D24	XRU2D24U XRR2D24	XRU2D120U XRR2D120U
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
Connection Data				
Rigid solid AWG (mm^2)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Flexible stranded AWG (mm^2)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Input Data for 1PDT Spring Cage Versions				
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
Permissible range	See **Page V7-T3-9**	See **Page V7-T3-9**	See **Page V7-T3-9**	See **Page V7-T3-9**
Typical input current	33 mA	18 mA	17.5 mA	4.5 mA (120 Vac)/4.2 mA (110 Vdc)
Typical response time	8 ms	8 ms	8 ms	7 ms
Typical release time	10 ms	10 ms	10 ms	10 ms
Input protection	Polarity protection diode, free-wheeling diode	Polarity protection diode, free-wheeling diode	Bridge rectifier	Bridge rectifier
Output Data				
Contact type	2PDT	Single contact, 2PDT	Single contact, 2PDT	Single contact, 2PDT
Contact material	AgNi	AgNi	AgNi	AgNi
Max. switching voltage	250 Vac/Vdc ①	250 Vac/Vdc ①	250 Vac/Vdc ①	250 Vac/Vdc ①
Min. switching voltage	5 V	5 V	5 V	5 V
Limiting continuous current	6 A	6 A	6 A	6 A
Max. inrush current	15 A (300 ms)	15 A (300 ms)	15 A (300 ms)	15 A (300 ms)
Min. switching current	10 mA	10 mA	10 mA	10 mA
Min. switching power	50 mW	50 mW	50 mW	50 mW
General Data				
Ambient temp range	–4 °F to +140 °F (–20 °C to +60 °C)	–4 °F to +140 °F (–20 °C to +60 °C)	–4 °F to +140 °F (–20 °C to +60 °C)	–4 °F to +140 °F (–20 °C to +60 °C)
Rated operating mode	100% operating factor	100% operating factor	100% operating factor	100% operating factor
Inflammability class	V0, in accordance with UL 94	V0, in accordance with UL 94	V0, in accordance with UL 94	V0, in accordance with UL 94
Mechanical service life	3 x 10^7 cycles	3 x 10^7 cycles	3 x 10^7 cycles	3 x 10^7 cycles

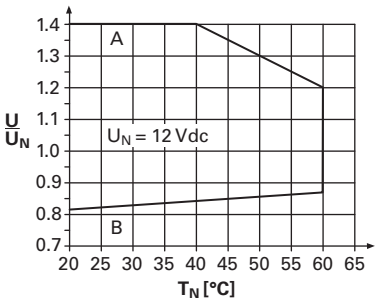
Note

① The separating plate, XRAPLCESK, should be installed for voltages greater than 250 V (L1, L2, L3) between identical terminal points of adjacent modules. Potential bridging is then possible with the XRAFBST bridge system.

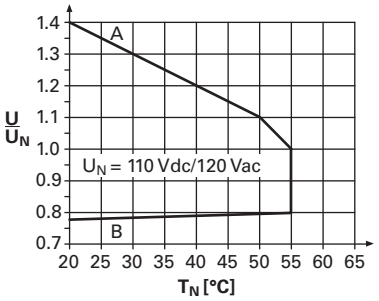
Permissible Range Diagrams

1PDT Relay Modules

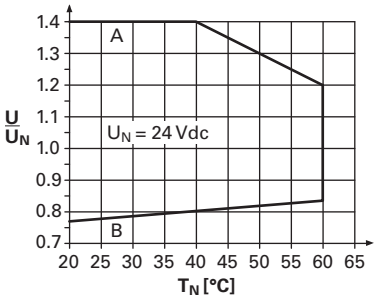
Operating Range Voltage for 12 Vdc



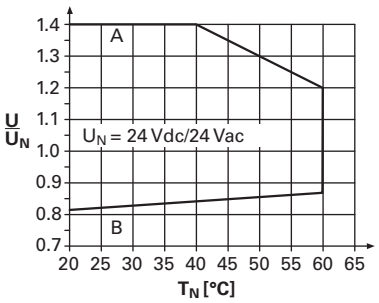
Operating Range Voltage for 120 Vac/110 Vdc



Operating Range Voltage for 24 Vdc

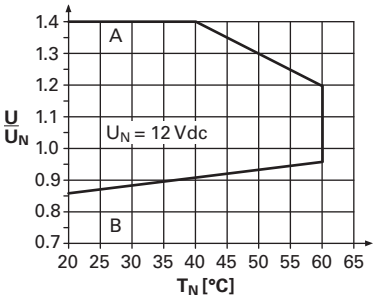


Operating Range Voltage for 24 Vac/Vdc

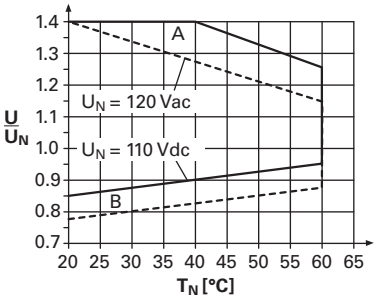


DPDT Relay Modules

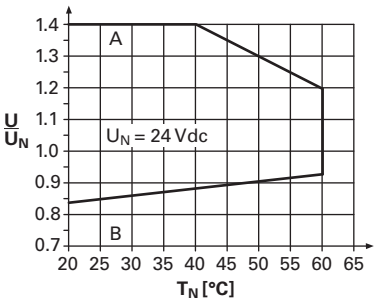
Operating Range Voltage for 12 Vdc



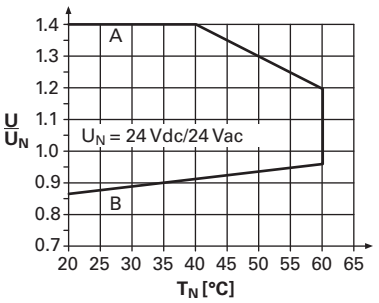
Operating Range Voltage for 120 Vac/110 Vdc



Operating Range Voltage for 24 Vdc



Operating Range Voltage for 24 Vac/Vdc



Notes

General Conditions — Direct alignment in the block, all devices 100% operating factor, horizontal or vertical mounting.

Curve A — Maximum permissible continuous operating voltage U_{max} with limiting continuous current on the contact side (see respective technical data).

Curve B — Minimum permissible relay operate voltage U_{op} after pre-excitation ① (see respective technical data).

① Pre-excitation: Relay has been operated in a thermally steady state at the ambient temperature T_U with nominal voltage U_N and limiting continuous current on the contact side (see respective technical data) (warm coil). After being switched off for a short time, the relay must reliably pick up again at U_{op}.

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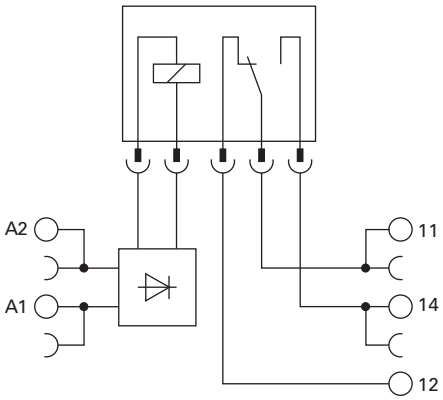
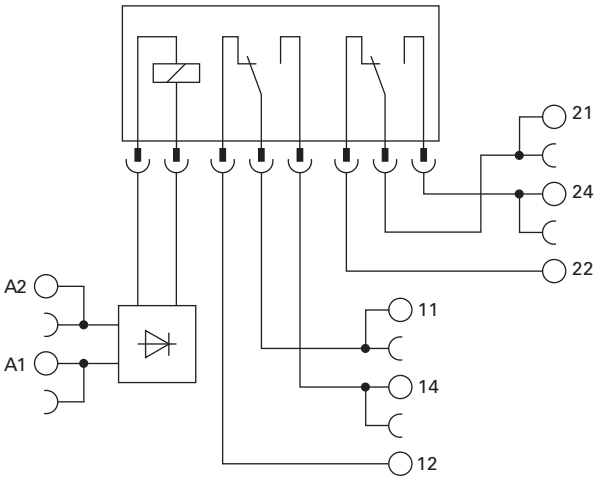
Electrical Schematics

1PDT Terminal Block Relays



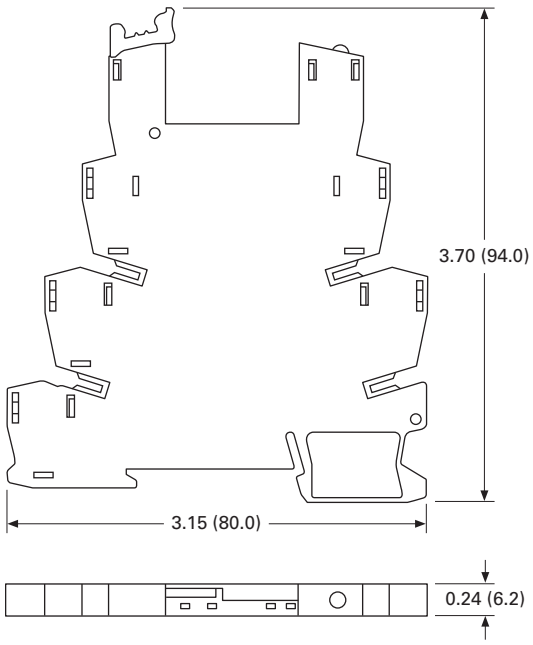
DPDT Terminal Block Relays



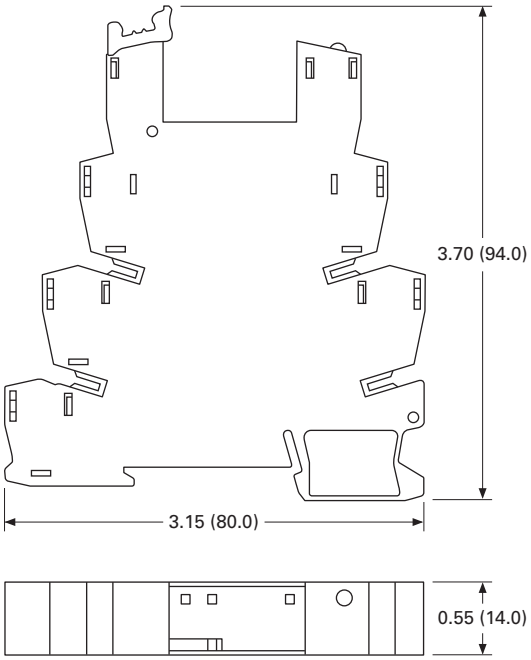
Dimensions

Approximate Dimensions in Inches (mm)

Standard 1PDT Terminal Block Relays



Standard DPDT Terminal Block Relays



OptoCoupler Terminal Block Relay

Contents

OptoCoupler Terminal Block Relays

Product Description

The ***XR*** Series OptoCoupler Terminal Block Relays can be used in all applications and consist of a pluggable miniature OptoCoupler and a basic terminal block. The ***XR*** Series uses screw or spring-cage technology, as well as offers quick system wiring, superior safety features, clear labeling and a high level of modularity.

Application Description

The ***XR*** Series OptoCoupler relays can be used as an input or output interface. They provide the typical reliability of OptoCouplers and are especially suited for high operating frequencies.

Features

- Pluggable relay allows for field replacement
- Functional plug-in bridges
- LED status indication
- DIN rail mount
- Only 6.2 mm wide
- Switching capacity up to 24 Vdc/3 A
- IP67-protected optical electronics
- Wear-resistant and bounce-free switching
- Insensitive to shock and vibration
- Integrated protection circuit
- Zero voltage switch at AC output

Standards and Certifications

- cULus listed
- CE

c UL us Listed CE

Product Selection

XRU1S24

OptoCoupler Terminal Block Relays

Rated Current	Supply Voltage	Standard Pack	Catalog Number
2 A	120 Vac/110 Vdc	10	**XRU1S120U**
2 A	24 Vdc	10	**XRU1S24**

OptoCoupler Replacement Relays

Rated Current	Supply Voltage ①	Standard Pack	Catalog Number
2 A	24 Vdc	18	**XRR1S24**
2 A	120 Vac/110 Vdc	10	**XRR1S120U**

Technical Data and Specifications

Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays

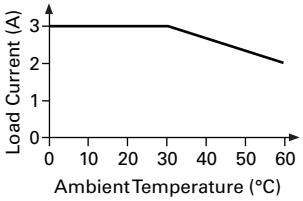
Catalog Number Replacement Relay	XRU1S24 XRR1S24	XRU1S120U XRR1S120U
Input voltage	24 Vdc	120 Vac/110 Vdc
Connection Data		
Rigid solid AWG (mm^2)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Flexible stranded AWG (mm^2)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Input Data		
Input voltage	24 Vdc	120 Vac/110 Vdc
Permissible range	0.8–1.2	0.8 –1.1
Typical input current	9 mA	4 mA
Switching level 1 signal (“H”)	≥0.8	≥0.8
Switching level 0 signal (“L”)	≤0.4	≤0.25
Typical switch-on time	20 µS	6 ms
Typical turn-off time	500 µS	10 ms
Input protection	Polarity protection diode, free-wheeling diode	Bridge rectifier
Output Data		
Max. switching voltage	33 Vdc	33 Vdc
Min. switching voltage	3 Vdc	3 Vdc
Limiting continuous current	3 A (See derating curve)	3 A (See derating curve)
Max. inrush current	15 A (10 ms)	15 A (10 ms)
Output circuit	2-conductor floating	2-conductor floating
Output protection	Polarity protection, surge protection	Polarity protection, surge protection
Voltage drop at maximum limiting continuous current	≤ 200 mV	≤ 200 mV
General Data		
Ambient temp range	–4 °F to +140 °F (–20 °C to +60 °C)	–4 °F to +140 °F (–20 °C to +60 °C)
Rated operating mode	100% operating factor	100% operating factor
Inflammability class	V0, in accordance with UL 94	V0, in accordance with UL 94
Mechanical service life	2 x 10^7 cycles	2 x 10^7 cycles

Note

① Voltage is the rating at the base. It may not match the voltage on the specific replacement relay.

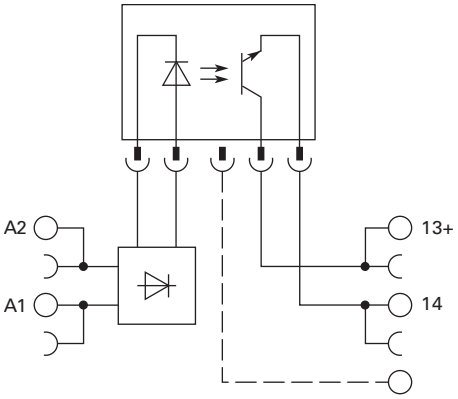
Derating Curve

OptoCoupler



Electrical Schematic

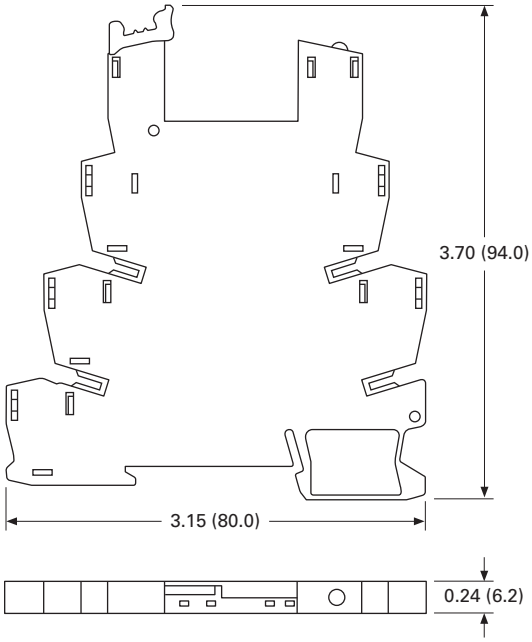
Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays



Dimensions

Approximate Dimensions in Inches (mm)

Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays



3

High Current Terminal Block Relay

Contents

High Current Terminal Block Relays

Product Description

The ***XR*** Series Relays include products designed to meet high continuous current and/or long electrical service life applications. The ***XR*** Series Relays are plug-in interfaces that connect to basic terminal blocks that use screw connection technology. Overall width is 14 mm.

Application Description

These relays are best suited for applications that require higher continuous load currents than miniature relays can carry and switch. They can withstand inrush currents or brief overloads without damage, and allow for continuous load currents of up to 10 A. The ***XR*** Series Relay boasts an average service life of the contacts that is two or three times the normal life of a less powerful relay, resulting in service cost savings.

Features

- 14 mm wide
- Pluggable relay allows for field replacement
- Convenient plug-in bridge system
- LED status indication
- DIN Rail Mount
- IP67-protected optical electronics
- Wear-resistant and bounce-free switching
- Insensitive to shock and vibration
- Integrated protection circuit
- Zero voltage switch at AC output
- Environmentally friendly, cadmium-free contact material
- Electrical isolation between input and output

Standards and Certifications

- cULus listed
- CE

c UL us Listed CE

Product Selection

XRU1H24

High Current Terminal Block Relays

Rated Current	Supply Voltage	Standard Pack	Catalog Number
10 A	12 Vdc	10	**XRU1H12**
10 A	120 Vac/110 Vdc	10	**XRU1H120U**
10 A	24 Vdc	10	**XRU1H24**
10 A	24 Vac/Vdc	10	**XRU1H24U**

High Current Replacement Relays

Rated Current	Supply Voltage ①	Standard Pack	Catalog Number
10 A	24 Vdc	10	**XRR1H24**
10 A	24 Vac/Vdc	10	**XRR1H24U**
10 A	12 Vdc	10	**XRR1H12**
10 A	120 Vac/110 Vdc	10	**XRR1H120U**

Technical Data and Specifications

High Current Terminal Block Relays (1PDT)

Catalog Number Replacement Relay	XRU1H12 XRR1H12	XRU1H24 XRR1H24	XRU1H24U XRR1H24U	XRU1H120U XRR1H120U
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
Connection Data				
Rigid solid AWG (mm^2)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Flexible stranded AWG (mm^2)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Input Data for 1PDT Spring Cage Versions				
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
Permissible range	See **Page V7-T3-9**	See **Page V7-T3-9**	See **Page V7-T3-9**	See **Page V7-T3-9**
Typical input current	33 mA	18 mA	17.5 mA	4.5 mA (120 Vac)/4.2 mA (110 Vdc)
Typical response time	8 ms	8 ms	8 ms	7 ms
Typical release time	10 ms	10 ms	10 ms	10 ms
Input protection	Polarity protection diode, free-wheeling diode	Polarity protection diode, free-wheeling diode	Bridge rectifier	Bridge rectifier
Output Data				
Contact type	Single contact, 1PDT	Single contact, 1PDT	Single contact, 1PDT	Single contact, 1PDT
Contact material	AgNi	AgNi	AgNi	AgNi
Max. switching voltage	250 Vac/Vdc ②	250 Vac/Vdc ②	250 Vac/Vdc ②	250 Vac/Vdc ②
Min. switching voltage	12 Vac/Vdc	12 Vac/Vdc	12 Vac/Vdc	12 Vac/Vdc
Limiting continuous current	10 A ③	10 A ③	10 A ③	10 A ③
Max. inrush current	30 A (300 ms)	30 A (300 ms)	30 A (300 ms)	30 A (300 ms)
Min. switching current	100 mA	100 mA	100 mA	100 mA
Min. switching power	1.2 W	1.2 W	1.2 W	1.2 W
Miscellaneous Data				
Ambient temp range	–4 °C to +140 °F (–20 °C to +60 °C)	–4 °C to +140 °F (–20 °C to +60 °C)	–4 °C to +140 °F (–20 °C to +60 °C)	–4 °C to +140 °F (–20 °C to +60 °C)
Rated operating mode	100% operating factor	100% operating factor	100% operating factor	100% operating factor
Inflammability class	V0, in accordance with UL 94	V0, in accordance with UL 94	V0, in accordance with UL 94	V0, in accordance with UL 94
Mechanical service life	3 x 10^7 cycles	3 x 10^7 cycles	3 x 10^7 cycles	3 x 10^7 cycles

Notes

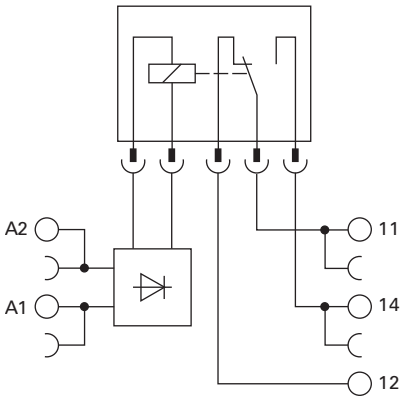
① Voltage is the rating at the base. It may not match the voltage on the specific replacement relay.

② The separating plate, XRAPLCESK, should be installed for voltages greater than 250 V (L1, L2, L3) between identical terminal points of adjacent modules. Potential bridging is then possible with the XRAFBST bridge system.

③ The current rating for the normally open contact (#14) is 10 A. The current rating for the normally closed contact (#12) is 6 A and can be increased to 10 A by bridging the two #12 contact connections.

Electrical Schematic

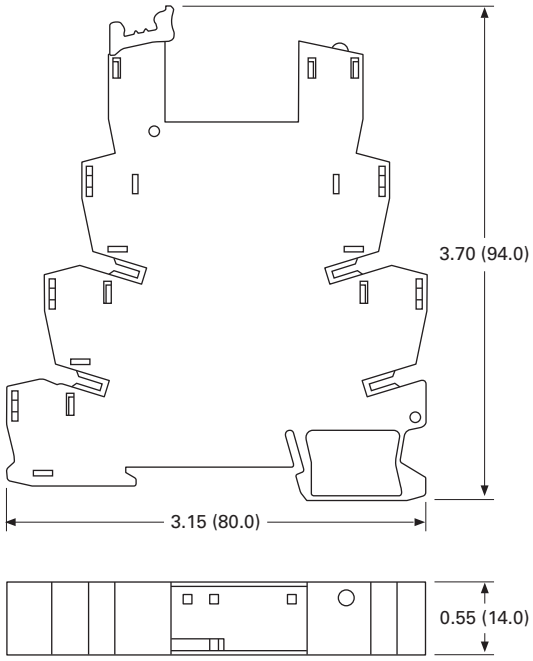
High Current Terminal Block Relays



Dimensions

Approximate Dimensions in Inches (mm)

High Current Terminal Block Relays



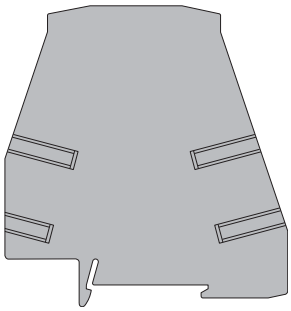
XR Series Accessories

Product Description

Power Terminal Block

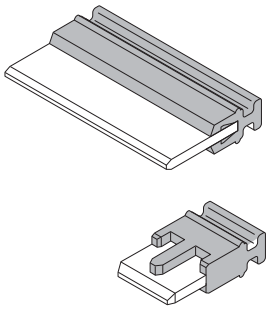
The XRAPLCESK power terminal block has the same shape as the relay modules and is used to feed in the bridging potentials. The nominal current is 32 A. When the total current is less than or equal to 6 A, supply can take place directly at the connecting terminal blocks of one of the connected relays.

End Cover



The XRAATPBK end cover is required at the start and stop of a relay strip. It can also be used for visual separation of groups of relays as well as separating relays with voltages greater than 250 V and separating neighboring bridges with different potentials. It is equipped with pre-scored break out points at the bridging positions so that individual bridges can be passed through as needed. It may also be necessary to use the end cover between adjacent relays when three phases (L1, L2, L3) are used on the contact side of the relay.

Bridges



The XRAFBST colored, insulated plug-in bridge system reduces wiring time by up to 70% compared to conventionally wired relays. The XRAFBST2, 2-position bridges, are suited for bridging a smaller number of relays and total currents ≤6 A. When a circuit is supplied from both sides, the circuit can be opened at any point, allowing all other modules to continue being supplied at the same time. The XRAFBST500 allow up to 80 modules to be bridged at one time. If bridges with different potentials meet in neighboring modules, the end cover XRAATPBK should be used. All bridges are equipped with a groove for removal with a standard screwdriver.

Product Selection

XR Series Accessories

Color	Standard Pack	Catalog Number
2-Position Snap-In Jumper		
Red	10	**XRAFBST2RD**
Blue	10	**XRAFBST2BU**
Gray	10	**XRAFBST2GY**
80-Position Snap-In Jumper		
Red	5	**XRAFBST500RD**
Blue	5	**XRAFBST500BU**
Gray	5	**XRAFBST500GY**
Power Terminal Block		
Gray	5	**XRAPLCESK**
End Cover		
Black	5	**XRAATPBK**

Technical Data and Specifications

Power Terminal Block

Description	Specification
Connection Data	
Rigid solid AWG (mm^2)	24–10 (0.2–4)
Flexible stranded AWG (mm^2)	24–10 (0.2–4)
Miscellaneous Data	
Max. current	32 A
Max. voltage	250 Vac ①

Note

① The separating plate, XRAPLCESK, should be installed for voltages greater than 250 V (L1, L2, L3) between identical terminal points of adjacent modules. Potential bridging is then possible with the XRAFBST bridge system.

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General Purpose Plug-In Relay

Contents

Product Selection Guide

General Purpose Relay Selection Characteristics

- Current rating: 1 A–30 A
- Contact arrangement: SPDT, DPDT, 3PDT, 4PDT, etc.
- Coil voltage: 6 V–240 Vac/ 6 V–110 Vdc
- Mounting options: socket, flange, DIN rail, panel
- Specifications: CSA, CE, IEC, NEMA, UL, etc.
- Other: physical dimensions, maximum voltage, mechanical/ electrical life, etc.

General Purpose Plug-In Relays

Relay Series	D1RR/D1RF	D2RR/D2RF		D3RR/D3RF	
					
Approvals					
	RoHS COMPLIANT c UL us CE CSA **Note**: UL when used with the appropriate socket.	RoHS COMPLIANT c UL us CE CSA **Note**: UL when used with the appropriate socket.		RoHS COMPLIANT c UL us CE CSA **Note**: UL when used with the appropriate socket.	
Features					
	Polycarbonate cover	Polycarbonate cover		Polycarbonate cover	
	Indicator lamp and pushbutton available	Indicator lamp and pushbutton available		Indicator lamp and pushbutton available	
	Panel and DIN mounting	Panel, DIN and flange mounting		Panel and DIN mounting	
	—	Latching		—	
Contact Data					
Configuration	**SPDT**	**DPDT**	**4PDT**	**DPDT**	**3PDT**
Max. allowable load	15 A at 277 Vac 15 A at 28 Vdc	12 A at 277 Vac 12 A at 28 Vdc	6 A at 277 Vac 6 A at 28 Vdc	10 A at 277 Vac 10 A at 28 Vdc	10 A at 277 Vac 10 A at 28 Vdc
Material	Silver alloy	Silver alloy		Silver alloy	
Dielectric strength between poles	1500 V	1500 V		1500 V	
Coil Data					
AC	6 to 240 Vac	6 to 240 Vac		6 to 240 Vac	
DC	6 to 110 Vdc	6 to 110 Vdc		6 to 110 Vdc	
Power					
VA (Vac)	0.9 VA	1.2 VA		3 VA 1.4 W (D3RR and D3RF)	
Watts (Vdc)	0.7 W	0.9 W		—	
General Data					
Ambient temperature					
Storage	–40 °F to +185 °F (–40 °C to +85 °C)	–40 °F to +185 °F (–40 °C to +85 °C)		–40 °F to +185 °F (–40 °C to +85 °C)	
Operational	–40 °F to +131 °F (–40 °C to +55 °C)	–40 °F to +131 °F (–40 °C to +55 °C)		–40 °F to +131 °F (–40 °C to +55 °C)	
Response time	20 milliseconds	20 milliseconds		20 milliseconds	
Life					
Mechanical operations	10 million	10 million		5 million (D3RR and D3RF)	
Electrical operations	100,000	200,000		100,000	
Page Numbers	**V7-T3-22** to **V7-T3-25**	**V7-T3-26** to **V7-T3-34**		**V7-T3-35** to **V7-T3-42**	

General Purpose Plug-In Relays, continued

Relay Series	D4	D5RR/D5RF	D7PR/D7PF
			
Approvals			
	RoHS COMPLIANT, cULus, CE	RoHS COMPLIANT, cULus, CE, CSA **Note**: UL when used with the appropriate socket.	RoHS COMPLIANT, cULus, CE, CSA **Note**: UL when used with the appropriate socket.
Features			
	Polycarbonate cover	Polycarbonate cover	Polycarbonate cover
	Indicator lamp available	Indicator lamp and pushbutton available	Indicator lamp and pushbutton available
	Panel and DIN mounting	Panel, DIN and flange mounting	Panel and DIN mounting
	Socket has built-in hold-down spring		

Contact Data							
Configuration	**SPDT**	**DPDT**	**DPDT**	**3PDT**	**DPDT**	**3PDT**	**4PDT**
Max. allowable load (NO and NC)	10 A at 250 Vac 10 A at 30 Vdc	5 A at 250 Vac 5 A at 30 Vdc	10 A at 277 Vac 10 A at 28 Vdc	10 A at 277 Vac 10 A at 28 Vdc	15 A at 277 15 A at 28 Vdc	15 A at 277 Vac 15 A at 28 Vdc	15 A at 277 Vac 15 A at 28 Vdc
Material	Ag Alloy		Silver alloy		Silver alloy		
Dielectric strength	5000 V		1500 V		1500 V	2500 V	2500 V
Coil Data							
AC	24 to 230 Vac		6 to 240 Vac		6 to 240 Vac		
DC	12 to 24 Vdc		6 to 110 Vdc		6 to 110 Vdc		
Power							
VA (Vac)	0.82 VA ±20%		3 VA		1.2 VA	1.5 VA	1.5 VA
Watts (Vdc)	0.53 W ±20%		1.4 W		0.9 W	1.4 W	1.5 W
General Data							
Ambient temperature							
Storage	–40 °F to +185 °F (–40 °C to +85 °C)		–40 °F to +185 °F (–40 °C to +85 °C)		–40 °F to +185 °F (–40 °C to +85 °C)		
Operational	–40 °F to +158 °F (–40 °C to +70 °C)		–40 °F to +131 °F (–40 °C to +55 °C)		–40 °F to +131 °F (–40 °C to +55 °C)		
Response time	20 milliseconds max. (at 100% coil voltage)		20 milliseconds		20 milliseconds (30 milliseconds for latching)		
Life							
Mechanical operations	10 million		5 million		10 million		
Electrical operations	100,000		100,000		100,000	200,000	200,000
Page Numbers	**V7-T3-43** to **V7-T3-45**		**V7-T3-46** to **V7-T3-53**		**V7-T3-54** to **V7-T3-67**		

General Purpose Plug-In Relays, continued

Relay Series	D8		D9	
				
Approvals				
Features				
	Dust cover		Dust cover	
	Panel, DIN and flange mounting		Pushbutton available	
	Quick-connect and screw terminals		Panel mounting	
			Screw terminals	
Contact Data				
Configuration			**4PST**	
	SPST-NO	**DPST-NO**	**NO**	**NC**
Max. allowable load	30 A at 277 Vac	25 A at 277 Vac	25 A at 277 Vac 25 A at 30 Vdc	8 A at 277 Vac 8 A at 30 Vdc
Material	AgCdO		AgCdO	
Dielectric strength	4000 V		4000 V	
Coil Data				
AC	6 to 240 Vac		24 to 240 Vac	
DC	12 to 24 Vdc		12 to 110 Vdc	
Power				
VA (Vac)	2.5 VA		2.6 VA	
Watts (Vdc)	1.9 W		2.0 W	
General Data				
Ambient temperature				
Storage	–4 °F to +185 °F (–20 °C to +85 °C)		–13 °F to +140 °F (–25 °C to +60 °C)	
Operational	–4 °F to +131 °F (–20 °C to +55 °C)		–13 °F to +140 °F (–25 °C to +60 °C)	
Response time	30 milliseconds		50 milliseconds	
Life				
Mechanical operations	5 million		1 million	
Electrical operations	100,000		100,000	
Page Numbers	**V7-T3-68** to **V7-T3-72**		**V7-T3-73** to **V7-T3-75**	

D1 Series Relay

Contents

D1RR/D1RF Series

Product Description

The D1 Series of relay provides a compact single-pole relay capable of handling 15 A. Multiple feature and voltage options allow for the perfect fit for any application.

Features

D1RR

- Compact relay capable of breaking relatively large load currents
- Panel and DIN rail mounting

D1RF

- The contact operation can be easily checked by Push-to-Test button
- Flag indicator shows relay status in manual or powered condition
- LED status lamp shows coil ON or OFF status—ideal for use in low light applications
- Push-to-Test button allows for manual operation of relay without the need for coil power
- Lock-down door holds pushbutton and contacts in the operate position when activated
- Finger-grip cover allows operator to remove relays from sockets easily
- ID tag/write label to identify relays in multiple-relay circuits
- Bipolar LED allows for reverse polarity applications

Standards and Certifications

When used with accompanying Eaton screw terminal socket.

- UL 508, URus (File No. E1491, E65657)

Catalog Number Selection

D1RF/D1RR Series

D1RF 1 A

Family Type	Contact Configuration	Coil Voltage
D1RF = Full-featured style ①	**1** = SPDT	**A** = 120 Vac
D1RR = Plain cover style		**A1** = 110 Vdc
		B = 240 Vac
		R1 = 12 Vdc
		T = 24 Vac
		T1 = 24 Vdc
		W1 = 48 Vdc

Note

① Full-featured, LED test button, flag indicator, lock-down door, finger-grip cover, ID tag.

Product Selection

D1RR/D1RF Relay/Socket Quick Reference

Relay Type	Socket	Clip	Module Type	ID Tag	Jumper
D1RR1	D1RAA	PMC-1781	B	—	—
D1RF1	D1RAA	PMC-1781	B	—	—

D1RF Series Relay

D1RR/D1RF Series

Coil Voltage	Contact Configuration	Coil Resistance (Ohms)	Catalog Number
Full Featured			
12 Vdc	SPDT	188	**D1RF1R1**
24 Vac 50/60 Hz	SPDT	180	**D1RF1T**
24 Vdc	SPDT	750	**D1RF1T1**
110 Vdc	SPDT	13,800	**D1RF1A1**
120 Vac 50/60 Hz	SPDT	4,430	**D1RF1A**
240 Vac 50/60 Hz	SPDT	15,720	**D1RF1B**
Plain Cover			
12 Vdc	SPDT	188	**D1RR1R1**
24 Vdc	SPDT	750	**D1RR1T1**
48 Vdc	SPDT	2,600	**D1RR1W1**
110 Vdc	SPDT	13,800	**D1RR1A1**
120 Vac 50/60 Hz	SPDT	4,430	**D1RR1A**
240 Vac	SPDT	15,270	**D1RR1B**

Accessories

D1RR/D1RF Sockets and Accessories

Type	Module Size	Nominal Voltage (Max. for Sockets)	Nominal Current	Mounting Style	Wire Size	Wire Connection	Standard Pack	Catalog Number
Socket	B	300	20	Panel/DIN rail	12 /14 (2) AWG, 4 /2.5 (2) mm^2	Screw clamping	1	**D1RAA** ①
Flange mount adapter	—	—	—	Flange	—	—	25	**PFC-D11**
Metal spring clip	—	—	—	—	—	—	25	**PMC-1781**
Protection diode	B	6 to 250 Vdc	—	—	—	—	20	**MOD-BD250**
LED indicator	B	24 Vac/Vdc	—	—	—	—	20	**MOD-BLG24**
	B	120/240 Vac/Vdc	—	—	—	—	20	**MOD-BLG240**
MOV suppressor	B	120 Vac/Vdc	—	—	—	—	20	**MOD-BMV120**
	B	24 Vac/Vdc	—	—	—	—	20	**MOD-BMV24**
	B	240 Vac/Vdc	—	—	—	—	20	**MOD-BMV240**
Plastic DIN rail end stop	—	—	—	—	—	—	25	**PFP-P**

Note

① Protection Category (Finger Safe), EN 60529: IP20.

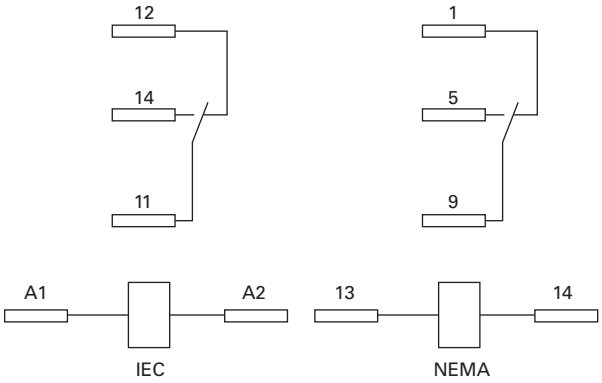
Technical Data and Specifications

D1RF/D1RR Relay Specifications

Description	D1RR	D1RF
Contact Characteristics		
Contact rating	15 A	15 A
Terminal style	Plug-in	Plug-in
Contact materials	Silver alloy	Silver alloy
Maximum switching voltage	300 V	300 V
Switching current at voltage—resistive	15 A at 120 Vac 50/60 Hz	15 A at 120 Vac 50/60 Hz
	15 A at 277 Vac 50/60 Hz	15 A at 277 Vac 50/60 Hz
	15 A at 28 Vdc	15 A at 28 Vdc
Switching current at voltage	1/2 hp at 120 Vac	1/2 hp at 120 Vac
	1 hp at 277 Vac	1 hp at 277 Vac
Pilot duty	B300	B300
Minimum switching requirement	100 mA at 5 Vdc (0.5 W)	100 mA at 5 Vdc (0.5 W)
Coil Characteristics		
Operating range		
% of nominal (AC)	85 to 110%	85 to 110%
% of nominal (DC)	80 to 110%	80 to 110%
Average consumption	0.9 VA	0.9 VA
	0.7 W	0.7 W
Dropout voltage threshold	15% (AC)	15% (AC)
	10% (DC)	10% (DC)
Performance		
Electrical life (UL 508) operations at rated current	100,000 operations	100,000 operations
Mechanical life operations unpowered	10,000,000 operations	10,000,000 operations
Response time	20 ms	20 ms
Dielectric strength		
Between coil and contact Vac (rms)	2500 V (rms)	2500 V (rms)
Between poles Vac (rms)	1500 V (rms)	1500 V (rms)
Environment		
Ambient air temperature around the device		
Storage	–40 °F to +131 °F (–40 °C to +55°C)	–40 °F to +131 °F (–40 °C to +55 °C)
Operation	–40 °F to +185 °F (–40 °C to +85°C)	–40 °F to +185 °F (–40 °C to +85 °C)
Vibration resistance—operational	3 g-n at 10–55 Hz	3 g-n at 10–55 Hz
Shock resistance	10 g-n	10 g-n
Degree of protection	IP40	IP40
Features		
Cover options	Plain cover	Full featured
Features	Mechanical flag indicator (optional LED)	Locking pushbutton/ Bipolar LED/ Removable ID tag/ Mechanical flag indicator
Product certifications	RoHS/UL/CE/CSA	RoHS/UL/CE/CSA

Wiring Diagram

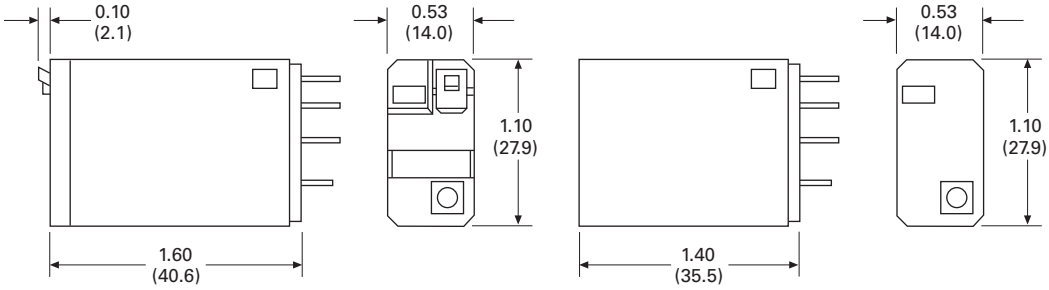
D1RF/D1RR



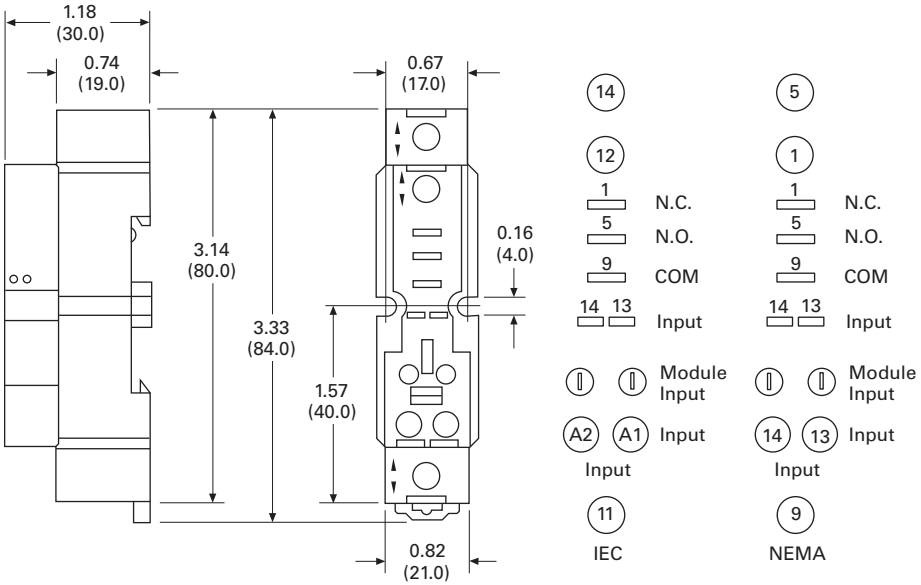
Dimensions

Approximate Dimensions in Inches (mm)

D1RF/D1RR



D1RAA



D2 Series Relay

Contents

D2RR/D2RF Series

Product Description

The D2 Series is a compact line of relays with quick response time and long life. Available in DPDT, 4PDT and DPDT latching configurations.

Features

D2RR

- Ultra-high sensitivity relay with quick response
- High reliability, long life
- Panel, DIN rail and flange mounting
- Small size

D2PR5

- Latching relay
- Energize one coil winding momentarily to latch. Energize a separate coil winding momentarily to unlatch

D2RF

- Flag indicator shows relay status in manual or powered condition
- Bipolar LED status lamp allows for reverse polarity applications
  - Shows coil ON or OFF status
  - Ideal in low light conditions
- Color-coded pushbutton identifies AC coils with red or DC coils with blue pushbuttons
  - Allows for manual operation of relay without the need for coil power
  - Ideal for field service personnel to test control circuits
- Lock-down door, when activated, holds pushbutton and contacts in the operate position
  - Excellent for analyzing circuit problems
- Finger-grip cover allows operator to remove relays from sockets more easily than conventional relays
- White plastic ID tag/write label used for identification of relays in multi-relay circuits

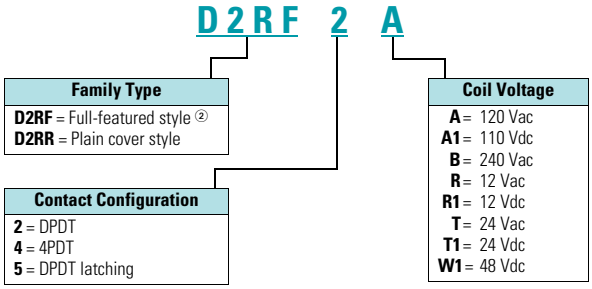
Standards and Certifications

When used with accompanying Eaton screw terminal socket.

- UL 508, URus (File No. E1491, E65657)

Catalog Number Selection

D2RF/D2RR ①



Product Selection

D2RF/D2RR Relay/Socket Quick Reference

Relay Type	Socket	Clip	Module Type	ID Tag	Jumper
D2RR2, D2RF2	D2PAL	PWC-D24	B	PWF-D2P	D2PJ1
		PQC-1782	—	—	—
	D2PA6	PQC-1342	None	—	—
D2RR4, D2RF4	D2PAP	PWC-D24	B	PWF-D2P	D2PJ1
		PQC-1782	—	—	—
	D2PA7	PWC-D24	B	—	—
		PQC-1782	B	—	—
	D2PA6	PQC-1342	None	—	—
D2PR5	D2PA4	PYC-A1	None	—	—

Notes

① For deciphering catalog numbers. Do not use for ordering as not all combinations are readily available.

② Full-featured, LED test button, flag indicator, lock-down door, finger-grip cover, ID tag.

D2RF Series Relay

D2RF/D2RR Series

Coil Voltage	Contact Configuration	Coil Resistance (Ohms)	Catalog Number
Full Featured Style			
12 Vdc	DPDT	160	**D2RF2R1**
24 Vac	DPDT	180	**D2RF2T**
24 Vdc	DPDT	650	**D2RF2T1**
48 Vdc	DPDT	2,600	**D2RF2W1**
110/125 Vdc	DPDT	11,000	**D2RF2A1**
120 Vac	DPDT	4,430	**D2RF2A**
220/240 Vac	DPDT	15,720	**D2RF2B**
12 Vdc	4PDT	160	**D2RF4R1**
24 Vac	4PDT	180	**D2RF4T**
24 Vdc	4PDT	650	**D2RF4T1**
48 Vdc	4PDT	2,600	**D2RF4W1**
110/125 Vdc	4PDT	11,000	**D2RF4A1**
120 Vac	4PDT	4,430	**D2RF4A**
220/240 Vac	4PDT	15,720	**D2RF4B**
Plain Cover Style			
12 Vdc	DPDT	160	**D2RR2R1**
24 Vac	DPDT	180	**D2RR2T**
24 Vdc	DPDT	650	**D2RR2T1**
120 Vac	DPDT	4,430	**D2RR2A**
220/240 Vac	DPDT	15,720	**D2RR2B**
12 Vdc	4PDT	160	**D2RR4R1**
24 Vac	4PDT	180	**D2RR4T**
24 Vdc	4PDT	650	**D2RR4T1**
110/125 Vdc	4PDT	11,000	**D2RR4A1**
120 Vac	4PDT	4,430	**D2RR4A**
220/240 Vac	4PDT	15,720	**D2RR4B**
Latching Style			
24 Vac	DPDT	180	**D2PR5T**
24 Vdc	DPDT	650	**D2PR5T1**
110 Vac	DPDT	11,000	**D2PR5A**

Accessories

D2RF/D2RR Sockets and Accessories

Type	Module Size	Nominal Voltage (Max. for Sockets)	Nominal Current	Mounting Style	Wire Size	Wire Connection	Standard Pack	Catalog Number
Socket	B	300	12	DIN rail/panel	14/16 (2) AWG, 2.5/1.5 (2) mm^2	Elevator	1	**D2PAL** ①
	None	300	10	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm^2	Screw clamping	10	**D2PA6**
	B	300	10	DIN rail/panel	14/16 (2) AWG, 2.5/1.5 (2) mm^2	Elevator	1	**D2PAP** ①
	B	300	10	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm^2	Screw clamping	10	**D2PA7** ①
	None	300	10	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm^2	Screw clamping	5	**D2PA4**
Flange mount adapter	—	—	—	Flange	—	—	25	**PFC-D2D72**
Plastic ejector clip	—	—	—	—	—	—	10	**PWC-D24**
Metal spring clip	—	—	—	—	—	—	25	**PQC-1782**
	—	—	—	—	—	—	25	**PQC-1342**
Hold-down spring	—	—	—	—	—	—	100	**PYC-A1**
Protection diode	B	6 to 250 Vdc	—	—	—	—	20	**MOD-BD250**
LED indicator	B	24 Vac/Vdc	—	—	—	—	20	**MOD-BLG24**
	B	120/240 Vac/Vdc	—	—	—	—	20	**MOD-BLG240**
MOV suppressor	B	120 Vac/Vdc	—	—	—	—	20	**MOD-BMV120**
	B	24 Vac/Vdc	—	—	—	—	20	**MOD-BMV24**
	B	240 Vac/Vdc	—	—	—	—	20	**MOD-BMV240**
Coil bus jumpers	—	—	—	—	—	—	10	**D2PJ1**
Plastic DIN rail end stop	—	—	—	—	—	—	25	**PFP-P**

Note

① Protection category (finger safe), EN 60529: IP20.

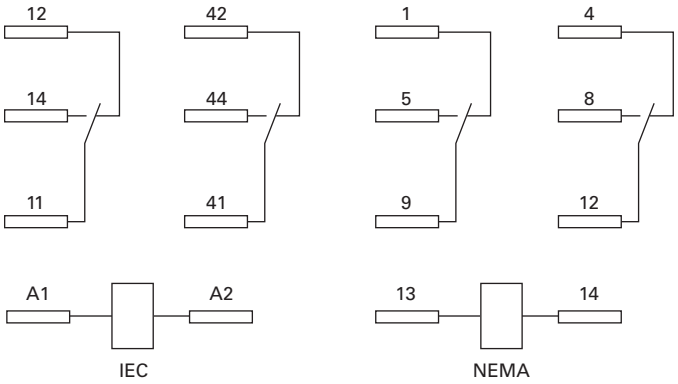
Technical Data and Specifications

D2RF/D2RR Relay Specifications

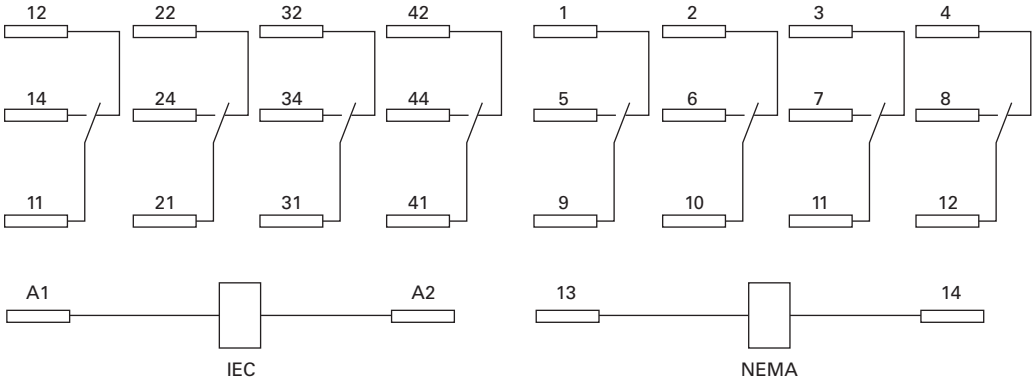
Description	D2RR2/D2RF2	D2RR4/D2RF4	D2PR5
Contact Characteristics			
Contact rating	12 A / 6 A	6 A	5 A
Terminal style	Plug-in	Plug-in	Plug-in
Contact materials	Silver alloy	Silver alloy	Silver (gold flashed)
Maximum switching voltage	300 V	300 V	250 Vac/125 Vdc
Switching current at voltage—resistive	12 A at 120 Vac 50/60 Hz	6 A at 277 Vac 50/60 Hz	3 A at 250 Vac
	12 A at 277 Vac 50/60 Hz	8 A at 120 Vac 50/60 Hz	—
	12 A at 28 Vdc	8 A at 28 Vdc	5 A at 30 Vdc
Switching current at voltage	1/3 hp at 120 Vac 1 hp at 277 Vac	1/3 hp at 120 Vac 1 hp at 277 Vac	1/8 hp at 250 Vac
Pilot duty	B300	B300	—
Minimum switching requirement	100 mA at 5 Vdc (0.5 W)	100 mA at 5 Vdc (0.5 W)	100 mA,1 Vdc
Coil Characteristics			
Operating range			
% of nominal (AC)	85 to 110%	85 to 110%	80 to 110%
% of nominal (DC)	80 to 110%	80 to 110%	80 to 110%
Average consumption	1.2 VA	1.2 VA	—
	0.9 W	0.9 W	—
Dropout voltage threshold	15% (AC)	15% (AC)	30% (AC)
	10% (DC)	10% (DC)	10% (DC)
Performance			
Electrical life (UL 508) operations at rated current	200,000	200,000	200,000
Mechanical life operations unpowered	10,000,000	10,000,000	100,000,000
Response time	20 ms	20 ms	—
Dielectric strength			
Between coil and contact Vac (rms)	1500 rms	1500 rms	—
Between poles Vac (rms)	1500 rms	1500 rms	—
Environment			
Ambient air temperature around the device			
Operation	–40 °F to +131 °F (–40 °C to +55 °C)	–40 °F to +131 °F (–40 °C to +55 °C)	—
Storage	–40 °F to +185 °F (–40 °C to +85 °C)	–40 °F to +185 °F (–40 °C to +85 °C)	—
Vibration resistance—operational	3 g-n at 10–55 Hz	3 g-n at 10–55 Hz	—
Shock resistance	10 g-n	10 g-n	—
Degree of protection	IP40	IP40	—
Features			
Cover options	Plain cover	Full featured	Plain cover
Features	Mechanical flag indicator	Locking pushbutton/ Bipolar LED/ Removable ID tag/ Mechanical flag indicator	Latching
Product certifications	RoHS/UL/CE/CSA	RoHS/UL/CE/CSA	UL/CE/CSA

Wiring Diagrams

D2RF2/D2RR2



D2RF4/D2RR4



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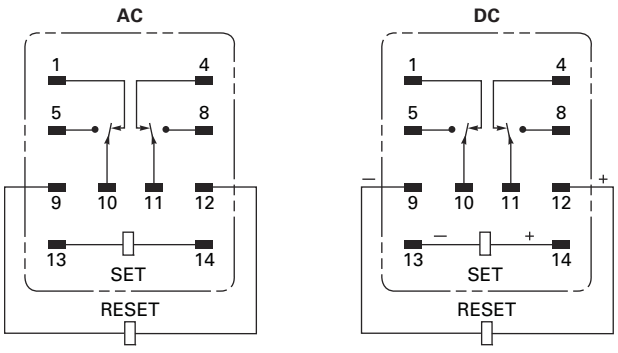
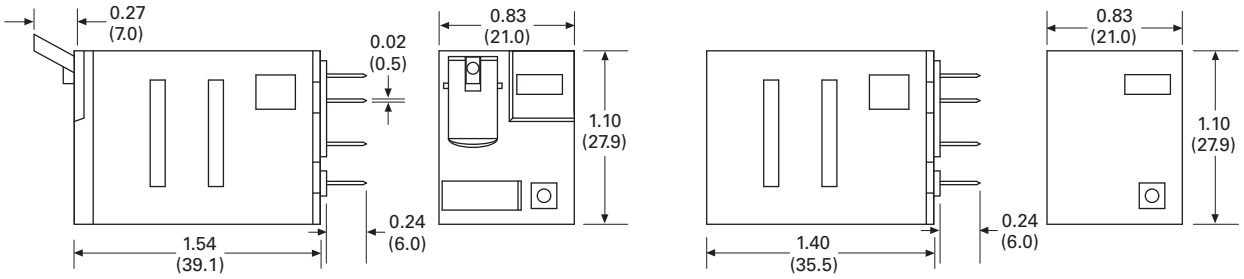


Terminal Arrangement/Internal Connections (BottomView)

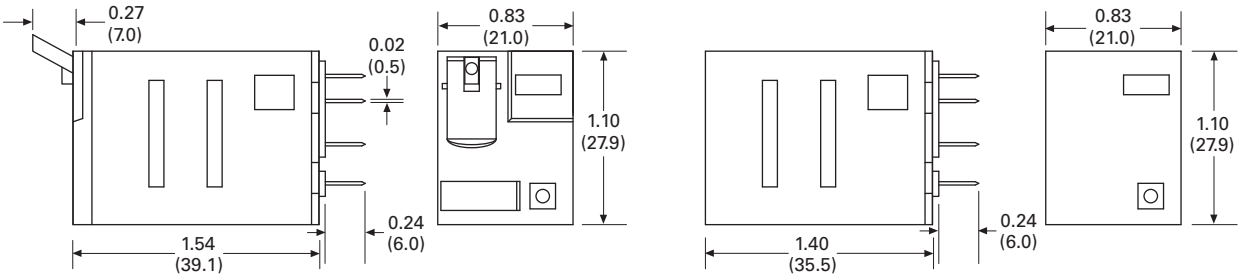
Dimensions

Approximate Dimensions in Inches (mm)

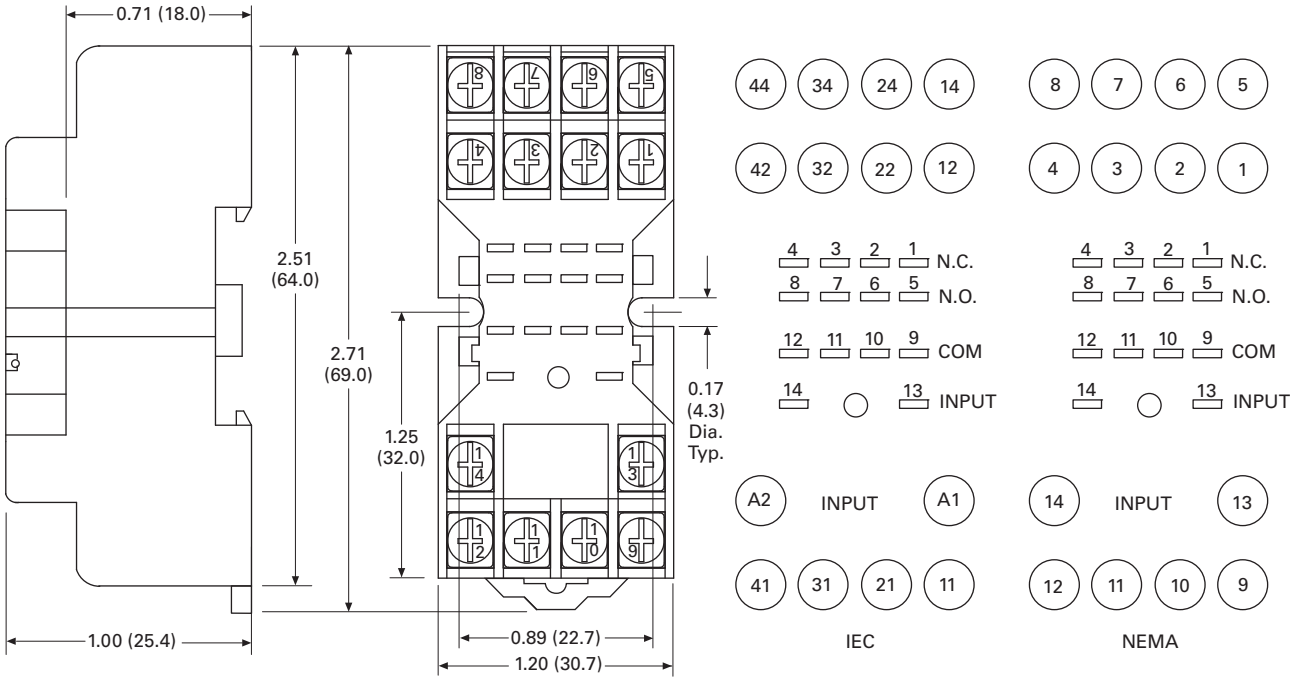
D2RF2/D2RR2



D2RF4/D2RR4

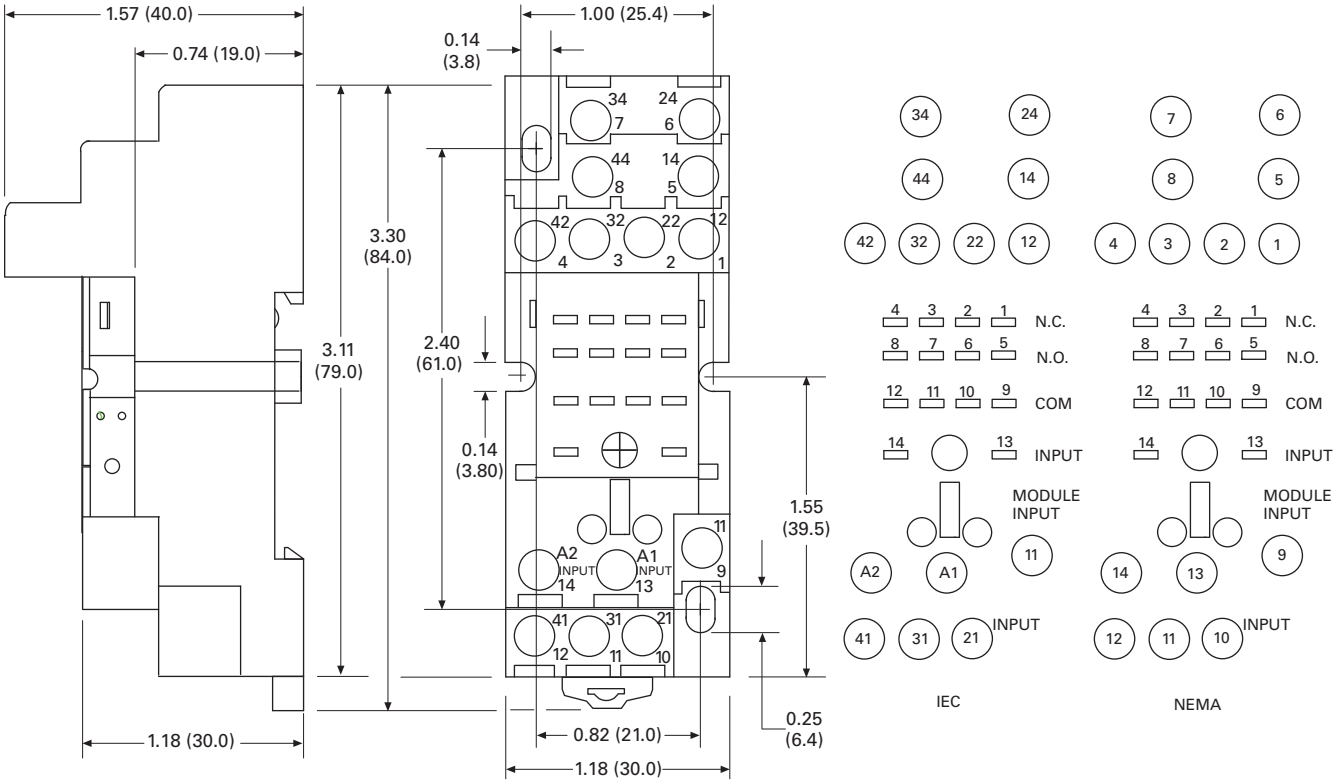


D2PA6



Approximate Dimensions in Inches (mm)

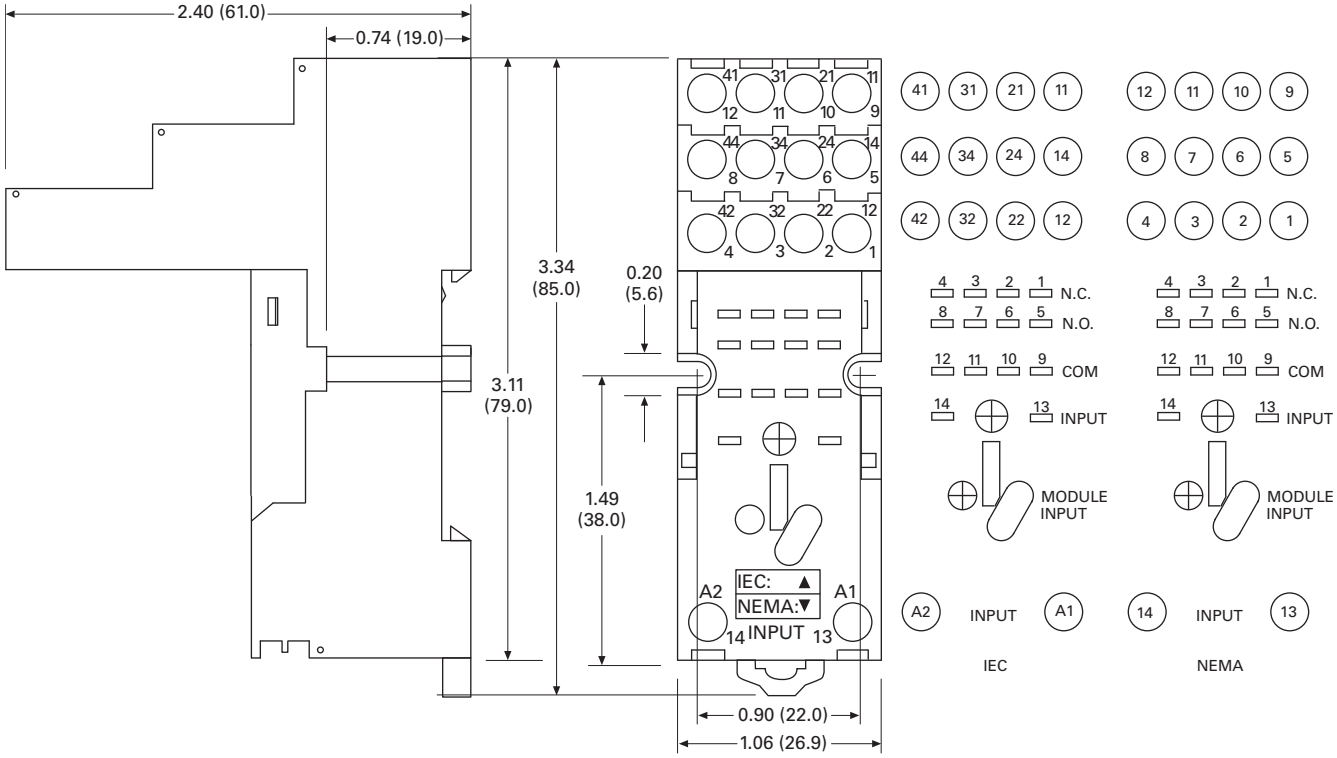
D2PA7



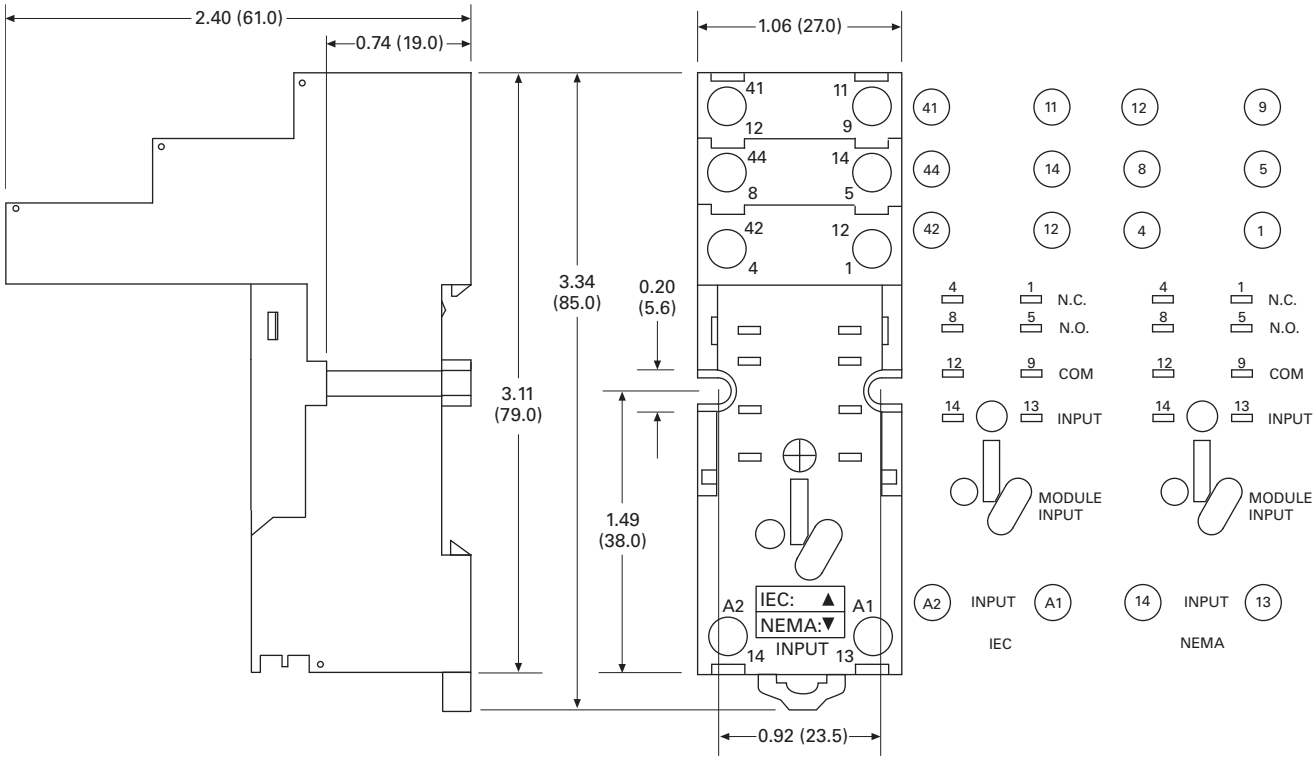
3

Approximate Dimensions in Inches (mm)

D2PAP



D2PAL



D3 Series Relay

Contents

D3RR/D3RF Series

Product Description

The D3 Series of relays provides excellent functionality in a popular octal base design. Rigid pins and guide allow for quick and easy installation with little risk of damage.

Features

D3RR

- Compact relay capable of breaking relatively large load currents
- Panel and DIN rail mounting
- 8- or 11-pin octal plug-in

D3RF

- The contact operation can be easily checked by Push-to-Test button
- Flag indicator shows relay status in manual or powered condition
- LED status lamp shows coil ON or OFF status—ideal for use in low light applications
- Push-to-Test button allows for manual operation of relay without the need for coil power
- Lock-down door holds pushbutton and contacts in the operate position when activated
- Finger-grip cover allows operator to remove relays from sockets easily
- ID tag/write label to identify relays in multiple-relay circuits
- Bipolar LED allows for reverse polarity applications

Standards and Certifications

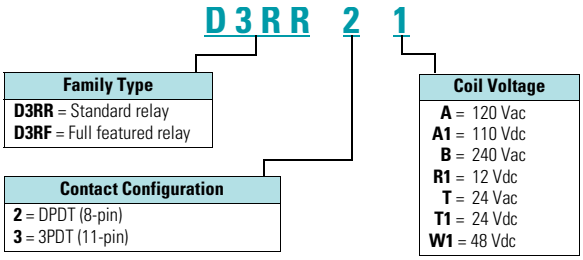
RoHS COMPLIANT

UL Listed — When used with accompanying Eaton screw terminal socket (for D3RF only)

- UL 508, URus (File No. E1491, E65657)

Catalog Number Selection

D3RR/D3RF Series ①



Product Selection

D3 Relay/Socket Quick Reference

Relay Type	Socket	Clip	Module Type	ID Tag	Jumper
D3RR2, D3RF2	D3PA6	PQC-1332	A	—	D3PJ1
	D3PAL8	PQC-1351	A	PWF-D3D5	—
	D3PA2	PQC-1351	None	—	—
D3RR3, D3RF3	D3PA7	PQC-1332	A	—	D3PJ1
	D3PAL11	PQC-1351	A	PWF-D3D5	—
	D3PA3	PQC-1351	None	—	—

Notes

① For deciphering catalog numbers. Do not use for ordering as not all combinations are readily available.

D3 Series Relay

D3RR/D3RF Series

Coil Voltage	Contact Configuration	Coil Resistance (Ohms)	Catalog Number
Full Featured Style			
120 Vac	DPDT	1,700	**D3RF2A**
240 Vac	DPDT	7,200	**D3RF2B**
12 Vdc	DPDT	120	**D3RF2R1**
24 Vdc	DPDT	470	**D3RF2T1**
120 Vac	3PDT	1,700	**D3RF3A**
220/240 Vac	3PDT	7,200	**D3RF3B**
12 Vdc	3PDT	120	**D3RF3R1**
24 Vac	3PDT	72	**D3RF3T**
24 Vdc	3PDT	470	**D3RF3T1**
Plain Cover Style			
120 Vac	DPDT	1,700	**D3RR2A**
110/125 Vdc	DPDT	10,000	**D3RR2A1**
220/240 Vac	DPDT	7,200	**D3RR2B**
12 Vdc	DPDT	120	**D3RR2R1**
24 Vac	DPDT	72	**D3RR2T**
24 Vdc	DPDT	470	**D3RR2T1**
48 Vdc	DPDT	1,800	**D3RR2W1**
120 Vac	3PDT	1,700	**D3RR3A**
110/125 Vdc	3PDT	10,000	**D3RR3A1**
220/240 Vac	3PDT	7,200	**D3RR3B**
12 Vdc	3PDT	120	**D3RR3R1**
24 Vac	3PDT	72	**D3RR3T**
24 Vdc	3PDT	470	**D3RR3T1**

Accessories

D3RR/D3RF Series Sockets and Accessories

Type	Module Size	Nominal Voltage (Max. for Sockets)	Nominal Current	Mounting Style	Wire Size	Wire Connection	Standard Pack	Catalog Number
Socket	A	300	16	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm²	Screw clamping	1	**D3PA6** ①
	A	300	12	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm²	Elevator	10	**D3PAL8** ①
	None	300/600	15/10	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm²	Screw clamping	10	**D3PA2**
	A	600	5	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm²	Screw clamping	1	**D3PA7** ①
	A	300	12	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm²	Elevator	10	**D3PAL11** ①
	None	300/600	15/5	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm²	Screw clamping	10	**D3PA3**
Metal spring clip	—	—	—	—	—	—	25	**PQC-1332**
	—	—	—	—	—	—	10	**PQC-1351**
Protection diode	A	6 to 250 Vdc	—	—	—	—	20	**MOD-AD250**
LED indicator	A	24 Vac/Vdc	—	—	—	—	20	**MOD-ALG24**
	A	120/240 Vac/Vdc	—	—	—	—	20	**MOD-ALG240**
MOV suppressor	A	120 Vac/Vdc	—	—	—	—	20	**MOD-AMV120**
	A	24 Vac/Vdc	—	—	—	—	20	**MOD-AMV24**
	A	240 Vac/Vdc	—	—	—	—	20	**MOD-AMV240**
R/C suppressor	A	6 to 24 Vac/Vdc	—	—	—	—	20	**MOD-RC24**
	A	110 to 240 Vac/Vdc	—	—	—	—	20	**MOD-RC240**
Write-on plastic labels	—	—	—	—	—	—	10	**PWF-D3D5**
Coil bus jumpers	—	—	—	—	—	—	10	**D3PJ1**
Plastic DIN rail end stop	—	—	—	—	—	—	25	**PFP-P**

Note

① Protection category (finger safe), EN 60529: IP20.

Technical Data and Specifications

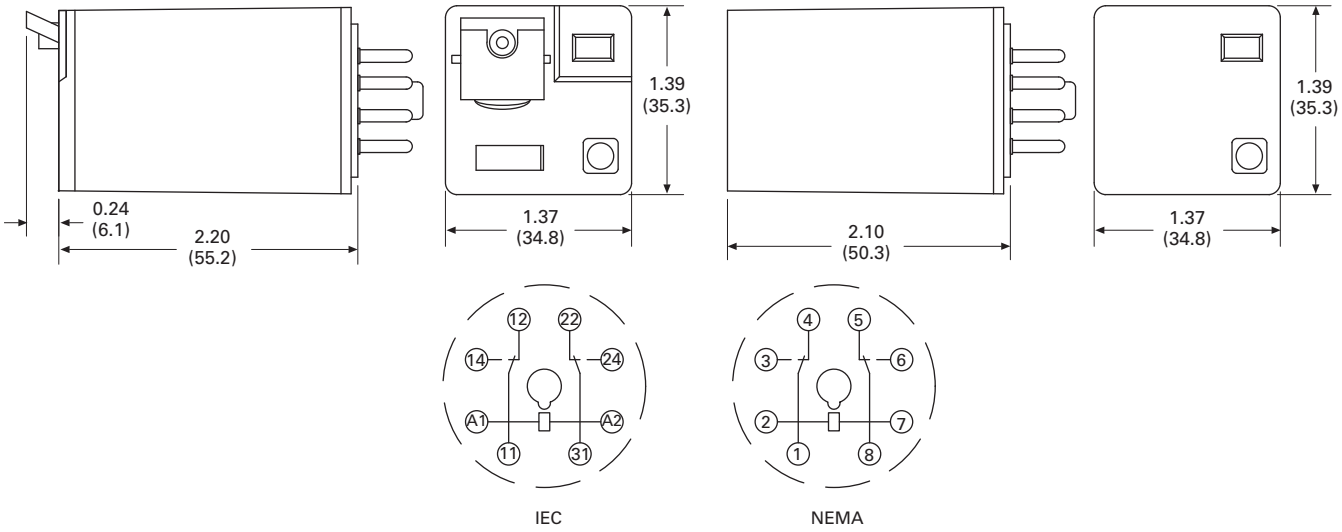
D3RR/D3RF Series Relay Specifications

Description	D3RR	D3RF
Contact Characteristics		
Contact rating	10 A	10 A
Terminal style	Octal	Octal
Contact materials	Silver alloy	Silver alloy
Maximum switching voltage	300 V	300 V
Switching current at voltage—resistive	10 A at 277 Vac 50/60 Hz	10 A at 277 Vac 50/60 Hz
	10 A at 120 Vac 50/60 Hz	10 A at 120 Vac 50/60 Hz
	10 A at 28 Vdc	10 A at 28 Vdc
Switching current at voltage	1/2 hp at 240 Vac	1/2 hp at 240 Vac
	1/3 hp at 120 Vac	1/3 hp at 120 Vac
Pilot duty	B300	B300
Minimum switching requirement	100 mA at 5 Vdc (0.5 W)	100 mA at 5 Vdc (0.5 W)
Coil Characteristics		
Operating range		
% of nominal (AC)	85 to 110%	85 to 110%
% of nominal (DC)	80 to 110%	80 to 110%
Average consumption	3 VA	3 VA
	1.4 W	1.4 W
Dropout voltage threshold	15% (AC)	15% (AC)
	10% (DC)	10% (DC)
Performance		
Electrical life (UL 508) operations at rated current	100,000 operations	100,000 operations
Mechanical life operations unpowered	5,000,000 operations	5,000,000 operations
Response time	20 ms	20 ms
Dielectric strength		
Between coil and contact Vac (rms)	1500 V (rms)	1500 V (rms)
Between poles Vac (rms)	1500 V (rms)	1500 V (rms)
Environment		
Ambient air temperature around the device		
Storage	–40 °F to +185 °F (–40 °C to +85 °C)	–40 °F to +185 °F (–40 °C to +85 °C)
Operation	–40 °F to +131 °F (–40 °C to +55 °C)	–40 °F to +131 °F (–40 °C to +55 °C)
Vibration resistance—operational	3 g-n at 10–55 Hz	3 g-n at 10–55 Hz
Shock resistance	10 g-n	10 g-n
Degree of protection	IP40	IP40
Features		
Cover options	Plain cover	Full Featured
Features	Mechanical flag indicator	Bipolar LED/ Locking pushbutton/ Removable ID tag/ Mechanical flag indicator
Product certifications	RoHS/UL/CE/CSA	RoHS/UL/CE/CSA

Dimensions

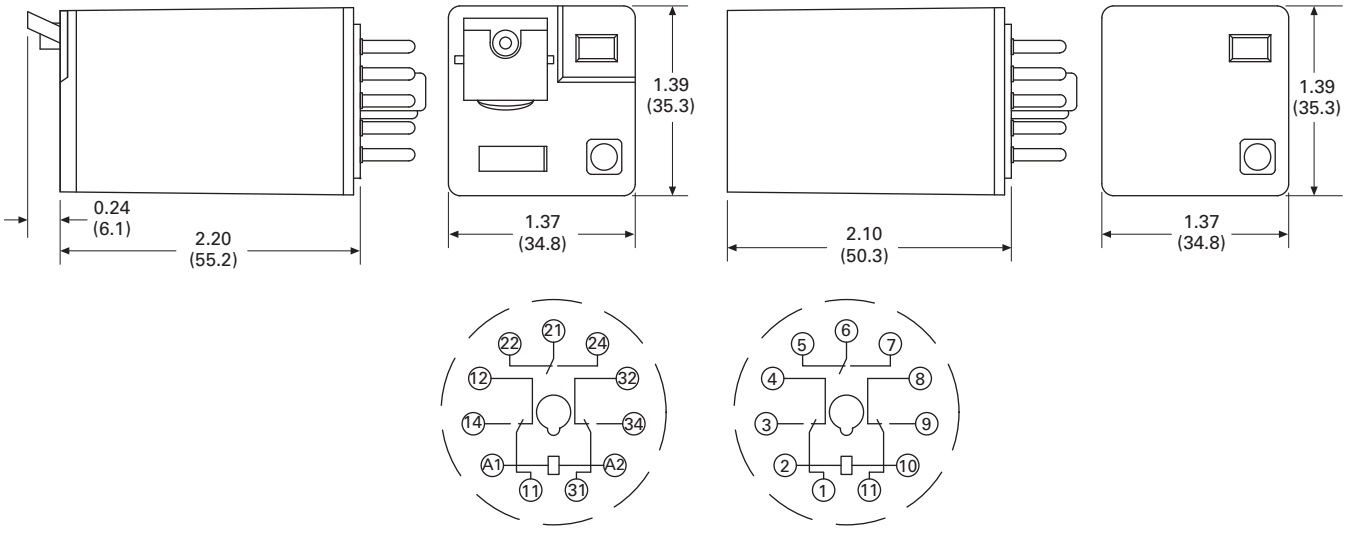
Approximate Dimensions in Inches (mm)

D3RR2/D3RF2



IEC NEMA

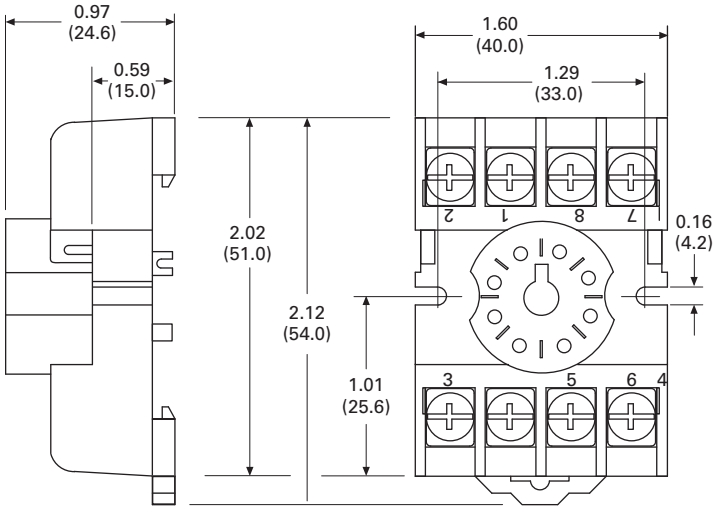
D3RR3/D3RF3

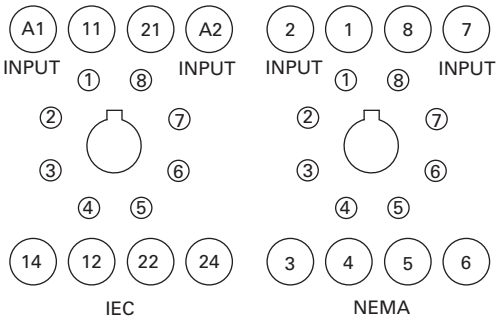


IEC NEMA

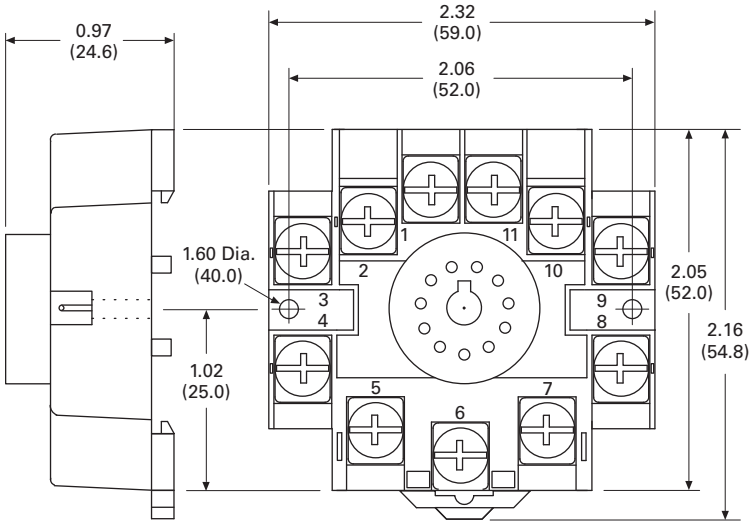
Approximate Dimensions in Inches (mm)

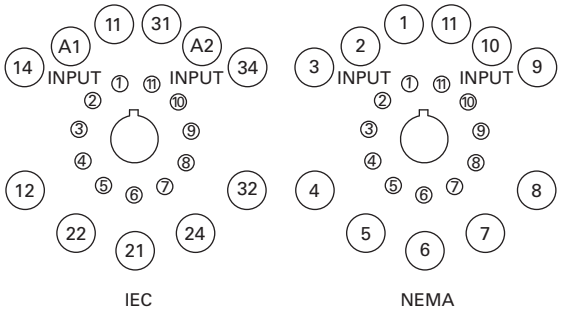
D3PA2

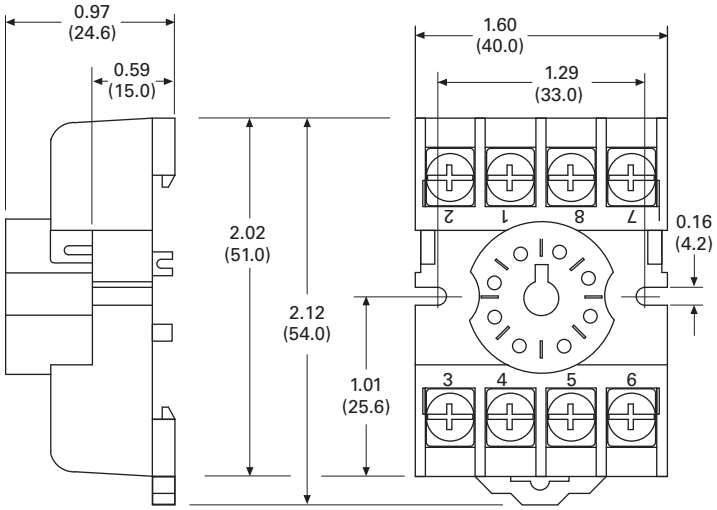


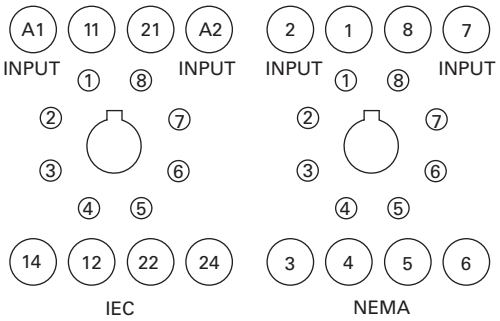


D3PA3



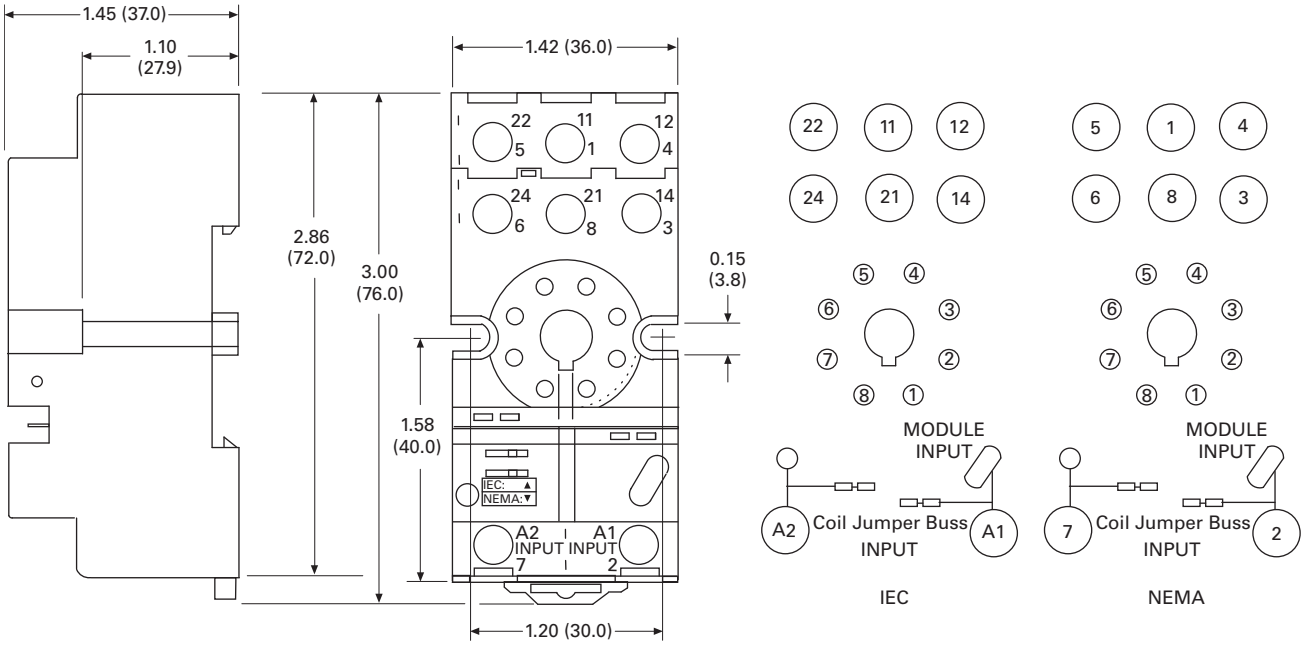






Approximate Dimensions in Inches (mm)

D3PA6



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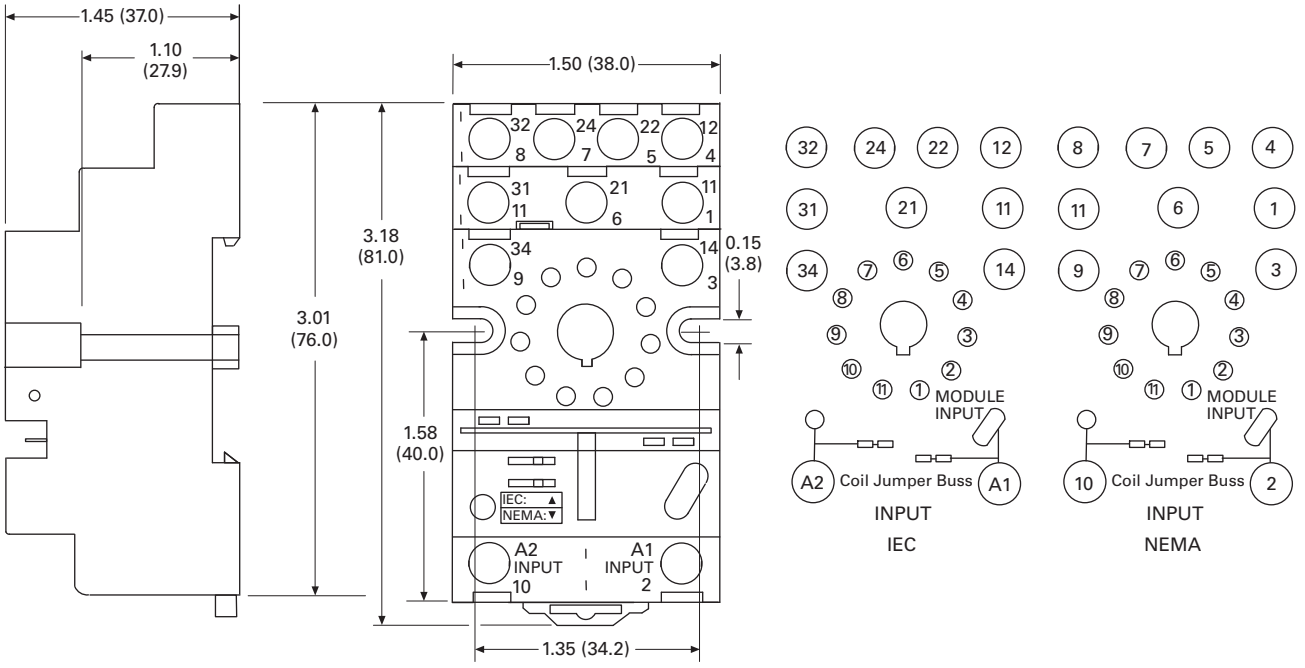
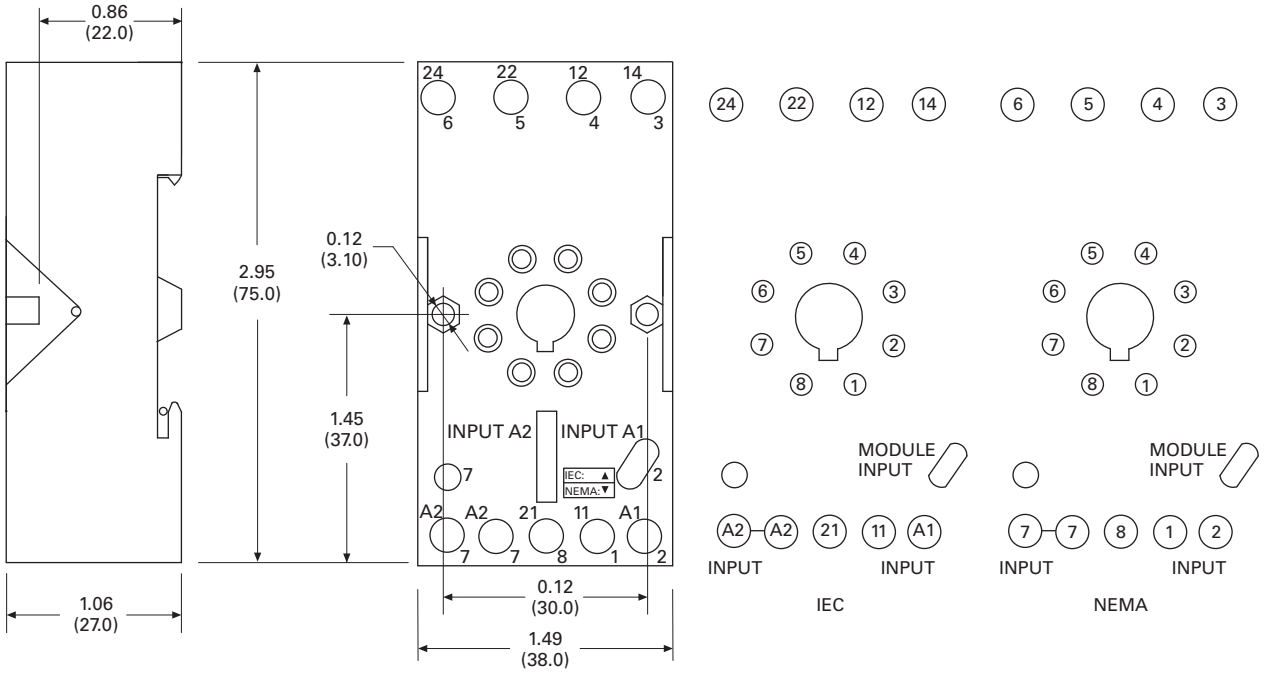
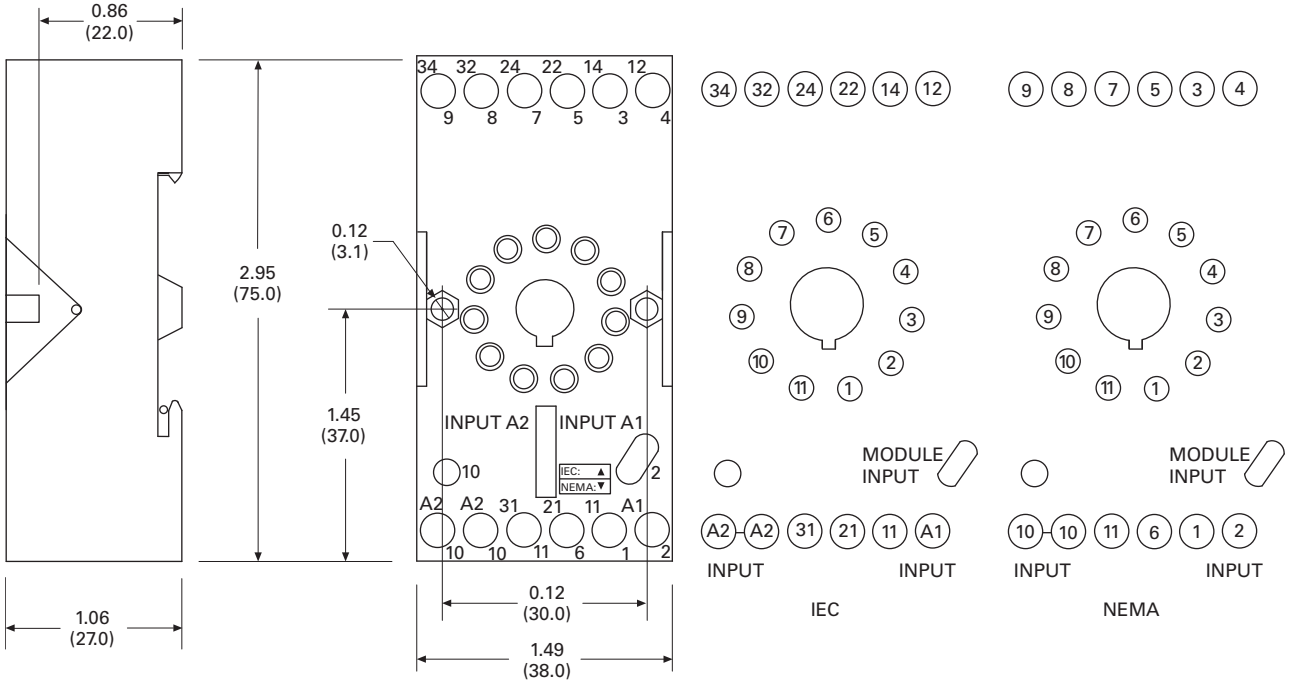


Approximate Dimensions in Inches (mm)

D3PAL8



D3PAL11



D4 Series Relay

Contents

D4 Series

Product Description

The D4 Series is a slim-form relay designed to fit into tight spaces. The retaining clip is built in to the socket to provide easy and secure assembly.

Features

- Slim-styled power relay
- Socket has built-in hold-down clip
- Panel or DIN rail mounting

Standards and Certifications

- IEC/EN 61810-1
- UL 508, URus (File No. E37317, E65657)
- CSA C22-2 (File No. LR701519)

Catalog Number Selection

D4 Series ①

D 4 P R 1 1 A

Family Type	Contact Configuration	Coil Voltage	Options
D4PR	**1** = SPDT **2** = DPDT	**A** = 120 Vac **B** = 230 Vac **R1** = 12 Vdc **T** = 24 Vac **T1** = 24 Vdc	**Blank** = Plain cover **1** = Indicating light

Product Selection

D4 Relay/Socket Quick Reference

Relay Type	Socket	Hold-Down Clip
D4PR1	D4PA11	②
D4PR2	D4PA21	②

Notes

① For deciphering catalog numbers. Do not use for ordering as not all combinations are readily available.

② Socket has built-in hold-down spring.

D4 Series Relay

D4 Series

Voltage/Poles	Standard Pack	Catalog Number
DIN Rail Sockets		
Single-pole	10	**D4PA11**
Two-pole	10	**D4PA21**
SPDT with Indicating Light		
120 Vac	1	**D4PR11A**
12 Vdc	1	**D4PR11R1**
24 Vac	1	**D4PR11T**
24 Vdc	1	**D4PR11T1**
Standard SPDT		
120 Vac	1	**D4PR1A**
24 Vac	10	**D4PR1T**
24 Vdc	1	**D4PR1T1**

Voltage/Poles	Standard Pack	Catalog Number
DPDT with Indicating Light		
120 Vac	1	**D4PR21A**
230 Vac	1	**D4PR21B**
24 Vac	1	**D4PR21T**
24 Vdc	1	**D4PR21T1**
Standard DPDT		
120 Vac	1	**D4PR2A**
230 Vac	50	**D4PR2B**
24 Vac	10	**D4PR2T**
24 Vdc	1	**D4PR2T1**

Technical Data and Specifications

D4 Series

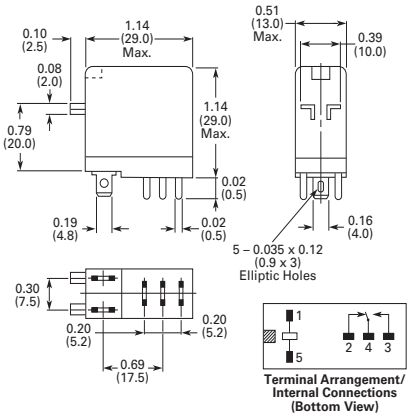
Technical specifications are the same for resistive and inductive loads.

Description	Specification
D4PR1	
Rated load	250 Vac 10 A/30 Vdc 10 A
Carry current	10 A
Max. operating voltage	250 Vac/30 Vdc
Max. operating current	10 A
Contact material	Ag alloy
Max. switching capacity	2500 VA/300 W
Min. permissible load	100 mA, 5 Vdc
Pickup voltage (max.)	80% AC/70% DC
Dropout voltage (min.)	30% AC/10% DC
Voltage (max.)	110%
Mechanical life (min.)	10,000,000 AC/ 10,000,000 DC
Electrical life at all contact ratings (min.)	100,000
Maximum hp ratings	1/3 hp (240 Vac)
D4PR2	
Rated load	240 Vac 5 A/30 Vdc 5 A
Carry current	5 A
Max. operating voltage	250 Vac/30 Vdc
Max. operating current	5 A
Contact material	Ag alloy
Max. switching capacity	1250 VA/150 W
Min. permissible load	100 mA, 5 Vdc
Pickup voltage (max.)	80% AC/DC
Dropout voltage (min.)	30% AC/10% DC
Voltage (max.)	110%
Mechanical life (min.)	10,000,000 AC/ 10,000,000 DC
Electrical life at all contact ratings (min.)	100,000
Maximum hp ratings	1/6 hp (240 Vac)

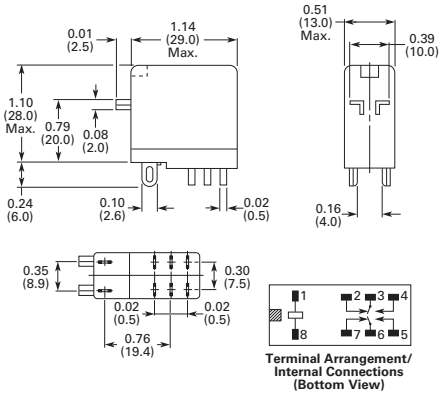
Dimensions

Approximate Dimensions in Inches (mm)

D4PR1



D4PR2



D5 Series Relay

Contents

D5RR/D5RF Series

Product Description

The D5 Series is rated at 10 A and is available in full-featured and plain cover styles.

Features

D5RR

- Industrial rated 300 V, 10 A relay in two-pole and three-pole configurations
- Compact design can be panel or DIN rail mounted

D5RF

- Flag indicator shows relay status in manual or powered condition
- LED status lamp shows coil ON or OFF status—ideal for use in low light applications
- Push-to-Test button allows for manual operation of relay without the need for coil power
- Lock-down door holds pushbutton and contacts in the operate position when activated
- Finger-grip cover allows operator to remove relays from sockets easily
- ID tag/write label to identify relays in multiple-relay circuits
- Bipolar LED allows for reverse polarity applications

Standards and Certifications

When used with accompanying Eaton screw terminal socket (D5RF only)

- UL 508, URus (File No. E1491, E65657)

Catalog Number Selection

D5 Series

D5RR 3 1

Family Type
D5RR = Standard relay
D5RF = Full featured relay

Contact Configuration
2 = DPDT
3 = 3PDT

Coil Voltage
A = 120 Vac
A1 = 110 Vdc
B = 240 Vac
R1 = 12 Vdc
T = 24 Vac
T1 = 24 Vdc
W1 = 48 Vdc

Product Selection

D5 Relay/Socket Quick Reference

Relay Type	Socket	Clip	Module Type	ID Tag	Jumper
D5RR2, D5RF2, D5RR3, D5RF3	D5PAL	PQC-1351	A	PWF-D3D5	D3PJ1
	D5PA2	PQC-1351	None	—	—
	D5PA3L	PQC-1351	None	—	—
	D5PA3S	PQC-1351	None	—	—

D5 Series Relay

D5 Series

Coil Voltage	Contact Configuration	Coil Resistance (Ohms)	Catalog Number
Full Featured			
120 Vac	DPDT	1,700	**D5RF2A**
110/125 Vdc	DPDT	10,000	**D5RF2A1**
220/240 Vac	DPDT	7,200	**D5RF2B**
12 Vdc	DPDT	120	**D5RF2R1**
24 Vac	DPDT	72	**D5RF2T**
24 Vdc	DPDT	470	**D5RF2T1**
120 Vac	3PDT	1,700	**D5RF3A**
110/125 Vdc	3PDT	10,000	**D5RF3A1**
220/240 Vac	3PDT	7,200	**D5RF3B**
12 Vdc	3PDT	120	**D5RF3R1**
24 Vac	3PDT	72	**D5RF3T**
24 Vdc	3PDT	470	**D5RF3T1**
Side Flange Cover			
220/240 Vac	DPDT	7,200	**D5RB2B**
12 Vdc	DPDT	120	**D5RB2R1**
24 Vac	DPDT	72	**D5RB2T**
24 Vdc	DPDT	470	**D5RB2T1**
Plain Cover			
120 Vac	DPDT	1,700	**D5RR2A**
110/125 Vdc	DPDT	10,000	**D5RR2A1**
220/240 Vac	DPDT	7,200	**D5RR2B**
24 Vac	DPDT	72	**D5RR2T**
24 Vdc	DPDT	470	**D5RR2T1**
120 Vac	3PDT	1,700	**D5RR3A**
110/125 Vdc	3PDT	10,000	**D5RR3A1**
220/240 Vac	3PDT	7,200	**D5RR3B**
12 Vdc	3PDT	120	**D5RR3R1**
24 Vac	3PDT	72	**D5RR3T**
24 Vdc	3PDT	470	**D5RR3T1**

Accessories

D5 Sockets and Accessories

Type	Module Size	Nominal Voltage (Max. for Sockets)	Nominal Current	Mounting Style	Wire Size	Wire Connection	Standard Pack	Catalog Number
Socket	A	300	25	DIN rail	10 /14 (2) AWG, 6/2.5 (2) mm^2	Elevator	10	**D5PAL** ①
	None	300	15	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm^2	Screw clamping	10	**D5PA2**
	None	300	15	Chassis	(Output): 16 AWG, 1 mm^2	Solder	10	**D5PA3L**
	None	300	15	Chassis	(Output): 16 AWG, 1 mm^2	Solder	10	**D5PA3S**
Metal spring clip	—	—	—	—	—	—	10	**PQC-1351**
Protection diode	A	6 to 250 Vdc	—	—	—	—	20	**MOD-AD250**
LED indicator	A	24 Vac/Vdc	—	—	—	—	20	**MOD-ALG24**
	A	120/240 Vac/Vdc	—	—	—	—	20	**MOD-ALG240**
MOV suppressor	A	120 Vac/Vdc	—	—	—	—	20	**MOD-AMV120**
	A	24 Vac/Vdc	—	—	—	—	20	**MOD-AMV24**
	A	240 Vac/Vdc	—	—	—	—	20	**MOD-AMV240**
R/C suppressor	A	6 to 24 Vac/Vdc	—	—	—	—	20	**MOD-RC24**
	A	110 to 240 Vac/Vdc	—	—	—	—	20	**MOD-RC240**
Write-on plastic labels	—	—	—	—	—	—	10	**PWF-D3D5**
Coil bus jumpers	—	—	—	—	—	—	10	**D3PJ1**
Plastic DIN rail end stop	—	—	—	—	—	—	25	**PFP-P**

Note

① Protection category (finger safe), EN 60529: IP20.

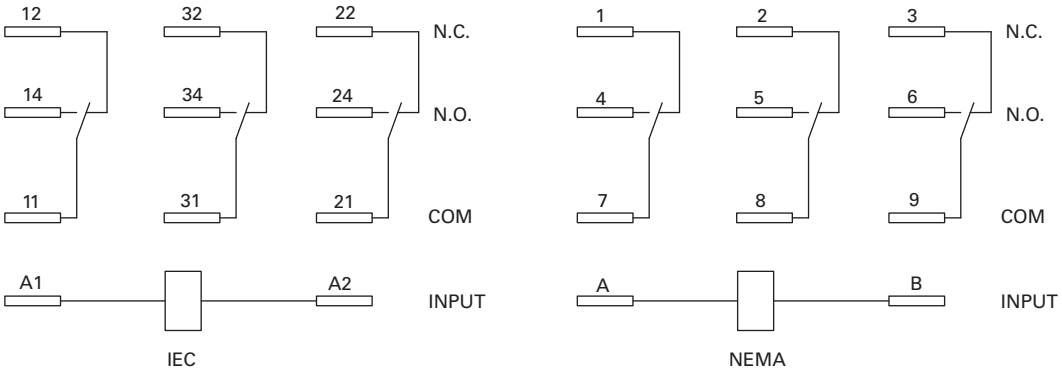
Technical Data and Specifications

D5 Series

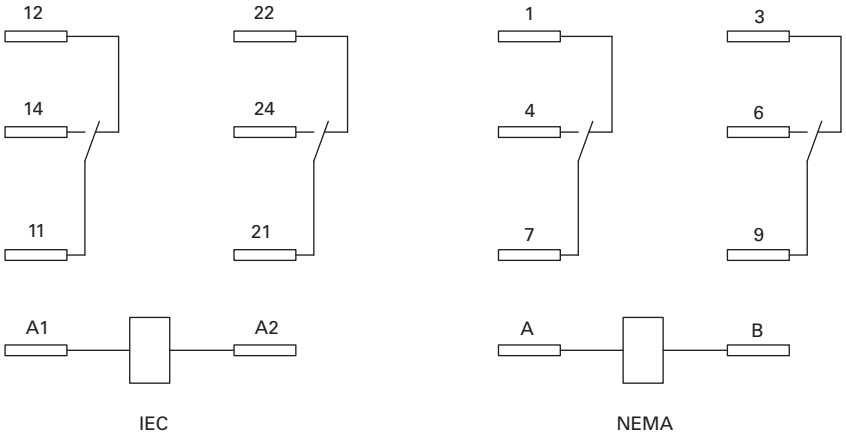
Description	D5RR	D5RF
Contact Characteristics		
Contact rating	10 A	10 A
Terminal style	Plug-in	Plug-in
Contact materials	Silver alloy	Silver alloy
Maximum switching voltage	300 V	300 V
Switching current at voltage—resistive		
	10 A at 277 Vac 50/60 Hz	10 A at 277 Vac 50/60 Hz
	10 A at 120 Vac 50/60 Hz	10 A at 120 Vac 50/60 Hz
	10 A at 28 Vdc	10 A at 28 Vdc
Switching current at voltage	1/2 hp at 240 Vac	1/2 hp at 240 Vac
	1/3 hp at 120 Vac	1/3 hp at 120 Vac
Pilot duty	B300	B300
Minimum switching requirement	100 mA at 5 Vdc (0.5 W)	100 mA at 5 Vdc (0.5 W)
Coil Characteristics		
Operating range		
% of nominal (AC)	85 to 110%	85 to 110%
% of nominal (DC)	80 to 110%	80 to 110%
Average consumption	3 VA 1.4 W	3 VA 1.4 W
Drop-out voltage threshold	10%/15% (AC) 10% (DC)	10%/15% (AC) 10% (DC)
Performance		
Electrical life (UL 508) operations at rated current	100,000 operations	100,000 operations
Mechanical life operations unpowered	5,000,000 operations	5,000,000 operations
Response time	20 ms	20 ms
Dielectric strength		
Between coil and contact Vac (rms)	1500 V (rms)	1500 V (rms)
Between poles Vac (rms)	1500 V (rms)	1500 V (rms)
Environment		
Ambient air temperature around the device		
Storage	–40 °F to +185 °F (–40 °C to +85 °C)	–40 °F to +185 °F (–40 °C to +85 °C)
Operation	–40 °F to +131 °F (–40 °C to +55 °C)	–40 °F to +131 °F (–40 °C to +55 °C)
Vibration resistance—operational	3 g-n at 10–55 Hz	3 g-n at 10–55 Hz
Shock resistance	10 g-n	10 g-n
Degree of protection	IP40	IP40
Features		
Cover options	Flange/plain cover with LED	Full featured
Features	Mechanical flag indicator (LED optional)	Bipolar LED/ Mechanical flag indicator/ Locking pushbutton/ Removable ID tag
Product certifications	RoHS/UL/CE/CSA	RoHS/UL/CE/CSA

Wiring Diagrams

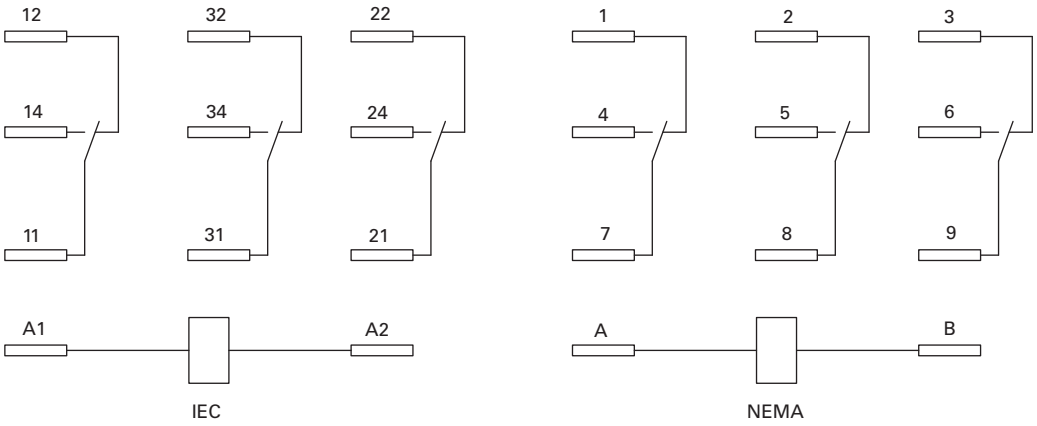
D5PA3L and D5PA3S



D5RR2/D5RF2 DPDT



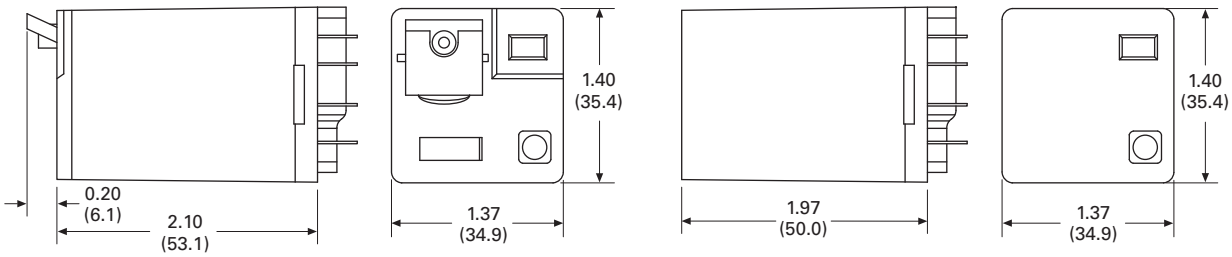
D5RR3/D5RF3 3PDT



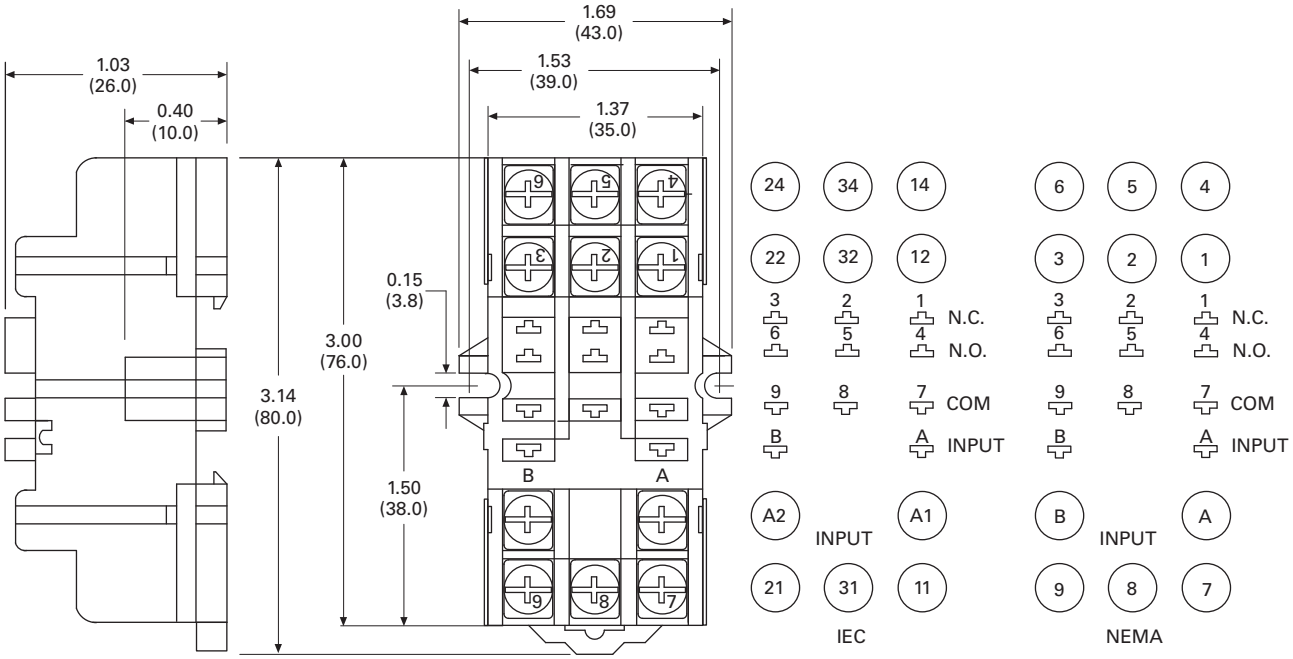
Dimensions

Approximate Dimensions in Inches (mm)

D5RR and D5RF

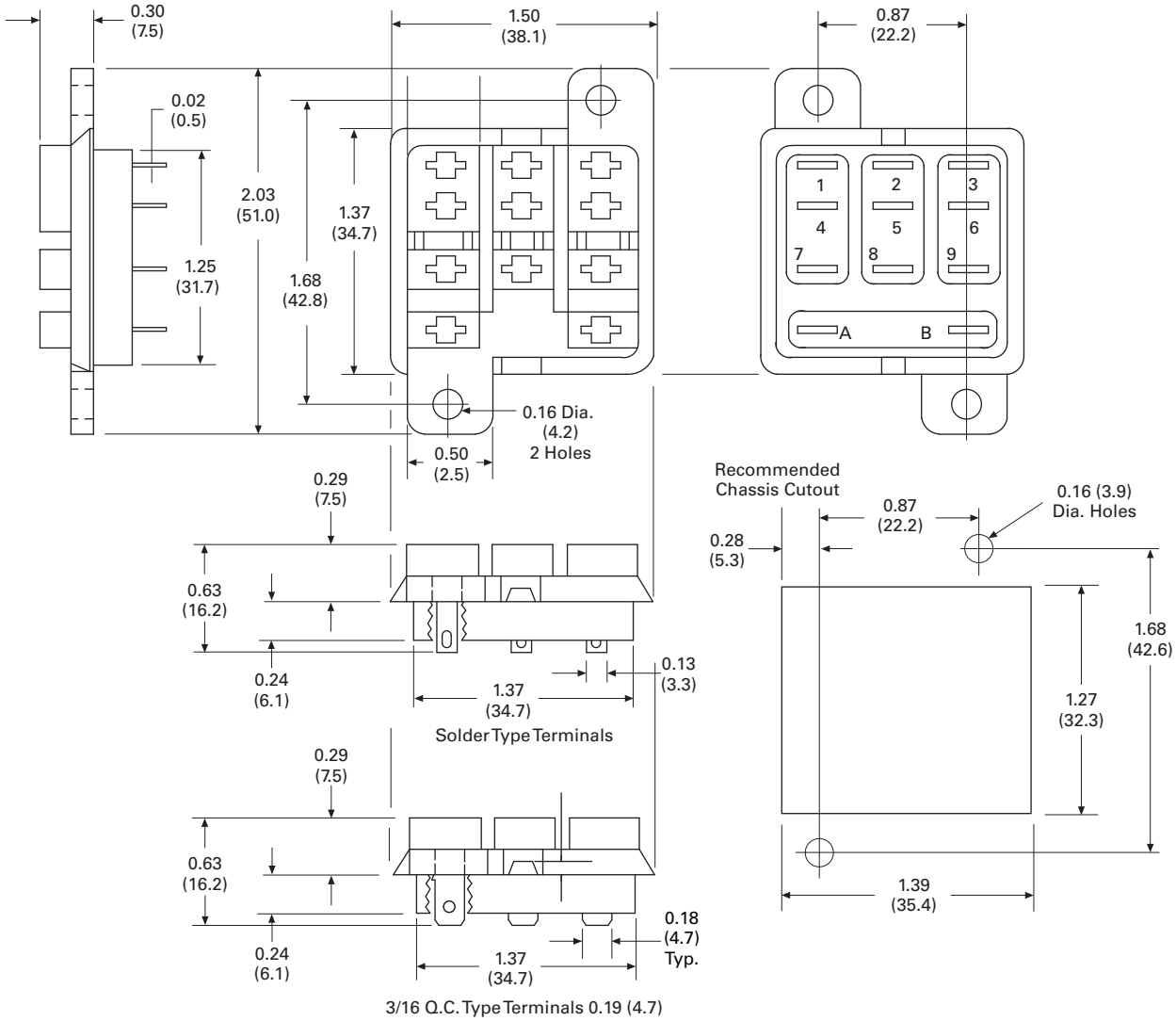


D5PA2



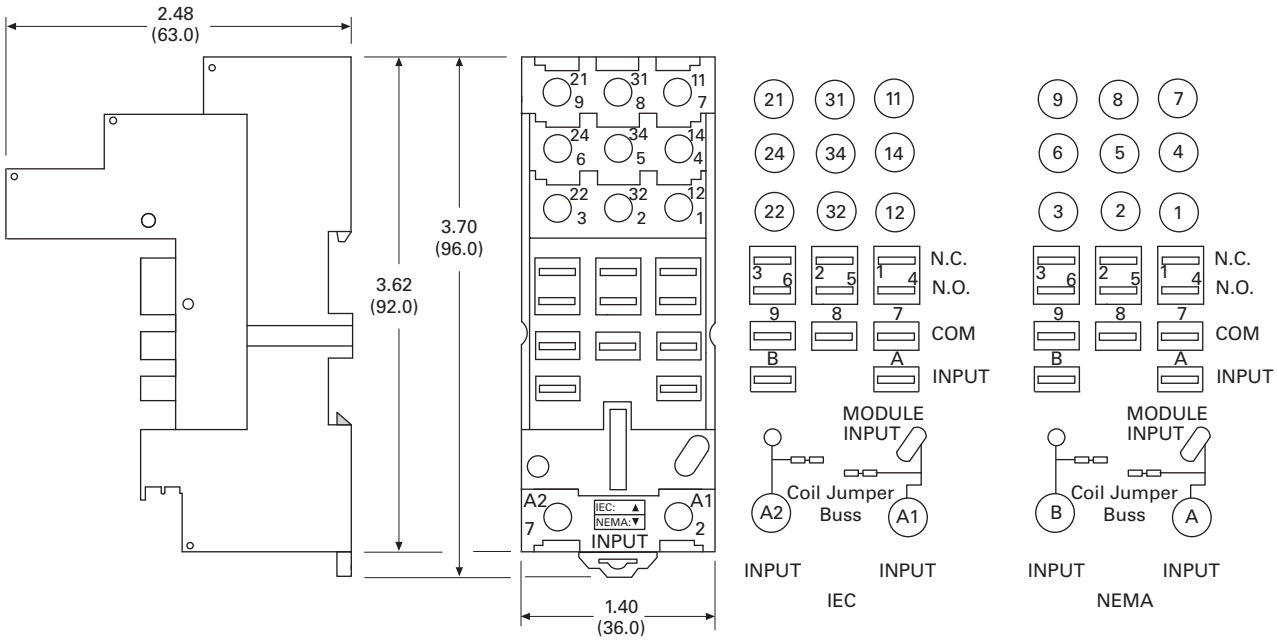
Approximate Dimensions in Inches (mm)

D5PA3L and D5PA3S



Approximate Dimensions in Inches (mm)

D5PAL



D7 Series Relay

Contents

D7PR/D7PF Series

Product Description

The D7 Series is a cost-effective control relay with high dielectric strength and high current-carrying capacity.

Features

D7PR

- Arc barrier equipped relay with high dielectric strength
- Panel and DIN rail mounting

D7PF

- Flag indicator shows relay status in manual or powered condition
- Bipolar LED status lamp allows for reverse polarity applications
  - Shows coil ON or OFF status
  - Ideal in low light conditions
- Color-coded pushbutton identifies AC coils with red or DC coils with blue pushbuttons
  - Allows for manual operation of relay without the need for coil power
  - Ideal for field service personnel to test control circuits
- Lock-down door, when activated, holds pushbutton and contacts in the operate position
  - Excellent for analyzing circuit problems
- Finger-grip cover allows operator to remove relays from sockets more easily than conventional relays
- White plastic ID tag/write label used for identification of relays in multi-relay circuits

Standards and Certifications

File # E1491, E65657

File # LR217017, LR217069

Catalog Number Selection

D7 Series

D7PR 1 1 A

Family Type
D7PR = Standard relay
D7PF = Full featured relay

Contact Configuration
2 = DPDT
3 = 3PDT
4 = 4PDT

Coil Voltage
A = 120 Vac
A1 = 110 Vdc
B = 240 Vac
R1 = 12 Vdc
T = 24 Vac
T1 = 24 Vdc
W1 = 48 Vdc

Options
Blank = Plain cover (D7PR only)
A = LED test button, flag indicator, lock-down door, finger-grip cover, ID tag (D7PF only)

Product Selection

D7 Relay/Socket Quick Reference

Relay Type	Socket/Adapter	Clip	Module Type	ID Tag	Jumper
D7PR2, D7PF2	D7PAA	PQC-1342	B	—	—
		PQC-1349	B	—	—
	D7PA9	PQC-1342	None	—	—
	PFC-D2D72	—	None	—	—
D7PR3, D7PF3	D7PAB	PQC-1783	A	—	—
		PMC-1783	A	—	—
	PFC-D73	—	None	—	—
D7PR4, D7PF4	D7PAD	PQC-1784	A	—	—
		PMC-1784	A	—	—
	PFC-D74	—	None	—	—

D7 Series Relay

D7 Series

Coil Voltage	Contact Configuration	Coil Resistance (Ohms)	Catalog Number
Full Featured			
120 Vac	DPDT	4,430	**D7PF2AA**
110/125 Vdc	DPDT	11,000	**D7PF2AA1**
220/240 Vac	DPDT	15,720	**D7PF2AB**
12 Vdc	DPDT	160	**D7PF2AR1**
24 Vac	DPDT	180	**D7PF2AT**
24 Vdc	DPDT	650	**D7PF2AT1**
24 Vac	3PDT	103	**D7PF3AT**
24 Vdc	3PDT	400	**D7PF3AT1**
120 Vac	4PDT	2,220	**D7PF4AA**
110/125 Vdc	4PDT	7,340	**D7PF4AA1**
240 Vac	4PDT	9,120	**D7PF4AB**
12 Vdc	4PDT	96	**D7PF4AR1**
24 Vac	4PDT	84.5	**D7PF4AT**
24 Vdc	4PDT	388	**D7PF4AT1**
48 Vac	4PDT	410	**D7PF4AW1**
Plain Cover			
120 Vac	DPDT	4,430	**D7PR2A**
12 Vdc	DPDT	160	**D7PR2R1**
24 Vac	DPDT	180	**D7PR2T**
24 Vdc	DPDT	650	**D7PR2T1**
120 Vac	3PDT	2,770	**D7PR3A**
240 Vac	3PDT	12,100	**D7PR3B**
24 Vac	3PDT	103	**D7PR3T**
24 Vdc	3PDT	400	**D7PR3T1**
120 Vac	4PDT	2,220	**D7PR4A**
110/125 Vdc	4PDT	7,340	**D7PR4A1**
240 Vac	4PDT	9,120	**D7PR4B**
24 Vac	4PDT	84.5	**D7PR4T**
24 Vdc	4PDT	388	**D7PR4T1**

Accessories

D7 Sockets and Accessories

Type	Module Size	Nominal Voltage (Max. for Sockets)	Nominal Current	Mounting Style	Wire Size	Wire Connection	Standard Pack	Catalog Number
Socket	B	300	16	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm²	Screw clamping	—	**D7PAA** ①
	None	300	10	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm²	Screw clamping	1	**D7PA9**
	A	300	16	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm²	Screw clamping	—	**D7PAD** ①
	A	300	16	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm²	Screw clamping	—	**D7PAB** ①
Flange mount adapter	—	—	—	Flange	—	—	25	**PFC-D2D72**
	—	—	—	Flange	—	—	25	**PFC-D73**
	—	—	—	Flange	—	—	25	**PFC-D74**
Metal spring clip	—	—	—	—	—	—	25	**PQC-1342**
Plastic ID clip	—	—	—	—	—	—	10	**PQC-1349**
Metal spring clip	—	—	—	—	—	—	25	**PQC-1784**
Plastic ID clip	—	—	—	—	—	—	10	**PMC-1784**
Hold-down spring	—	—	—	—	—	—	25	**PYC-B2**
Metal spring clip	—	—	—	—	—	—	10	**PQC-1783**
Plastic ID clip	—	—	—	—	—	—	10	**PMC-1783**
Protection diode	A	6 to 250 Vdc	—	—	—	—	20	**MOD-AD250**
LED indicator	A	24 Vac/Vdc	—	—	—	—	20	**MOD-ALG24**
	A	120/240 Vac/Vdc	—	—	—	—	20	**MOD-ALG240**
MOV suppressor	A	120 Vac/Vdc	—	—	—	—	20	**MOD-AMV120**
	A	24 Vac/Vdc	—	—	—	—	20	**MOD-AMV24**
	A	240 Vac/Vdc	—	—	—	—	20	**MOD-AMV240**
R/C suppressor	A	6 to 24 Vac/Vdc	—	—	—	—	20	**MOD-RC24**
	A	110 to 240 Vac/Vdc	—	—	—	—	20	**MOD-RC240**
Protection diode	B	6 to 250 Vdc	—	—	—	—	20	**MOD-BD250**
LED indicator	B	24 Vac/Vdc	—	—	—	—	20	**MOD-BLG24**
	B	120/240 Vac/Vdc	—	—	—	—	20	**MOD-BLG240**
MOV suppressor	B	120 Vac/Vdc	—	—	—	—	20	**MOD-BMV120**
	B	24 Vac/Vdc	—	—	—	—	20	**MOD-BMV24**
	B	240 Vac/Vdc	—	—	—	—	20	**MOD-BMV240**
Plastic DIN rail end stop	—	—	—	—	—	—	25	**PFP-P**

Note

① Protection category (finger safe), EN 60529: IP20.

Technical Data and Specifications

D7PR Relay

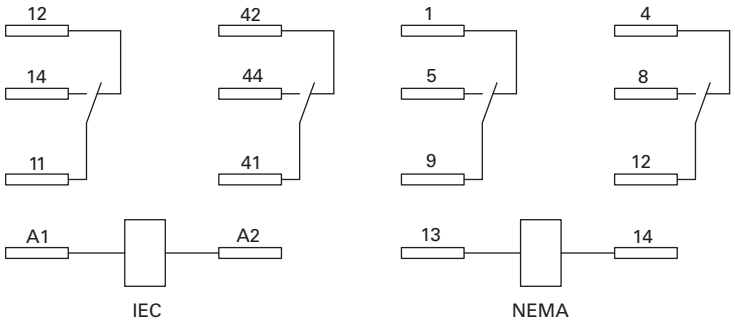
Description	D7PR (DPDT)	D7PR (3PDT)	D7PR (4PDT)
Contact Characteristics			
Contact rating	15 A	15 A	15 A
Terminal style	Plug-in	Plug-in	Plug-in
Contact materials	Silver alloy	Silver alloy	Silver alloy
Maximum switching voltage	300 V	300 V	300 V
Switching current at voltage—resistive	15 A at 120 Vac 50/60 Hz	15 A at 120 Vac 50/60 Hz	15 A at 120 Vac 50/60 Hz
	12 A at 277 Vac 50/60 Hz	12 A at 277 Vac 50/60 Hz	12 A at 277 Vac 50/60 Hz
	10 A at 277 Vac 50/60 Hz	—	—
	12 A at 28 Vdc	12 A at 28 Vdc	12 A at 28 Vdc
Switching current at voltage	1/2 hp at 120 Vac	1/2 hp at 120 Vac	1/2 hp at 120 Vac
	1 hp at 250 Vac	3/4 hp at 250 Vac	3/4 hp at 250 Vac
Pilot duty	B300	B300	B300
Minimum switching requirement	100 mA at 5 Vdc (0.5 W)	100 mA at 5 Vdc (0.5 W)	100 mA at 5 Vdc (0.5 W)
Coil Characteristics			
Operating range			
% of nominal (AC)	85 to 110%	85 to 110%	85 to 110%
% of nominal (DC)	80 to 110%	80 to 110%	80 to 110%
Average consumption	1.2 VA	1.5 VA	1.5 VA
	0.9 W	1.4 W	1.5 W
Dropout voltage threshold	15% (AC)	15% (AC)	15% (AC)
	10% (DC)	10% (DC)	10% (DC)
Performance			
Electrical life (UL 508) operations at rated current	100,000 operations	200,000 operations	200,000 operations
Mechanical life operations unpowered	10,000,000 operations	10,000,000 operations	10,000,000 operations
Response time	20 ms	20 ms	20 ms
Dielectric strength			
Between coil and contact Vac (rms)	2500 V (rms)	2500 V (rms)	2500 V (rms)
Between poles Vac (rms)	1500 V (rms)	2500 V (rms)	2500 V (rms)
Environment			
Ambient air temperature around the device			
Operation	–40 °F to +131 °F (–40 °C to +55 °C)	–40 °F to +131 °F (–40 °C to +55 °C)	–40 °F to +131 °F (–40 °C to +55 °C)
Storage	–40 °F to +185 °F (–40 °C to +85 °C)	–40 °F to +185 °F (–40 °C to +85 °C)	–40 °F to +185 °F (–40 °C to +85 °C)
Vibration resistance—operational	3 g-n at 10–55 Hz	3 g-n at 10–55 Hz	3 g-n at 10–55 Hz
Shock resistance	10 g-n	10 g-n	10 g-n
Degree of protection	IP40	IP40	IP40
Features			
Cover options	Plain cover	Plain cover	Plain cover
Features	Mechanical flag indicator (optional LED)	Mechanical flag indicator (optional LED)	Mechanical flag indicator (optional LED)
Product certifications	RoHS/UL/CE/CSA	RoHS/UL/CE/CSA	RoHS/UL/CE/CSA

D7PF Relay

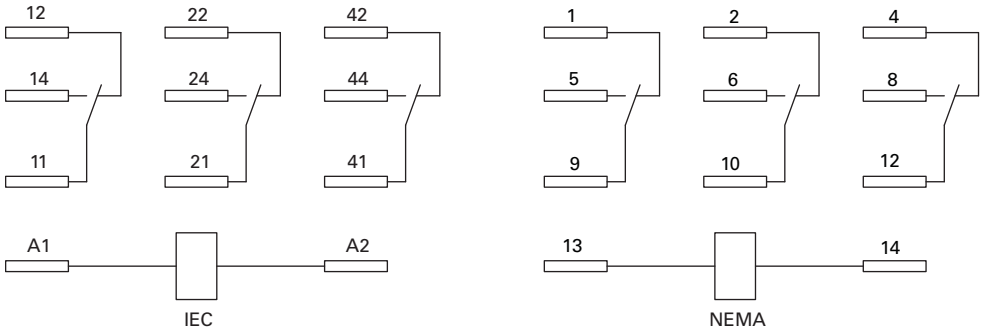
Description	D7PF (DPDT)	D7PF (3PDT)	D7PF (4PDT)
Contact Characteristics			
Contact rating	15 A	15 A	15 A
Terminal style	Plug-in	Plug-in	Plug-in
Contact materials	Silver alloy	Silver alloy	Silver alloy
Maximum switching voltage	300 V	300 V	300 V
Switching current at voltage—resistive			
	15 A at 120 Vac 50/60 Hz	15 A at 120 Vac 50/60 Hz	15 A at 120 Vac 50/60 Hz
	12 A at 277 Vac 50/60 Hz	12 A at 277 Vac 50/60 Hz	12 A at 277 Vac 50/60 Hz
	10 A at 277 Vac 50/60 Hz	—	—
	12 A at 28 VDC	12 A at 28 Vdc	12 A at 28 Vdc
Switching current at voltage	1/2 hp at 120 Vac	3/4 hp at 250 Vac	1/2 hp at 120 Vac
	1 hp at 250 Vac	1/2 hp at 120 Vac	3/4 hp at 250 Vac
Pilot duty	B300	B300	B300
Minimum switching requirement	100 mA at 5 Vdc (0.5 W)	100 mA at 5 Vdc (0.5 W)	100 mA at 5 Vdc (0.5 W)
Coil Characteristics			
Operating range			
% of nominal (AC)	85 to 110%	85 to 110%	85 to 110%
% of nominal (DC)	80 to 110%	80 to 110%	80 to 110%
Average consumption	1.2 VA	1.5 VA	1.5 VA
	0.9 W	1.4 W	1.5 W
Dropout voltage threshold	15% (AC)	15% (AC)	15% (AC)
	10% (DC)	10% (DC)	10% (DC)
Performance			
Electrical life (UL 508) operations at rated current	100,000 operations	200,000 operations	200,000 operations
Mechanical life operations unpowered	10,000,000 operations	10,000,000 operations	10,000,000 operations
Response time	20 ms	20 ms	20 ms
Dielectric strength			
Between coil and contact Vac (rms)	2500 V (rms)	2500 V (rms)	2500 V (rms)
Between poles Vac (rms)	1500 V (rms)	2500 V (rms)	2500 V (rms)
Environment			
Ambient air temperature around the device			
Operation	–40 °F to +131 °F (–40 ° to 55 °C)	–40 °F to +131 °F (–40 ° to 55 °C)	–40 °F to +131 °F (–40 ° to 55 °C)
Storage	–40 °F to +185 °F (–40 ° to 85 °C)	–40 °F to +185 °F (–40 ° to 85 °C)	–40 °F to +185 °F (–40 ° to 85 °C)
Vibration resistance—operational	3 g-n at 10–55 Hz	3 g-n at 10–55 Hz	3 g-n at 10–55 Hz
Shock resistance	10 g-n	10 g-n	10 g-n
Degree of protection	IP40	IP40	IP40
Features			
Cover options	Full featured	Full featured	Full featured
Features	Locking pushbutton/ Bipolar LED/ Removable ID tag/ Mechanical flag indicator	Locking pushbutton/ Bipolar LED/ Removable ID tag/ Mechanical flag indicator	Locking pushbutton/ Bipolar LED/ Removable ID tag/ Mechanical flag indicator
Product certifications	RoHS/UL/CE/CSA	RoHS/UL/CE/CSA	RoHS/UL/CE/CSA

Wiring Diagrams

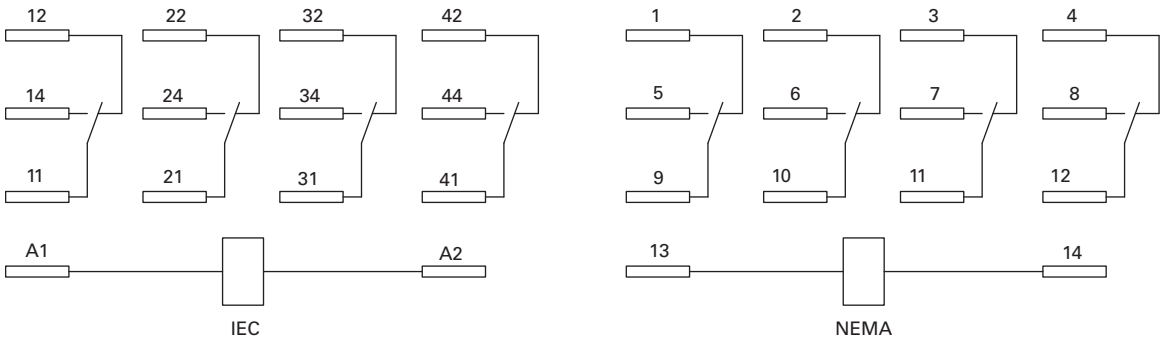
D7PR2/D7PF2



D7PR3/D7PF3



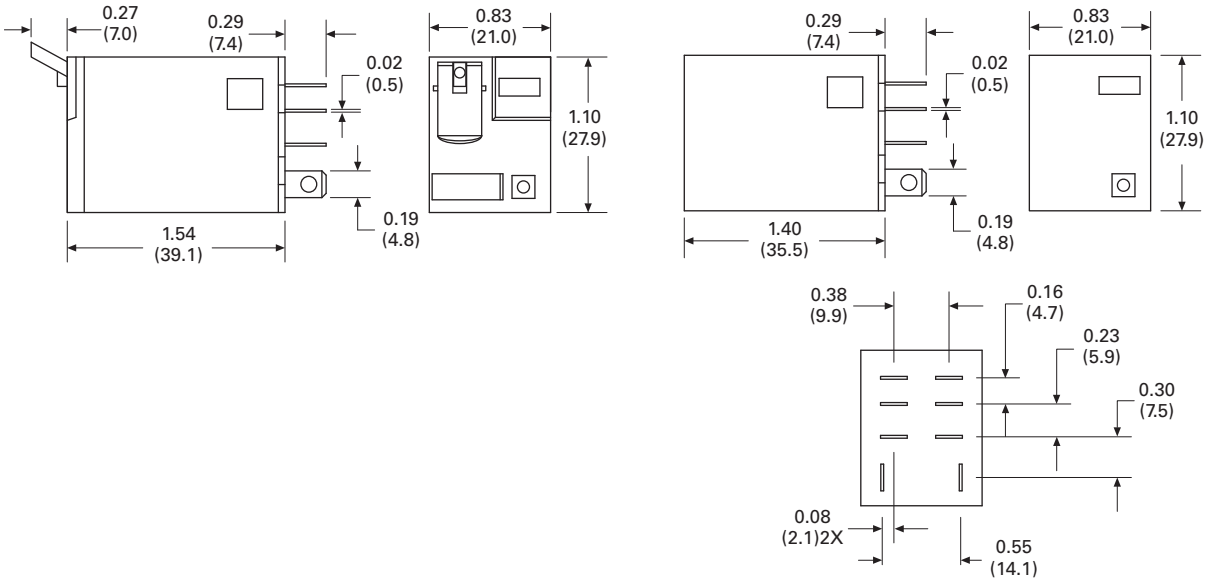
D7PR4/D7PF4



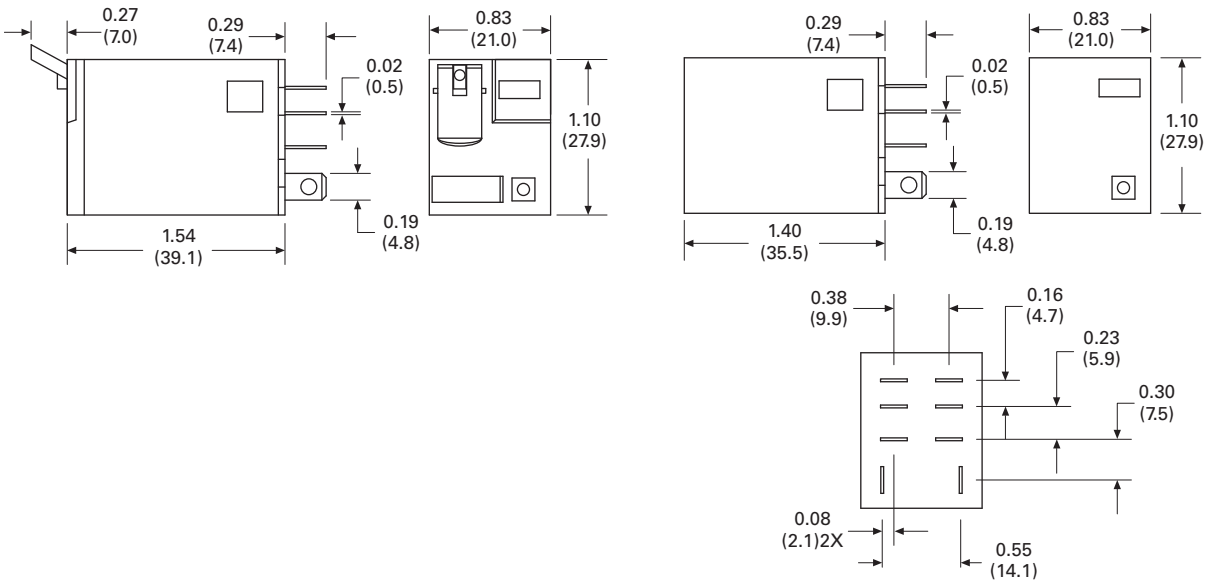
Dimensions

Approximate Dimensions in Inches (mm)

D7PR1/D7PF1



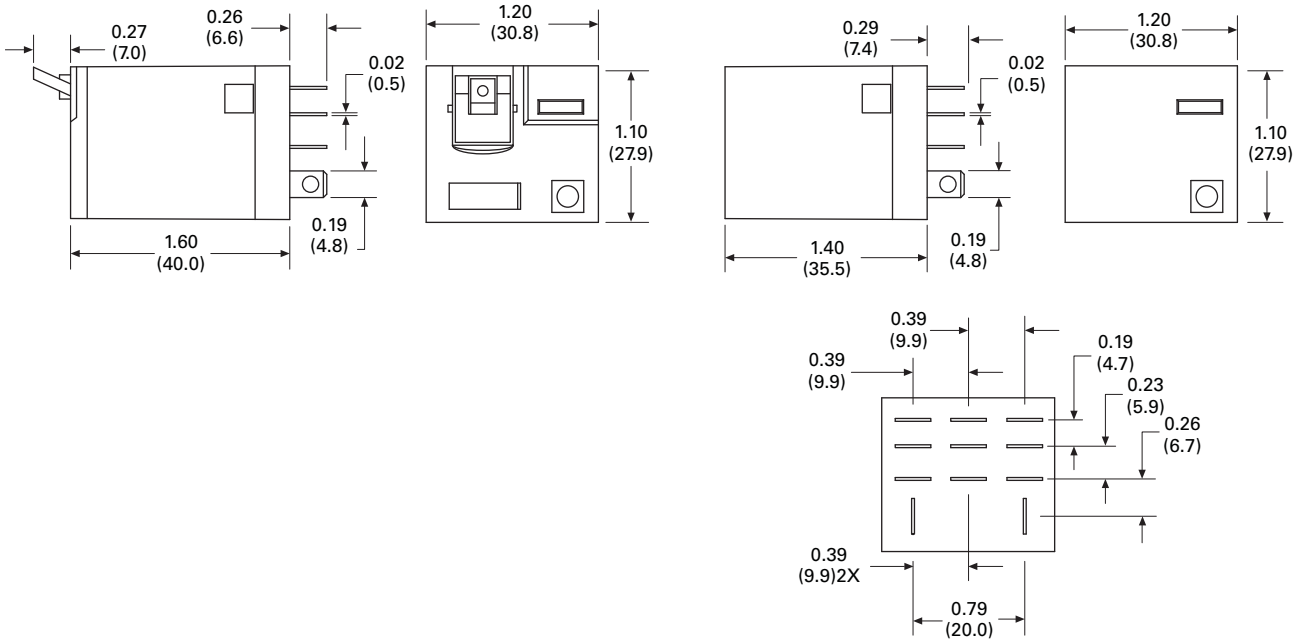
D7PR2/D7PF2



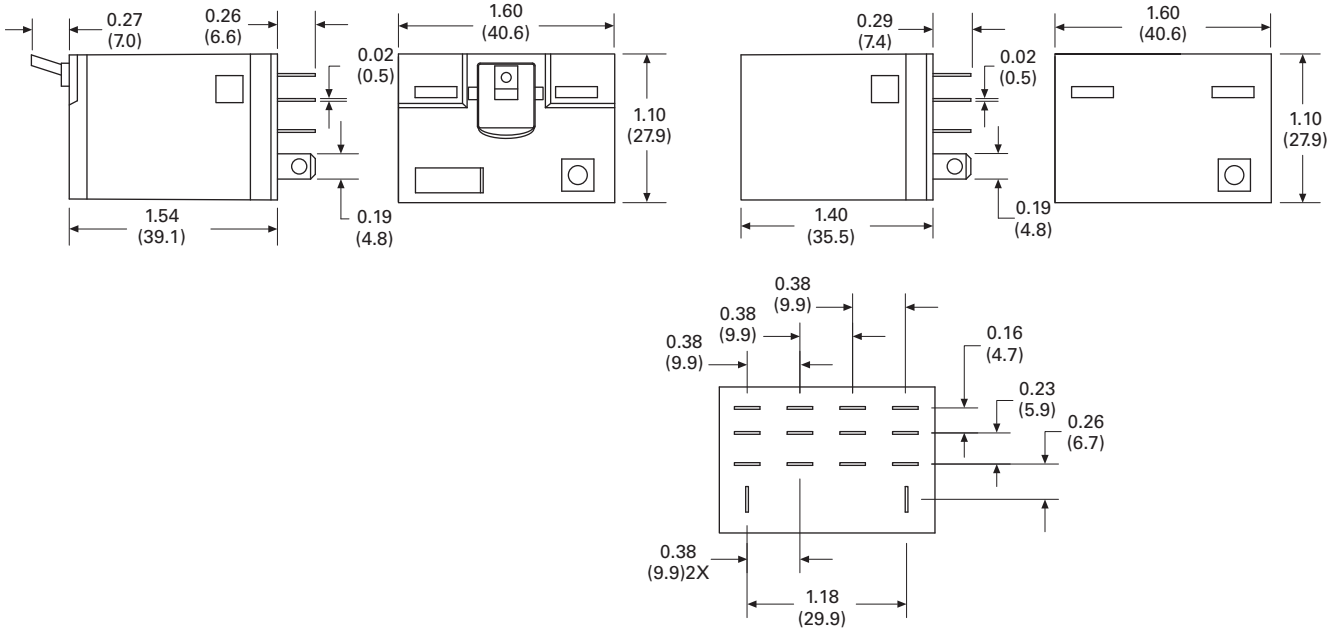
3

Approximate Dimensions in Inches (mm)

D7PR3/D7PF3

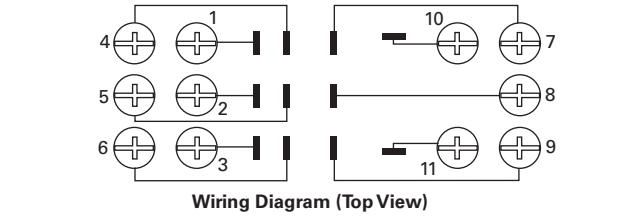


D7PR4/D7PF4

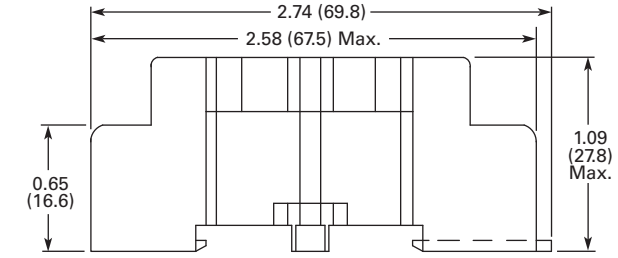


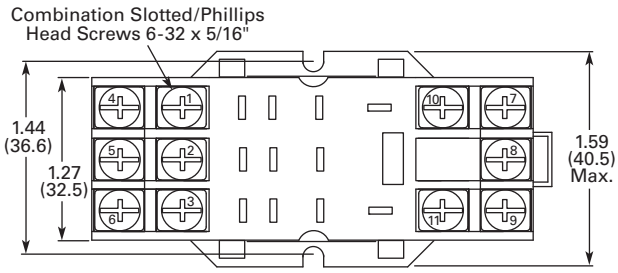
Approximate Dimensions in Inches (mm)

D7PA3

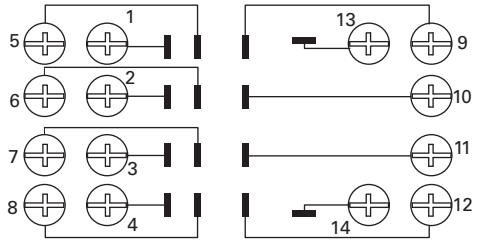


Wiring Diagram (Top View)

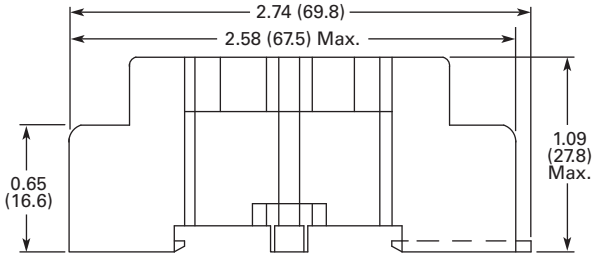


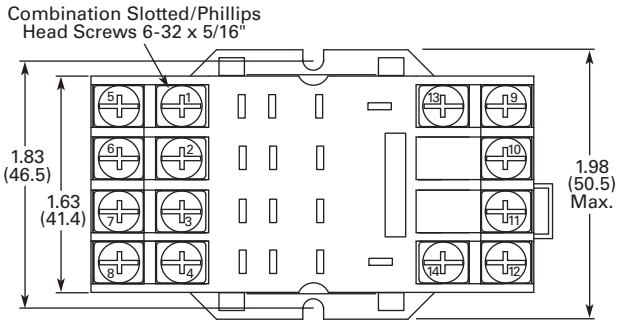


D7PA4



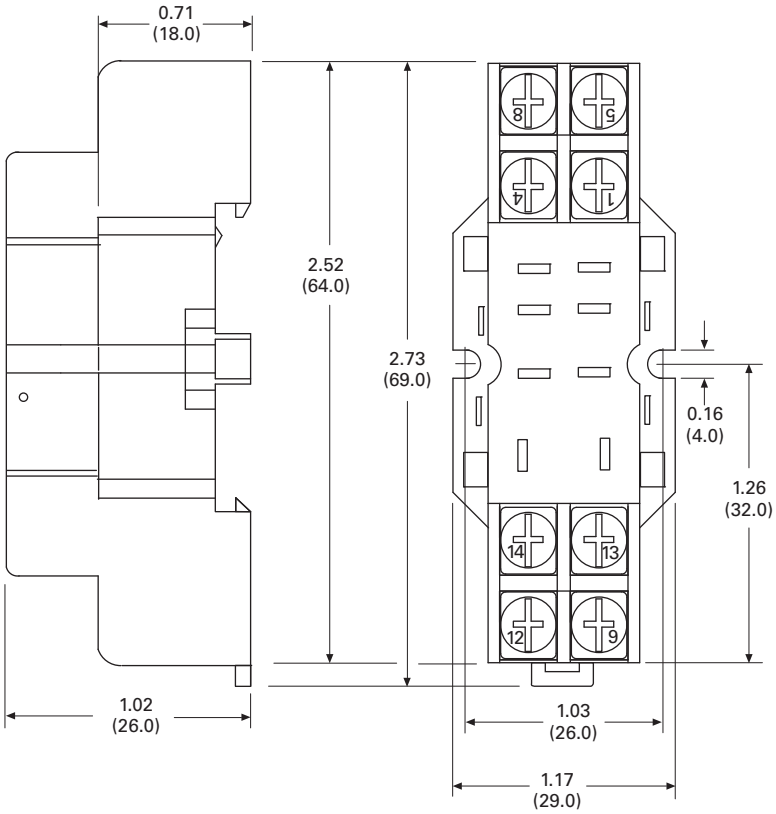
Wiring Diagram (Top View)

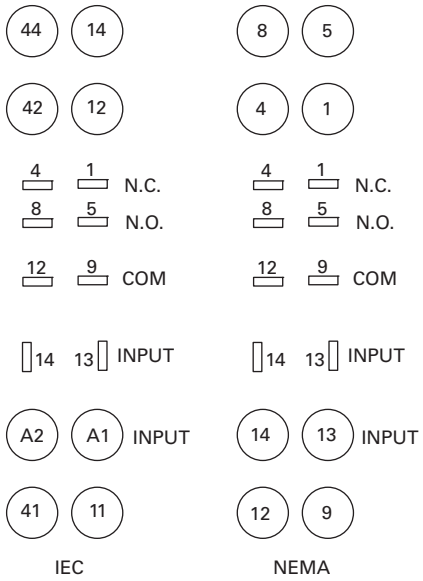




Approximate Dimensions in Inches (mm)

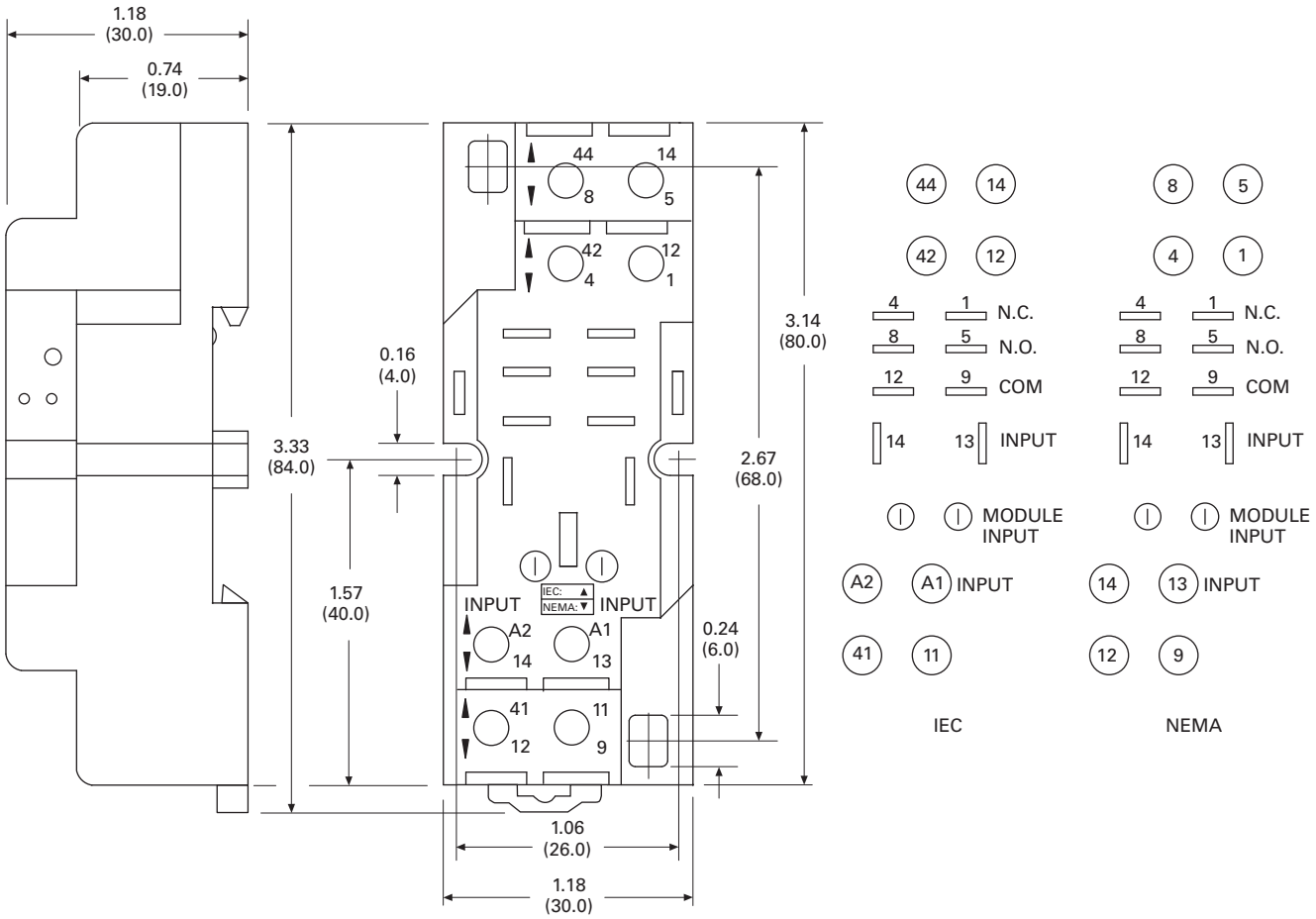
D7PA9 Standard Mount





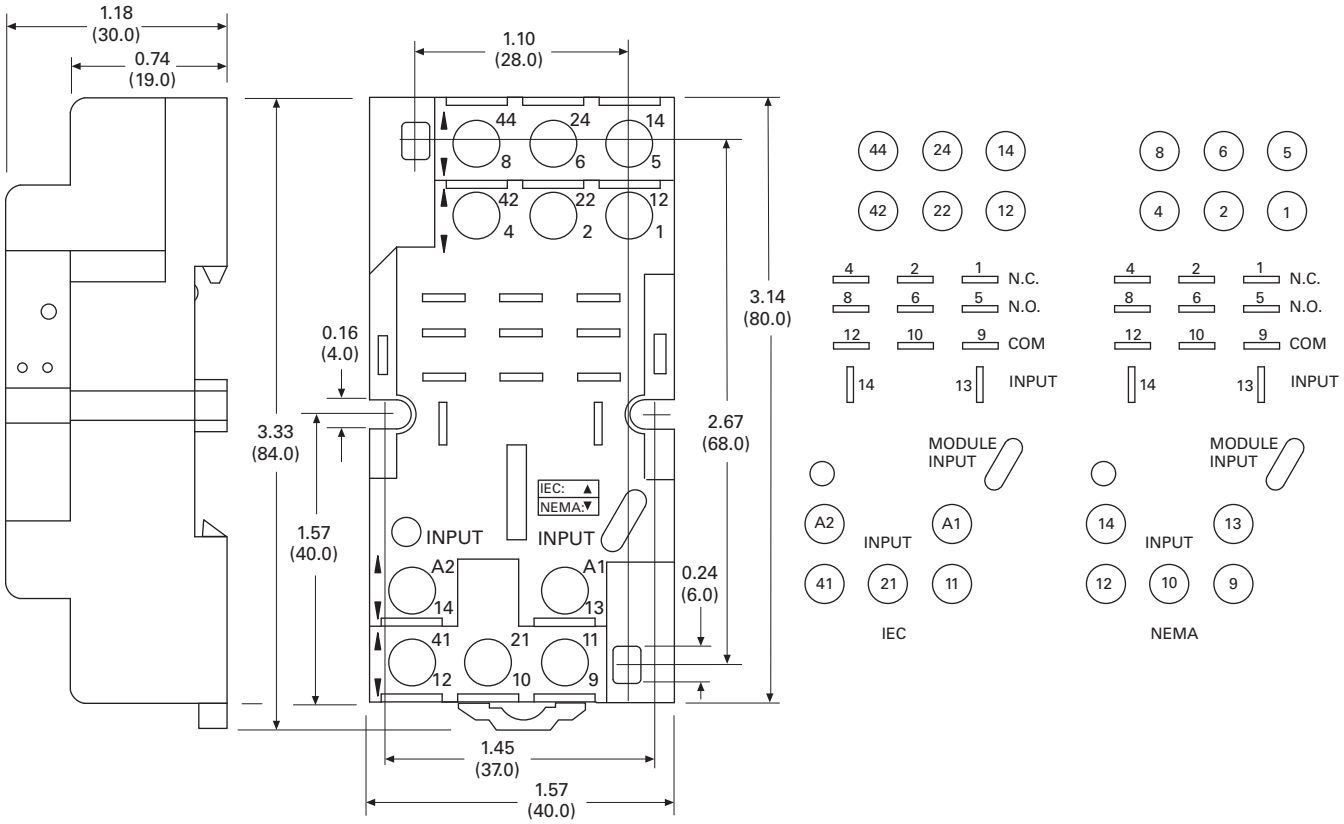
Approximate Dimensions in Inches (mm)

D7PAA



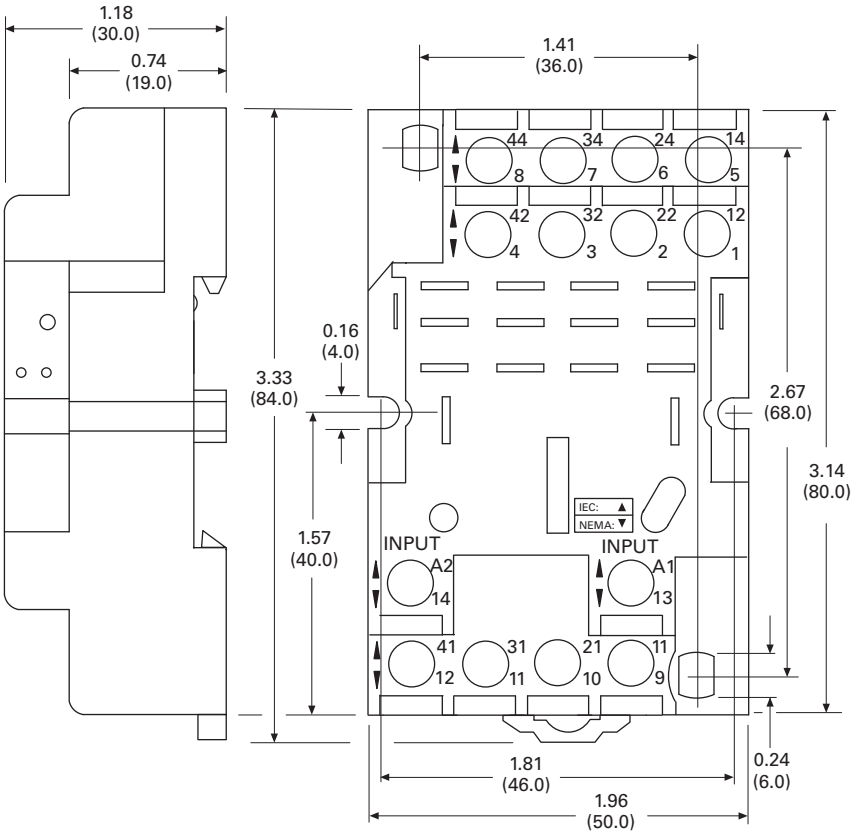
Approximate Dimensions in Inches (mm)

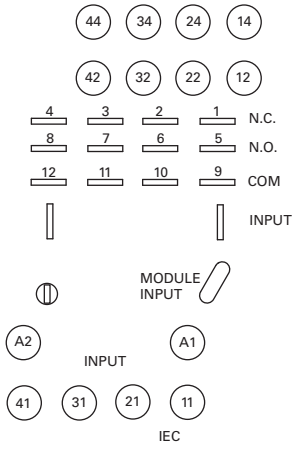
D7PAB

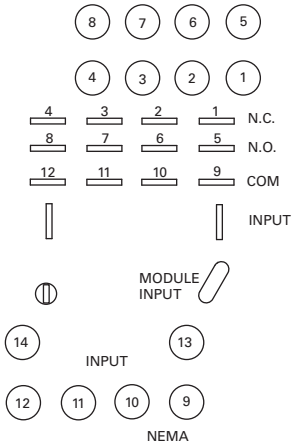


Approximate Dimensions in Inches (mm)

D7PAD

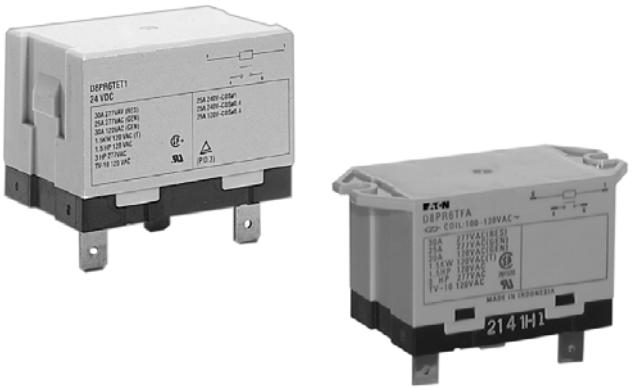






3

D8 Series Relay



Contents

D8 Series

Product Description

The D8 Series power relays are perfect for loads up to 30 A, with versions for flange mounting and e-clip mounting available.

Features

- Allows switching of 25 A and 30 A loads
- A high-capacity, high-withstand voltage relay compatible with momentary voltage drops
- No contact chattering for momentary voltage drops up to 50% of rated voltage
- UL Class B construction standard
- Wide-range AC-activated coil that handles 100 to 120 Vac at either 50 or 60 Hz
- Panel, DIN rail and flange mounting

Standards and Certifications

File # E1491

File # LR701520

Catalog Number Selection

D8 Series ①

D8PR 6 TE A

Family Type
D8PR

Contact Configuration
6 = SPST-NO
7 = DPST-NO

Coil Voltage
A = 120 Vac
B = 240 Vac
R1 = 12 Vdc
T = 24 Vac
T1 = 24 Vdc

Options
TE = E-bracket
TF = Flange mount

Product Selection

D8 Relay/Socket Quick Reference

Relay Type	Mounting Bracket	Adapter Track/ Panel Mount	Front Connecting Sockets Track/ Panel Mount
D8PR6TE	D8PA5	D8PA1	D8PA2
D8PR7TE	D8PA5	D8PA1	D8PA2

D8 Series Relay

D8 Series ②

Type	Standard Pack	Catalog Number
SPST E-Bracket ③		
Coil voltage		
24 Vac	1	**D8PR6TET**
24 Vdc	1	**D8PR6TET1**
SPST Flange Mount		
120 Vac	1	**D8PR6TFA**
24 Vdc	1	**D8PR6TFT1**
DPST E-Bracket ③		
Coil voltage		
120 Vac	1	**D8PR7TEA**
DPST Flange Mount		
120 Vac	1	**D8PR7TFA**
24 Vdc	1	**D8PR7TFT1**
Sockets		
DIN rail adapter	10	**D8PA1**
Screw terminal adapter	10	**D8PA2**
Bracket adapter	10	**D8PA5**
Accessory		
DIN rail end stop	100	**PFP-M**

Notes

① For deciphering catalog numbers. Do not use for ordering as not all combinations are readily available.
② Additional coil voltages available—consult Sales Office or Customer Support Center.
③ Requires use of either DIN rail adapter, screw terminal adapter or bracket adapter.

Technical Data and Specifications

Coil Resistance

Coil Voltage	Ohms	mA
24 Vac	303	71
110/120 Vac	5260	20.4
220/240 Vac	21,000	10.2
12 Vdc	75	158
24 Vdc	303	79

D8 Relays

Description	D8PR6	D8PR7
Rated load	220 Vac 30 A	220 Vac 25 A
Carry current	30 A	25 A
Max. operating voltage	250 Vac	250 Vac
Max. switching current	30 A	25 A
Contact material	AgCdO	AgCdO
Max. switching capacity	6600 VA	5500 VA
Min. permissible load	100 mA at 5 Vdc	100 mA at 5 Vdc
Mechanical life (min.)	5,000,000 operations	5,000,000 operations
Electrical life at all contact ratings (min.)	100,000 operations	100,000 operations
Maximum hp ratings	1-1/2 hp (120 Vac) 3 hp (240/265/277 Vac)	1-1/2 hp (120 Vac) 3 hp (240/265/277 Vac)

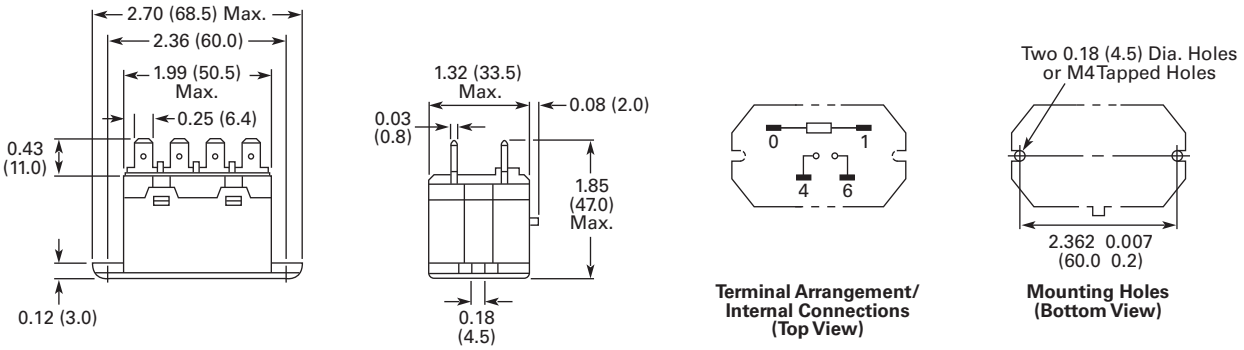
Coil Data

Coil Voltage	Must Operate	Must Release	Maximum Voltage
24 Vdc/Vac, 12 Vdc	75% maximum	15% minimum	110%
120 Vac	75 V	18 V	132 V
240 Vac	150 V	36 V	264 V

Dimensions

Approximate Dimensions in Inches (mm)

D8PR6TF

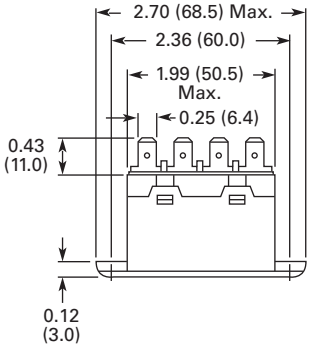


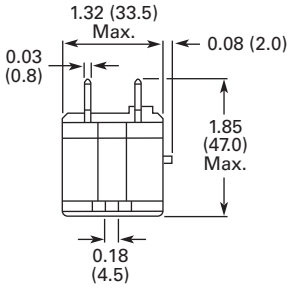
Terminal Arrangement/ Internal Connections (Top View)

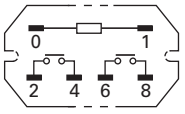
Mounting Holes (Bottom View)

Approximate Dimensions in Inches (mm)

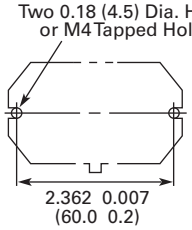
D8PR7TF





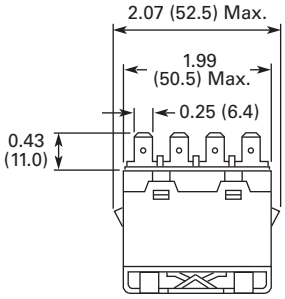


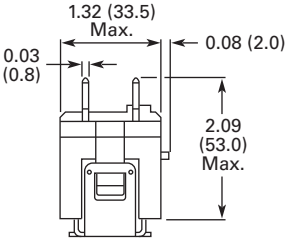
Terminal Arrangement/ Internal Connections (Top View)

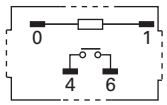


Mounting Holes (Bottom View)

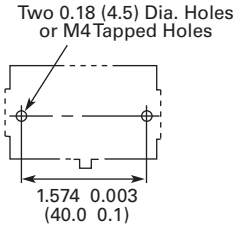
D8PR6TE with D8PA5 Bracket Attached





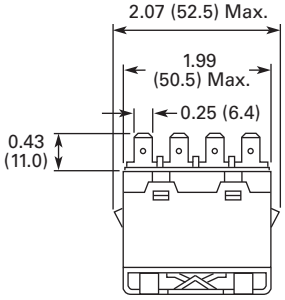


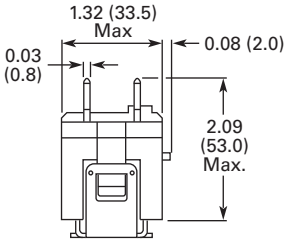
Terminal Arrangement/ Internal Connections (Top View)

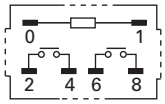


Mounting Holes (Bottom View)

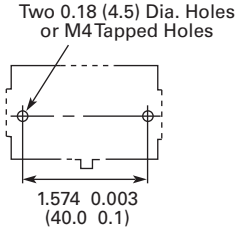
D8PR7TE with D8PA5 Bracket Attached





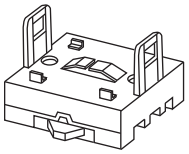


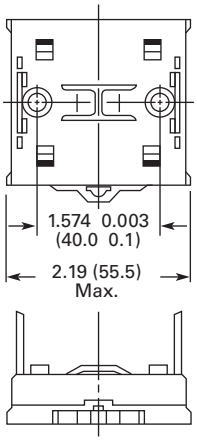
Terminal Arrangement/ Internal Connections (Top View)

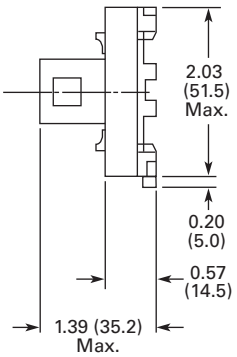


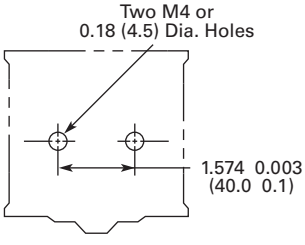
Mounting Holes (Bottom View)

D8PA1







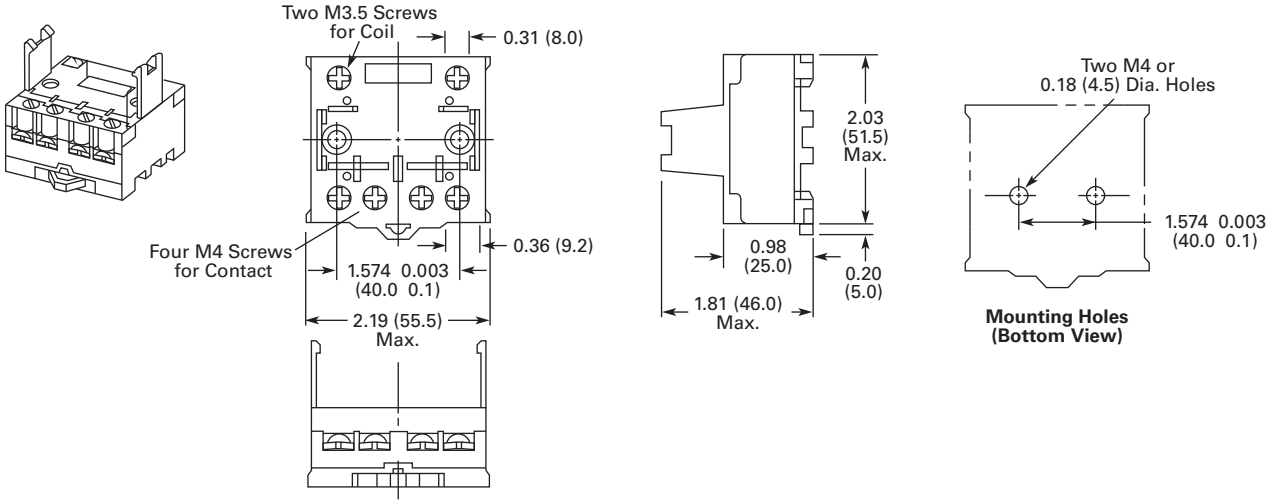


Mounting Holes (Bottom View)

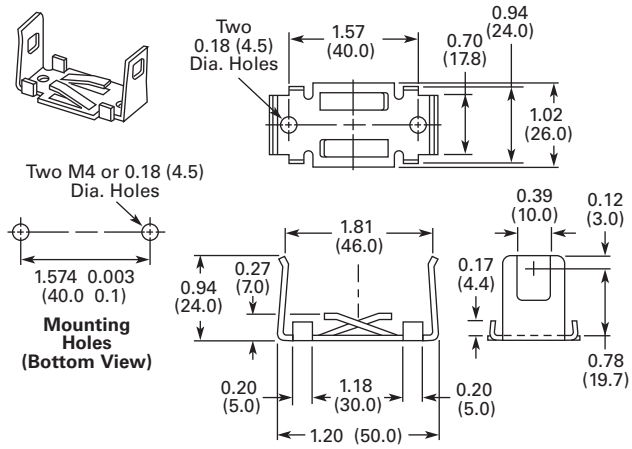
Note: Minimum spacing around relay = 0.20 inches (5 mm).

Approximate Dimensions in Inches (mm)

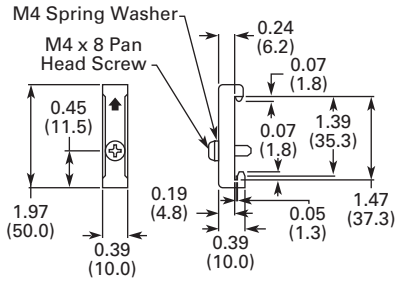
D8PA2



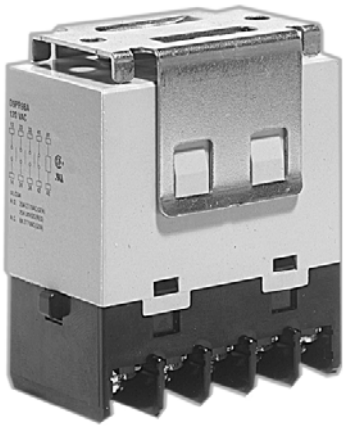
D8PA5



PFP-M DIN Rail End Stop



D9 Series Relay



Contents

D9 Series

Product Description

The four-pole D9 Series is ideal for three-phase motor applications. Various contact configurations are available.

Features

- Ideal for three-phase motor control applications
- No contact chattering for momentary voltage drops up to 50% of rated voltage
- Push-to-Test button is a standard feature to check contact operation
- Mounting bracket is supplied with relay

Standards and Certifications

File # E1491

File # LR701520

Catalog Number Selection

D9PR 8B A

Family Type
D9PR

Contact Configuration
8B = 4PST-NO
9B = 3PST-NO/SPST-NC
10B = DPST-NO/DPST-NC

Coil Voltage
A = 120 Vac
B = 240 Vac
R1 = 12 Vdc
T = 24 Vac
T1 = 24 Vdc

Product Selection

D9 Series

	Catalog Number
4PST-NO Power Relay	
Coil voltage	
24 Vac	**D9PR8BT**
120 Vac	**D9PR8BA**
240 Vac	**D9PR8BB**
24 Vdc	**D9PR8BT1**
3PST-NO/SPST-NC Power Relay	
120 Vac	**D9PR9BA**

	Catalog Number
DPST-NO/DPST-NC Power Relay	
Coil voltage	
24 Vac	**D9PR10BT**
120 Vac	**D9PR10BA**
24 Vac	**D9PR10BT1**

Technical Data and Specifications

Coil Resistance

Coil Voltage	Ohms	mA
24 Vac	—	75
120 Vac	—	21.6
240 Vac	—	10.8

Coil Voltage	Ohms	mA
12 Vdc	72	167
24 Vdc	288	83
110 Vdc	6,050	18

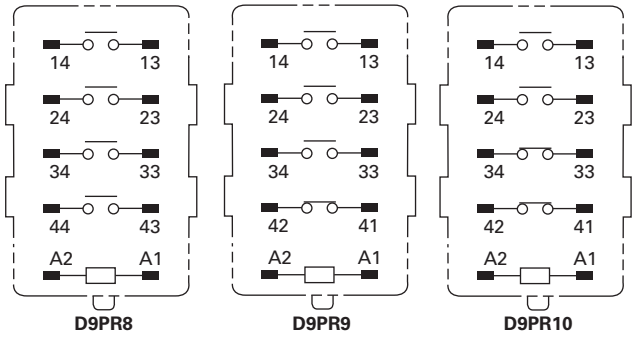
D9PR Specifications

Description	NO Contacts Resistive Load (p.f. = 1)	NC Contacts Resistive Load (p.f. = 1)
Rated load	220 Vac 25 A 30 Vdc 25 A	220 Vac 8 A 30 Vdc 8 A
Carry current	25 A	8 A
Max. operating voltage	250 Vac/125 Vdc	250 Vac/125 Vdc
Max. switching current	25 A	8 A
Max. switching capacity	5500 VA 750 W	1760 VA 240 W
Min. permissible load	100 mA at 24 Vdc	100 mA at 24 Vdc
Mechanical life (min.)	1,000,000 operations	1,000,000 operations
Electrical life at all contact ratings (min.)	100,000 operations	100,000 operations
Maximum hp ratings	1-1/2 hp (120 Vac) 3 hp (240/265/277 Vac) Three-phase 3 hp (240/265/277 Vac) 30,000 cycles Three-phase 5 hp (240/265/277 Vac) 30,000 cycles	1-1/2 hp (120 Vac) 3 hp (240/265/277 Vac) Three-phase 3 hp (240/265/277 Vac) 30,000 cycles Three-phase 5 hp (240/265/277 Vac) 30,000 cycles

Coil Data

Coil Voltage	Must Operate	Must Release	Maximum Voltage
24 Vdc/Vac, 12 Vdc, 110 Vdc	75% maximum	10% minimum	110%
120 Vac	75 V	18 V	132 V
240 Vac	150 V	36 V	264 V

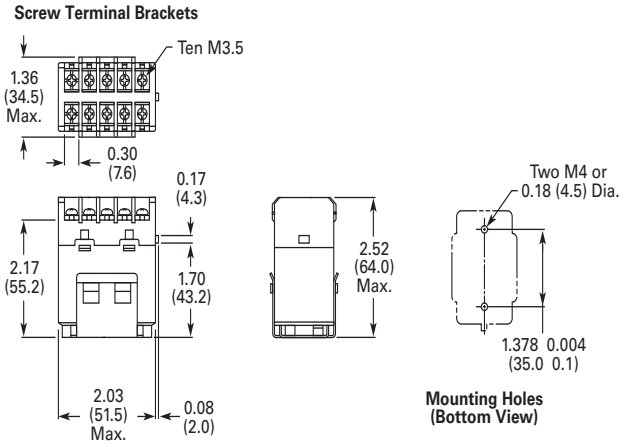
Terminal Arrangements



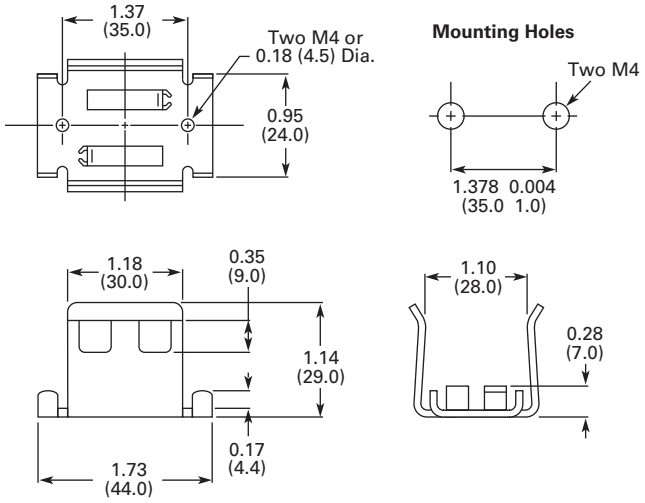
Dimensions

Approximate Dimensions in Inches (mm)

D9PR



Mounting Bracket



Accessories

Contents

Accessories

Accessories Selection Guide

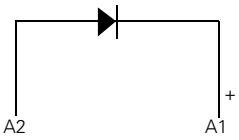
Eaton offers a variety of simple-to-install relay accessories that allow you to customize the features of a relay system to meet your exact needs.

The MOD Module System

Eaton's plug-in modules are a simple way to add functionality to your relay without the hassle of messy wiring and additional mounting of external electronics. They are available in a variety of configurations to meet the needs of almost any application.

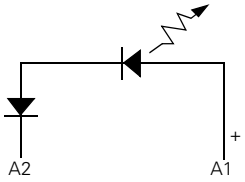
Circuit Diagrams

Diode Circuit



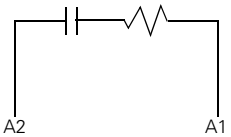
The diode module protects external drive circuitry from inductive voltages generated when removing coil voltages.

LED Circuit



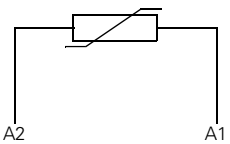
The LED status lamp verifies that power is being supplied to the coil. Ideal for both AC and DC applications. Polarity sensitive for DC applications.

RC Circuit



Snubs back EMF of relay coil.

Metal Oxide Varistor (MOV) Circuit



The MOV circuit protects by shunting potentially damaging electrical spikes away from the relay coil. Ideal for AC and DC applications.

System Diagrams

The MOD Module System

MOD Modules

Eaton's relay accessories provide a complete solution for add-on modules and identification tags.

MOD Modules

	Module Size	Description	Nominal Voltage	Catalog Number	Mating Sockets
MOD-AD250 	A	Protection diode	6–250 Vdc	**MOD-AD250**	D3PA6, D3PAL8, D3PA7, D3PAL11, D5PAL, D7PAB, D7PAD
MOD-RC_ 		R/C suppressor	6–24 Vac	**MOD-RC24**	
			110–240 Vac	**MOD-RC240**	
MOD-ALG_ 		LED indicator	24 Vac	**MOD-ALG24**	
			120/240 Vac	**MOD-ALG240**	
MOD-AMV_ 		MOV suppressor	24 Vac	**MOD-AMV24**	
			120 Vac	**MOD-AMV120**	
			240 Vac	**MOD-AMV240**	
MOD-BD250 	B	Protection diode	6–250 Vdc	**MOD-BD250**	D1RAA, D2PAL, D2PAP, D2PA7, D7PAA
MOD-BLG_ 		LED indicator	24 Vac	**MOD-BLG24**	
			120/240 Vac	**MOD-BLG240**	
MOD-BMV_ 		MOV suppressor	24 Vac	**MOD-BMV24**	
			120 Vac	**MOD-BMV120**	
			240 Vac	**MOD-BMV240**	

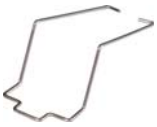
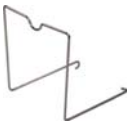
Relay Clips

Eaton offers a variety of relay clips designed to improve the performance and functionality within an electrical panel.

Metal Hold-Down Clips

Metal hold-down clips, or spring clips, are ideal for use where high heat or humid conditions are a factor. These clips hold their shape and tension and are designed to withstand harsh environments. All clips are made of corrosion-resistant stainless steel.

Metal Hold-Down Clips

Catalog Number	Mating Sockets	Mating Relays
PMC-1781 	**PMC-1781**	D1RAA	D1RR, D1RF
PQC-1782 	**PQC-1782**	D2PAL, D2PAP, D2PA7	D2RR2, D2RF2, D2RR3, D2RF4
PQC-1342 	**PQC-1342**	D2PA6, D7PAA, D7PA9	D2RR4, D2RF4
PQC-1332 	**PQC-1332**	D3PA6, D3PA7	D3RR2, D3RF2, D3RR3, D3RF3
PQC-1351 	**PQC-1351**	D3PAL8, D3PA2, D3PAL11, D3PA3, D5PAL, D5PA2, D5PA3L, D5PA3S	D3RR2, D3RF2, D3RR3, D3RF4, D5RR, D5RF
PQC-1783 	**PQC-1783**	D7PAB	D7PR1, D7PF1, D7PR2, D7PF3
PQC-1784 	**PQC-1784**	D7PAD	D7PR4, D7PF4
PYC-_ 	**PYC-B2**	D7PA3, D7PA4	D7PR1, D7PR2, D7PR4

Plastic Ejector/ Hold-Down Clips

These clips are great for applications where sockets are located in dense or tight areas. They allow for quick, safe and firm securing of relays in the sockets with the added benefit that the relay can be ejected with one finger. Plastic clips also aid in keeping operators' fingers away from live circuits. The optional snap-in identification tag allows for custom marking of sockets when used in multi-socket applications.

Plastic ID Clips

Plastic ID clips allow for easy circuit identification in multi-relay applications. They are designed for labeling and are not ideal for securing the relay in the socket.

PWC-D24

Plastic Ejector/Hold-Down Clips

Catalog Number	Mating Sockets	Mating Relays
PWC-D24	D2PAL, D2PAP, D2PA7	D2RF2, D2RF4

Plastic ID Clips

PQC-1349

Catalog Number	Mating Sockets	Mating Relays
PQC-1349	D7PAA	D7PF1, D7PF2

PMC-1783

PMC-1783	D7PAB	D7PF1, D7PF2

PMC-1784

PMC-1784	D7PAD	D7PF4

Coil Bus Jumpers ①

Eaton's coil bus jumpers allow inputs to be bridged to adjacent sockets without additional wiring, making multi-relay connections quick and easy. The easy-to-install design requires no tools and can be complete in a matter of seconds.

Coil Bus Jumpers

Catalog Number	Mating Sockets
D2PJ1	D2PAL, D2PAP
D3PJ1	D3PA6, D3PA7, D5PAL

Write-On Plastic Labels/ID Tags

These convenient plastic labels snap easily onto the relay socket for clear identification in multi-relay panels. The hinged design makes wiring simple and allows for angular adjustment of the tag to improve readability in the panel. Marking with a standard permanent marker creates a smudge-free surface.

Write-On Plastic Labels/ID Tags

Catalog Number	Mating Sockets
PWF-D2P	D2PAL, D2PAP
PWF-D3D5	D3PAL8, D3PAL11, D5PAL

Flange Mount Adapters

Eaton's relay flange mount adapters create a modular approach to flexible mounting options. Each low-cost adapter allows for panel mounting of a standard control relay and can eliminate the need for a socket.

Unit with Flange Mount Adapter

Flange Mount Adapters

Catalog Number	Mating Relay
PFC-D11	D1RF1, D1RR1
PFC-D2D72	D2P, D7PF2, D7PR2
PFC-D73	D7PF3, D7PR3
PFC-D74	D7PF4, D7PR4

Note

① Jumpers in photo are colored green to improve visibility, actual jumpers are black.

9575H Series 3000 Relay

Contents

9575H Series 3000—Type AA, AC and DC

Product Description

Type AA panel-mounted relays are rated (each pole) 40 A up to 300 Vac, 50/60 Hz; 5 A at 480/600 Vac, 50/60 Hz and 40 A at 28 Vdc.

Application Description

9575H Series 3000 relays are ideal for applications when controlling smaller loads, such as single-phase motors.

Standards and Certifications

- UL listed, E1491
- CSA 41729
- CE: EN60947-4-1, EN60947-5-1

Product Selection

When Ordering, Specify

Catalog number and magnet coil code letter. Example: for DPDT relay with auxiliary switch and a 120 V 50/60 Hz coil, order Catalog Number 9575H3A010.

9575H Series 3000 Relay

Type AA Relays ①

Relay Style	Catalog Number ②
Relay (DPDT)	**9575H3_000**
Relay with auxiliary switch	**9575H3_010**
Relay with blowout magnets	**9575H3_100**
Relay with auxiliary switch and blowout magnets	**9575H3_110**

Coil Voltage Selection

Coil Voltage	Hz	Suffix Code
Volts AC		
120	50/60	**A**
240	50/60	**B**
480/440	60/50	**C**
600/550	60/50	**D**
208	50/60	**E**
277	50/60	**H**
6	50/60	**J**
12	50/60	**K**
24	50/60	**L**
48	50/60	**M**
Volts DC		
110	—	**P**
220	—	**Q**
6	—	**R**
12	—	**S**
24	—	**T**
48	—	**W**

Accessories

Enclosure ③

Description	Catalog Number
NEMA 1 Enclosure	**9575H2449**

Notes

① There are no "repair parts" available for these relays.
② Underscore indicates missing code suffix for magnet coil—see Selection table above.
③ Only 9575H3 relays without an auxiliary switch should be mounted in the 9575H2449 enclosure.

Technical Data and Specifications

Relay Specifications

Coil

- Pull-in voltage: 80% DC coils, 85% AC coils of nominal voltage or less at 25°C
- Dropout voltage: 10% of nominal voltage or more at 25°C
- Coil resistance: ±10% measured at 25°C
- Max. DC coil dissipation capability: 4 watts DC continuous at 25°C

Contacts

- Contact combination: DPDT
- Contact rating each pole (main contacts): Each pole rated 40 amps up to 300 Vac, 50/60 Hz, 5 amps at 480/600 Vac 50/60 Hz, 0.75 PF load. 1-1/2 hp motor load (each pole) at 120–600 Vac, 50/60 Hz. 2 hp motor load at 200–600 Vac, 50/60 Hz only when using both poles to switch both sides of load, 40 amps at 28 Vdc resistive load each pole. NEMA A 600 pilot duty 50/60 Hz
- Additional contact ratings for relays with blowout magnets: 10 A at 110 Vdc resistive, 4 A at 225 Vdc resistive, 2 A at 325 Vdc resistive. For inductive loads, contacts must be derated accordingly.
- Contact material: Silver cadmium oxide, gold flashed. 5/16 in (7.9 mm) diameter standard

Dielectric Withstanding Voltage

- Between open contacts: 1500 V_{rms}
- All other mutually insulated conductive elements: 2200 V_{rms}

Miscellaneous

- Coil terminals: 6–32 screws
- Contact terminals: 8—32 screws
- Main base material: Molded phenolic, UL recognized (QMFZ2)
- Weight (DPDT Relay): 11 oz (311 grams) approximately
- Weight (DPDT Relay with auxiliary switch) 14.5 oz (411 grams) approximately

Auxiliary Switch Specifications

- Contact combination: SPDT
- Contact rating: Auxiliary switch rated 10 amps at 125 or 250 Vac, resistive load; 1/4 hp at 125 or 250 Vac, motor load; 0.4 amps at 125 Vdc or 0.20 amps at 250 Vdc, resistive load; 3 amps at 125 Vac lamp load. All AC ratings are 50/60 Hz
- Dielectric withstanding voltage: 500 Vac rms between open contacts, 1500 Vac rms between all other mutually insulated conductive elements
- Terminals: 4–40 round head screws for auxiliary contacts standard

Average Operating Times (Milliseconds)

Operation	DPDT Relay	DPDT Relay with Auxiliary Switch
Pickup	40	50
Dropout	35	35

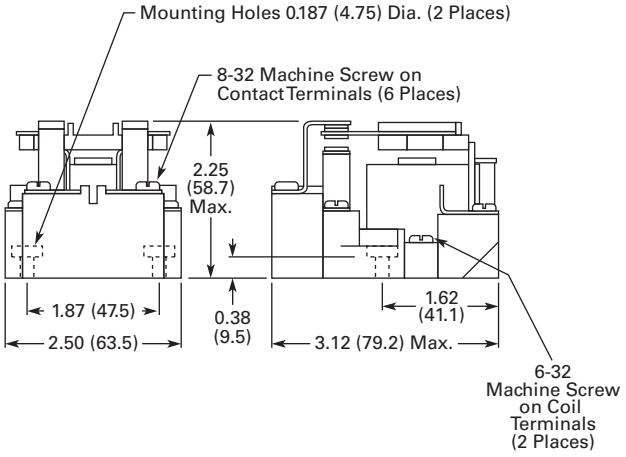
Temperature Ranges

Temperature	AC	DC
Operating range	–30 °C to +55 °C	–30 °C to +55 °C
Non-operating range	–30 °C to +100 °C	–30 °C to +100 °C

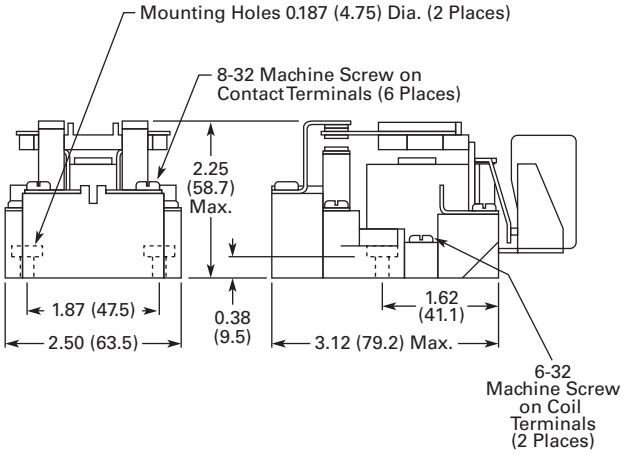
Dimensions

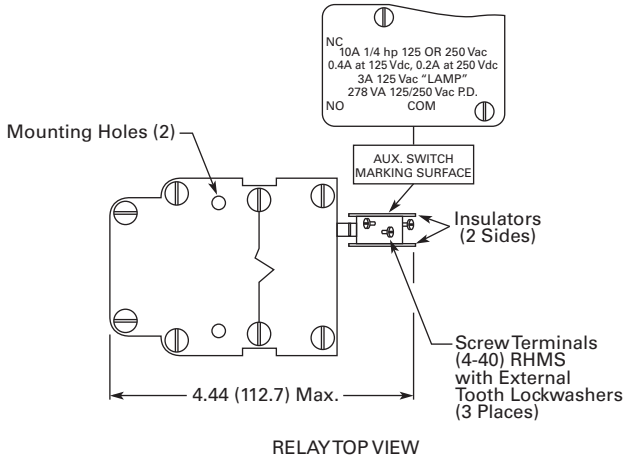
Approximate Dimensions in Inches (mm)

9575H3 DPDT Relay



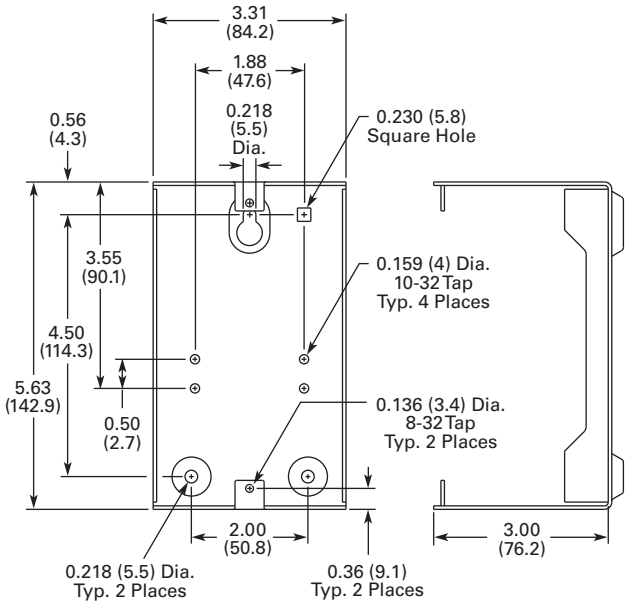
9575H3 DPDT Relay with Auxiliary SPDT Switch

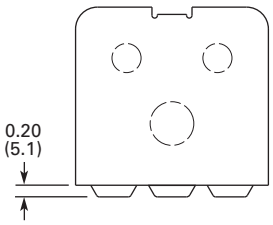




RELAY TOP VIEW

9575H2449





3

Solid-State Relays

Contents

Product Overview

Catalog Number Selection

Solid-State Relays—D93, D96 and D99 Series

D93 3 25 A M D 2

Description
D93 = Hockey puck
D96 = Compact
D99 = DIN rail

Output Voltage
1 = 2–60 Vdc
2 = 24–280 Vac ①
3 = 3–200 Vdc
4 = 48–480 Vac
6 = 48–600 Vac

Current
Output current in amps

Contact Configuration
A = SPST-NO
B = SPST-NC
C = DPST-NO
D = DPST-NC

Output Type
C = SCR
T = Triac
M = MOSFET

Turn On Type
Z = Zero cross
R = Random
D = DC switch

Input Voltage
1 = 90–280 Vac
2 = 3–32 Vdc
3 = 3.5–32 Vdc
4 = 4–15 Vdc
5 = 20–50 Vdc

Note
① For D96208ACZ3, output voltage is 3–150 Vdc.

D93 Series—Solid-State Relays

Contents

D93 Series

Product Description

Eaton's D93 series of solid-state relays is a line of heavy-duty industrial relays in the common "hockey puck" package. The removable, finger-safe cover and optional accessories make the D93 safe and easy to install in a variety of applications.

Models are available in a variety of input voltages and switch types up to 75 A.

Application Description

A solid-state relay (SSR) can perform many applications that an electromechanical relay can perform. The SSR differs in that it has no moving mechanical parts within it and has some distinct advantages over an electromechanical relay.

When used correctly in the intended application, the SSR provides a high degree of reliability, a long service life, significantly reduced electromagnetic interference, fast response and high vibration resistance.

Applications for the SSR typically include equipment that requires high cycling rates, low acoustical or electrical noise, or high vibration resistance. Some examples are medical equipment, heating/cooling equipment, lighting control and pumps/compressors, among others.

Features and Benefits

- All solid-state circuitry with no moving parts to wear
- Compact, panel mounting for flexible installation
- Isolated input and output terminals to protect the system from electrical noise
- Internal snubber circuitry to protect the SSR from transients

Standards and Certifications

- UL/cUL recognized—UL 508
- CSA certified
- CE marked
- RoHS compliant

CE RoHS COMPLIANT

Product Selection

D93210ACZ1

D93 Series

Input Voltage	Output Voltage	Contact Configuration	Switching Type	Rated Current Load (Amps)	Catalog Number
90–280 Vac	24–280 Vac	SPST-NO	Zero cross	10	**D93210ACZ1**
3–32 Vdc	24–280 Vac	SPST-NO	Zero cross	10	**D93210ACZ2**
3–32 Vdc	24–280 Vac	SPST-NO	Triac	10	**D93210ATZ2**
90–280 Vac	24–280 Vac	SPST-NO	Zero cross	25	**D93225ACZ1**
3–32 Vdc	24–280 Vac	SPST-NO	Zero cross	25	**D93225ACZ2**
3–32 Vdc	24–280 Vac	SPST-NO	Triac	25	**D93225ATZ2**
90–280 Vac	24–280 Vac	SPST-NO	Zero cross	40	**D93240ACZ1**
3–32 Vdc	24–280 Vac	SPST-NO	Zero cross	40	**D93240ACZ2**
3–32 Vdc	24–280 Vac	SPST-NO	Triac	40	**D93240ATZ2**
90–280 Vac	24–280 Vac	SPST-NO	Zero cross	50	**D93250ACZ1**
3–32 Vdc	24–280 Vac	SPST-NO	Zero cross	50	**D93250ACZ2**
90–280 Vac	24–280 Vac	SPST-NO	Zero cross	75	**D93275ACZ1**
3–32 Vdc	24–280 Vac	SPST-NO	Zero cross	75	**D93275ACZ2**
3–32 Vdc	3–200 Vdc	SPST-NO	MOSFET	12	**D93312AMD2**
3–32 Vdc	3–200 Vdc	SPST-NO	MOSFET	25	**D93325AMD2**
3–32 Vdc	3–200 Vdc	SPST-NO	MOSFET	40	**D93340AMD2**

Accessories

D93HS1

D93 Series—Heat Sink

Eaton's D93HS1 heat sink is specifically designed to be used with D93 solid-state relays. It is pre-drilled and tapped, and matches the heat dissipation requirements for relays up to 50 A.

Heat Sink Accessory

Description	Catalog Number
Heat sink	**D93HS1**

Note: Always ensure that all details of the application are considered when determining heat dissipation requirements, including ambient temperature. The D93 relays must be firmly mounted to the heat sink using a suitable thermally conductive grease or thermal transfer pad.

D93TP1

D93 Series—Thermal Transfer Pad

The D93TP1 is a self-adhesive transfer pad designed for use with Eaton's D93 solid-state relays. When used properly, it will adequately conduct the heat to a heat sink without the use of grease.

Technical Data and Specifications

D93 Series

Description	Units	D93210ACZ1	D93210ACZ2	D93210ATZ2	D93225ACZ1	D93225ACZ2	D93225ATZ2
Output Characteristics							
Contact configuration		SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO
Switching device		SCR	SCR	Triac	SCR	SCR	Triac
Current rating	A	10	10	10	25	25	25
Switching type		Zero cross	Zero cross	Zero cross	Zero cross	Zero cross	Zero cross
Maximum rate of rise off state voltage (DV/DT)	V/us	200	250	700	500	500	250
Incandescent lamp ampere rating (rms)	A	8	16	16	16	16	16
Motor load rating (rms)	A	4.5	8	8	8	8	8
Min. load current to maintain on	mA	50	120	250	120	120	120
Non-repetitive surge current (1 cycle)	A	83	250	1000	250	250	250
Max. rms overload current (1 second)	A	24	80	50	40	40	80
Max. off state leakage current (rms)	mA	8	10	10	8	10	10
Peak blocking voltage	Vpk	600	300	—	600	600	—
Typical on state voltage drop (rms)	Vac	1.6	1.6	1.35	1.6	1.6	1.6
Max. on state voltage drop (rms)	Vac	1.6	1.6	1.6	1.6	1.6	1.6
Max. I^2t for fusing (A^2)		72	300	1700	312	250	300
Input Characteristics							
Must release voltage	V	10 AC	1 DC	10 AC	10 AC	1 DC	1 DC
Typical input impedance	ohms	13k	Current regulator	16–25k	13k	Current regulator	1.5k
Nominal input current at 5 Vdc or 240 Vac	mA	20	2	12	20	16	2
Reverse polarity protection		NA	Yes	NA	NA	Yes	Yes
Performance Characteristics							
Operating time (response time)							
ON	ms	8.3	8.3	8.3	8.3	8.3	8.3
OFF	ms	8.3	8.3	8.3	8.3	8.3	8.3
Rated insulation voltage—input to input	Vac	4000	4000	4000	4000	4000	4000
Dielectric strength—terminal to chassis	Vac	4000	4000	4000	4000	4000	4000
Environment							
Product certifications		UR, CSA, CE	UR, CSA, CE	UR, CSA, CE	UR, CSA, CE	UR, CSA, CE	UR, CSA, CE
Ambient air temperature							
Storage	°C	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100
Operating	°C	–40 to 80	–40 to 80	–40 to 80	–40 to 80	–40 to 80	–40 to 80
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Miscellaneous Characteristics							
Thermal resistance (junction to case)	°C/W	3.5	3.5	1.45	1.02	1.02	1.45
Weight	g (oz)	100 (3.5)	100 (3.5)	100 (3.5)	100 (3.5)	100 (3.5)	100 (3.5)
LED—input		Green	Green	Green	Green	Green	Green
Input terminals		M3.5	M3.5	M3.5	M3.5	M3.5	M3.5
Output terminals		M4	M4	M4	M4	M4	M4
Terminal torque (max.)	Nm	1.0	1.0	1.0	1.0	1.0	1.0

D93 Series, continued

Description	Units	D93240ACZ1	D93240ACZ2	D93240ATZ2	D93250ACZ1	D93250ACZ2
Output Characteristics						
Contact configuration		SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO
Switching device		SCR	SCR	Triac	SCR	SCR
Current rating	A	40	40	40	50	50
Switching type		Zero cross	Zero cross	Zero cross	Zero cross	Zero cross
Maximum rate of rise off state voltage (DV/DT)	V/us	500	500	250	500	500
Incandescent lamp ampere rating (rms)	A	30	30	20	39	39
Motor load rating (rms)	A	14	14	14	14	14
Min. load current to maintain on	mA	250	250	50	250	250
Non-repetitive surge current (1 cycle)	A	625	625	250	520	520
Max. rms overload current (1 second)	A	80	80	80	100	100
Max. off state leakage current (rms)	mA	10	10	10	10	8
Peak blocking voltage	Vpk	600	600	600	600	600
Typical on state voltage drop (rms)	Vac	1.6	1.6	1.6	1.1	1.8
Max. on state voltage drop (rms)	Vac	1.6	1.6	1.6	1.8	1.8
Max. I^2t for fusing (A^2)		1250	1250	438	1250	1250
Input Characteristics						
Must release voltage	V	10 AC	1 DC	1 DC	10 AC	1 DC
Typical input impedance	ohms	13k	ACL	1.5k	13k	Current regulator
Nominal input current at 5 Vdc or 240 Vac	mA	20	16	2	20	16
Reverse polarity protection		N/A	Yes	Yes	NA	Yes
Performance Characteristics						
Operating time (response time)						
ON	ms	8.3	8.3	8.3	8.3	8.3
OFF	ms	8.3	8.3	8.3	8.3	8.3
Rated insulation voltage—input to input	Vac	4000	4000	4000	4000	4000
Dielectric strength—terminal to chassis	Vac	4000	4000	4000	4000	4000
Environment						
Product certifications		UR, CSA, CE	UR, CSA, CE	UR, CSA, CE	UR, CSA, CE	UR, CSA, CE
Ambient air temperature						
Storage	°C	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100
Operating	°C	–40 to 80	–40 to 80	–40 to 80	–40 to 80	–40 to 80
Degree of protection		IP20	IP20	IP20	IP20	IP20
Miscellaneous Characteristics						
Thermal resistance (junction to case)	°C/W	0.9	0.9	0.95	0.63	0.63
Weight	g (oz)	100	100	100	135 (4.8)	135 (4.8)
LED—input		Green	Green	Green	Green	Green
Input terminals		M3.5	M3.5	M3.5	M3.5	M3.5
Output terminals		M6	M6	M6	M6	M6
Terminal torque (max.)	Nm	1.0	1.0	1.0	1.0	1.0

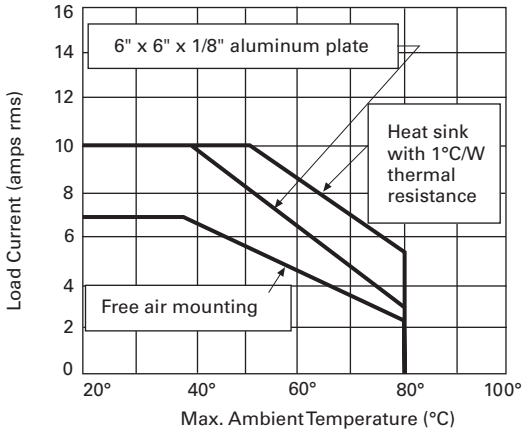
D93 Series, continued

Description	Units	D93275ACZ1	D93275ACZ2	D93312AMD2	D93325AMD2	D93340AMD2
Output Characteristics						
Contact configuration		SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO
Switching device		SCR	SCR	MOSFET	MOSFET	MOSFET
Current rating	A	75	75	12	25	40
Switching type		Zero cross	Zero cross	DC switching	DC switching	DC switching
Maximum rate of rise off state voltage (DV/DT)	V/us	500	500	NA	NA	NA
Incandescent lamp ampere rating (rms)	A	39	39	NA	NA	NA
Motor load rating (rms)	A	25	25	NA	NA	NA
Min. load current to maintain on	mA	250	250	20	20	20
Non-repetitive surge current (1 cycle)	A	1150	1150	27	50	90
Max. rms overload current (1 second)	A	150	150	NA	NA	NA
Max. off state leakage current (rms)	mA	10	10	8	8	8
Peak blocking voltage	Vpk	600	600	—	—	—
Typical on state voltage drop (rms)	Vac	1.8	1.8	1.6	1.6	1.6
Max. on state voltage drop (rms)	Vac	1.8	1.8	2.83	2.83	2.83
Max. I^2t for fusing (A^2)		5000	5000	NA	NA	NA
Input Characteristics						
Must release voltage	V	10 AC	1 DC	1 DC	1 DC	1 DC
Typical input impedance	ohms	13k	Current regulator	1k	1k	1k
Nominal input current at 5 Vdc or 240 Vac	mA	20	16	10	10	10
Reverse polarity protection		NA	Yes	No	No	No
Performance Characteristics						
Operating time (response time)						
ON	ms	8.3	8.3	300 µs	600 µs	600 µs
OFF	ms	8.3	8.3	1	2.6	2.6
Rated insulation voltage—input to input	Vac	4000	4000	4000	4000	4000
Dielectric strength—terminal to chassis	Vac	4000	4000	2500	2500	2500
Environment						
Product certifications		UR, CSA, CE	UR, CSA, CE	UR, CSA, CE	UR, CSA, CE	UR, CSA, CE
Ambient air temperature						
Storage	°C	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100
Operating	°C	–40 to 80	–40 to 80	–40 to 80	–40 to 80	–40 to 80
Degree of protection		IP20	IP20	IP20	IP20	IP20
Miscellaneous Characteristics						
Thermal resistance (junction to case)	°C/W	0.6	0.63	1.06	1.06	0.63
Weight	g (oz)	200	135 (4.8)	110 (3.9)	110 (3.9)	135 (4.8)
LED—input		Green	Green	Green	Green	Green
Input terminals		M3.5	M3.5	M3.5	M3.5	M3.5
Output terminals		M6	M6	M4	M4	M6
Terminal torque (max.)	Nm	1.0	1.0	1.0	1.0	1.0

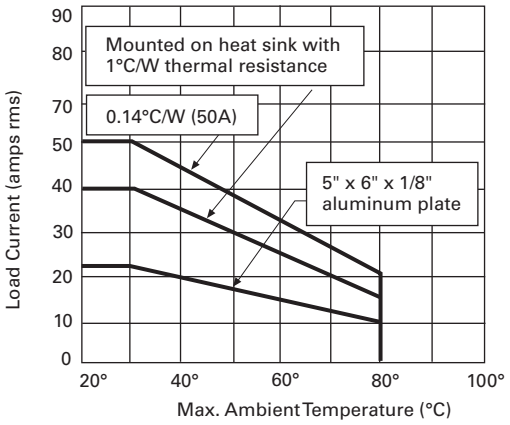
3

Temperature Derating Curves

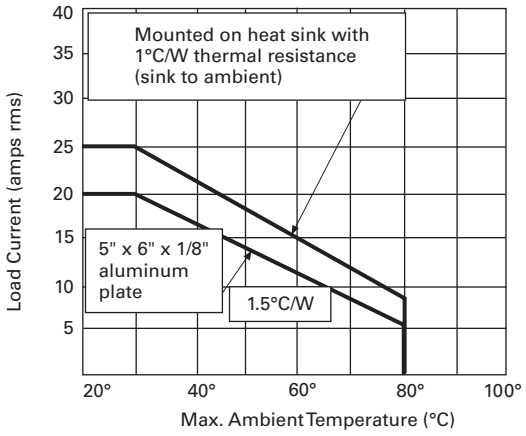
10 Amp Styles



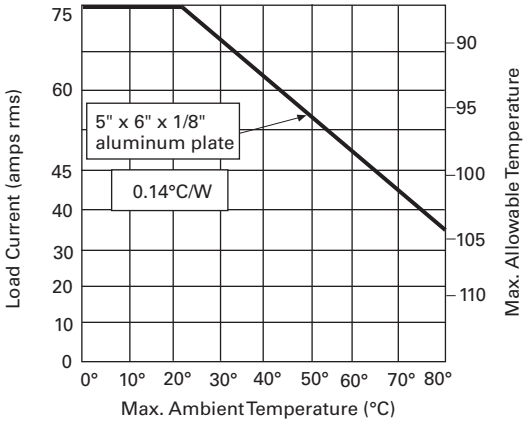
40 and 50 Amp Styles



25 Amp Styles



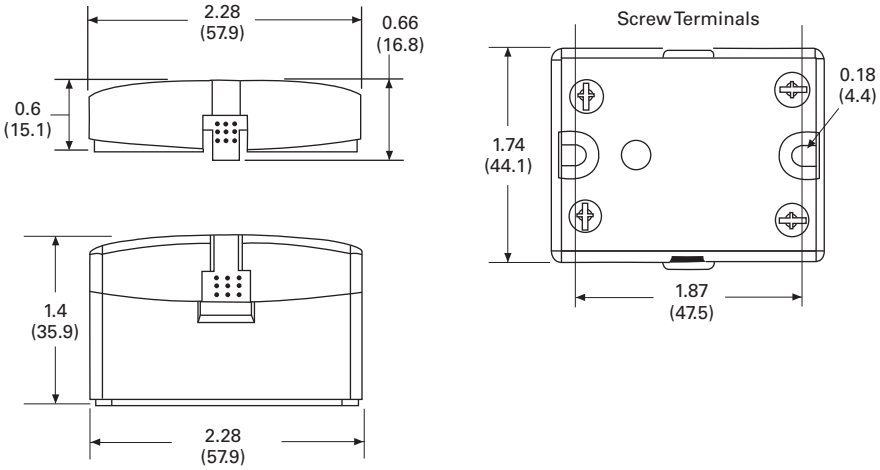
75 Amp Styles



Dimensions

Approximate Dimensions in Inches (mm)

D93 Series



3

D96 Series—Solid-State Relays

Contents

D96 Series

Product Description

Eaton's D96 series of solid-state relays is a technologically advanced set of electronic relays for tough applications and harsh environments. The compact 17.5 mm wide package with an integrated heat sink provides easy mounting in tight spaces.

Application Description

A solid-state relay (SSR) can perform many applications that an electromechanical relay can perform. The SSR differs in that it has no moving mechanical parts within it and has some distinct advantages over an electromechanical relay.

When used correctly in the intended application, the SSR provides a high degree of reliability, a long service life, significantly reduced electromagnetic interference, fast response and high vibration resistance.

Applications for the SSR typically include equipment that requires high cycling rates, low acoustical or electrical noise, or high vibration resistance. Some examples are medical equipment, heating/cooling equipment, lighting control and pumps/compressors, among others.

Features and Benefits

- All solid-state circuitry has no moving parts to wear
- Integral heat sink eliminates the need for added accessories and installation
- Flexible mounting allows DIN rail or panel mounting without additional hardware or tools
- Isolated input and output terminals protect the system from electrical noise
- Internal snubber circuitry protects the SSR from transients

Standards and Certifications

- UL/cUL listed—UL 508 (File E37317)
- CSA certified
- CE marked
- RoHS compliant

Listed

Product Selection

D96115ACZ3

D96 Series

Input Voltage	Output Voltage	Contact Configuration	Switching Type	Rated Current Load (Amps)	Catalog Number
3.5–32 Vdc	3–50 Vdc	SPST-NO	DC switch	15	**D96115ACZ3**
3.5–32 Vdc	3–150 Vdc	SPST-NO	DC switch	8	**D96208ACZ3**
90–280 Vac	24–280 Vac	SPST-NO	Random	10	**D96210ACR1**
3–32 Vdc	24–280 Vac	SPST-NO	Random	10	**D96210ACR2**
90–280 Vac	24–280 Vac	SPST-NO	Zero cross	10	**D96210ACZ1**
3–32 Vdc	24–280 Vac	SPST-NO	Zero cross	10	**D96210ACZ2**
3–32 Vdc	24–280 Vac	SPST-NC	Random	10	**D96210BCR2**
90–280 Vac	48–480 Vac	SPST-NO	Random	10	**D96410ACR1**
3–32 Vdc	48–480 Vac	SPST-NO	Random	10	**D96410ACR2**
90–280 Vac	48–480 Vac	SPST-NO	Zero cross	10	**D96410ACZ1**
3–32 Vdc	48–480 Vac	SPST-NO	Zero cross	10	**D96410ACZ2**
90–280 Vac	48–600 Vac	SPST-NO	Random	10	**D96610ACR1**
90–280 Vac	48–600 Vac	SPST-NO	Zero cross	10	**D96610ACZ1**
3–32 Vdc	48–600 Vac	SPST-NO	Zero cross	10	**D96610ACZ2**

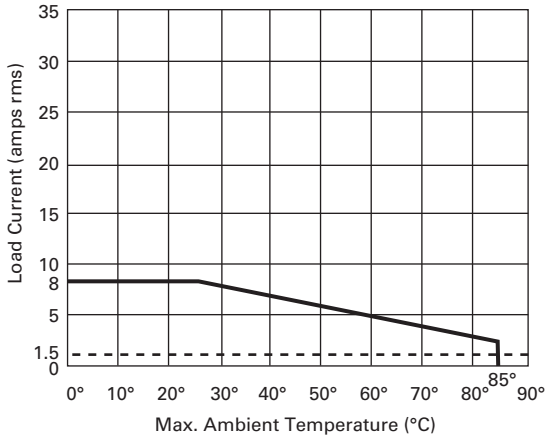
Technical Data and Specifications

D96 Series

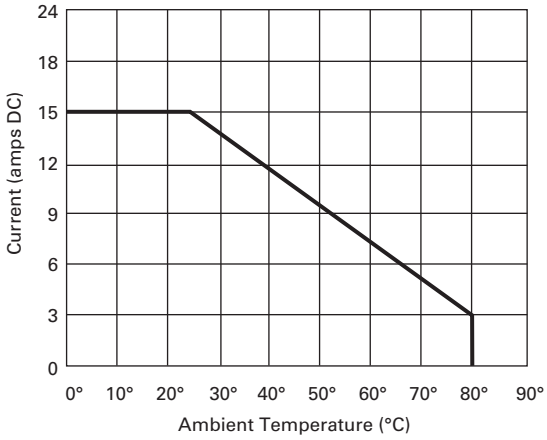
Description	Units	D96210ACZ1	D96210ACZ2	D96210ACR1	D96210ACR2	D96115ACZ3	D96208ACZ3	D96210BCR2
Output Characteristics								
Contact configuration		SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NC
Switching device		SCR	SCR	SCR	SCR	MOSFET	MOSFET	SCR
Current rating	A	10	10	10	10	15	8	10
Switching type		Zero cross	Zero cross	Random turn on	Random turn on	DC switching	DC switching	Random turn on
Maximum zero turn-on voltage (Vpk)	V	35	35	35	35	NA	NA	35
Maximum rate of rise off state voltage (DV/DT)	V/us	500	500	500	500	NA	NA	500
Incandescent lamp ampere rating (rms)	A	8	8	8	8	NA	NA	8
Motor load rating (rms)	A	4.5	4.5	4.5	4.5	NA	NA	4.5
Min. load current to maintain on	mA	50	50	50	50	20	20	50
Non-repetitive surge current (1 cycle)	A	500	500	500	500	50	35	500
Max. rms overload current (1 second)	A	24	24	24	24	24	17	24
Max. off state leakage current (rms)	mA	10	10	10	10	10	10	10
Typical on state voltage drop (rms)	V	1.25 AC	1.25 AC	1.25 AC	1.25 AC	1.25 DC	1.25 DC	1.25 AC
Max. on state voltage drop (rms)	V	1.6 AC	1.6 AC	1.6 AC	1.6 AC	1.6 DC	1.6 DC	1.6 AC
Max. I^2t for fusing (A^2)		1250	1250	1250	1250	NA	NA	1250
Input Characteristics								
Must release voltage	V	10 AC	1 DC	10 AC	1 DC	1 DC	1 DC	1 DC
Typical input impedance	ohms	16–25k	Current regulator	16–25k	ACL	Current regulator	Current regulator	ACL
Nominal input current at 5 Vdc or 240 Vac	mA	12	16	12	16	12	12	12
Reverse polarity protection		NA	Yes	NA	Yes	Yes	Yes	Yes
Performance Characteristics								
Operating time (response time)								
ON	ms	40	8.3	8.3	8.3	5	5	8.3
OFF	ms	80	8.3	8.3	8.3	5	5	8.3
Rated insulation voltage—input to input	Vac	2500	2500	4000	4000	2500	2500	4000
Dielectric strength—terminal to chassis	Vac	2500	2500	2500	2500	2500	2500	2500
Environment								
Product certifications		UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE
Ambient air temperature								
Storage	°C	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100
Operating	°C	–30 to 80	–30 to 80	–30 to 80	–30 to 80	–30 to 80	–30 to 80	–30 to 80
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20	IP20
Miscellaneous Characteristics								
Thermal resistance (junction to case)	°C/W	0.66	0.66	0.66	0.66	0.66	0.66	0.66
Integral heat sink	°C/W	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Weight	g (oz)	127 (4.1)	127 (4.1)	127 (4.1)	127 (4.1)	127 (4.1)	127 (4.1)	127 (4.1)
LED—input		Green	Green	Green	Green	Green	Green	Green
Terminal wire capacity	AWG (mm^2)	14 (2.1)	14 (2.1)	14 (2.1)	14 (2.1)	14 (2.1)	14 (2.1)	14 (2.1)
Terminal torque (max.)	in-lb (Nm)	7.1 (0.8)	7.1 (0.8)	7.1 (0.8)	7.1 (0.8)	7.1 (0.8)	7.1 (0.8)	7.1 (0.8)

Temperature Derating Curves

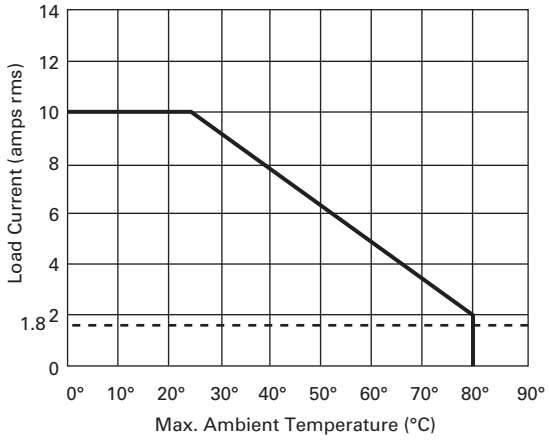
8 Amp Style



15 Amp Style



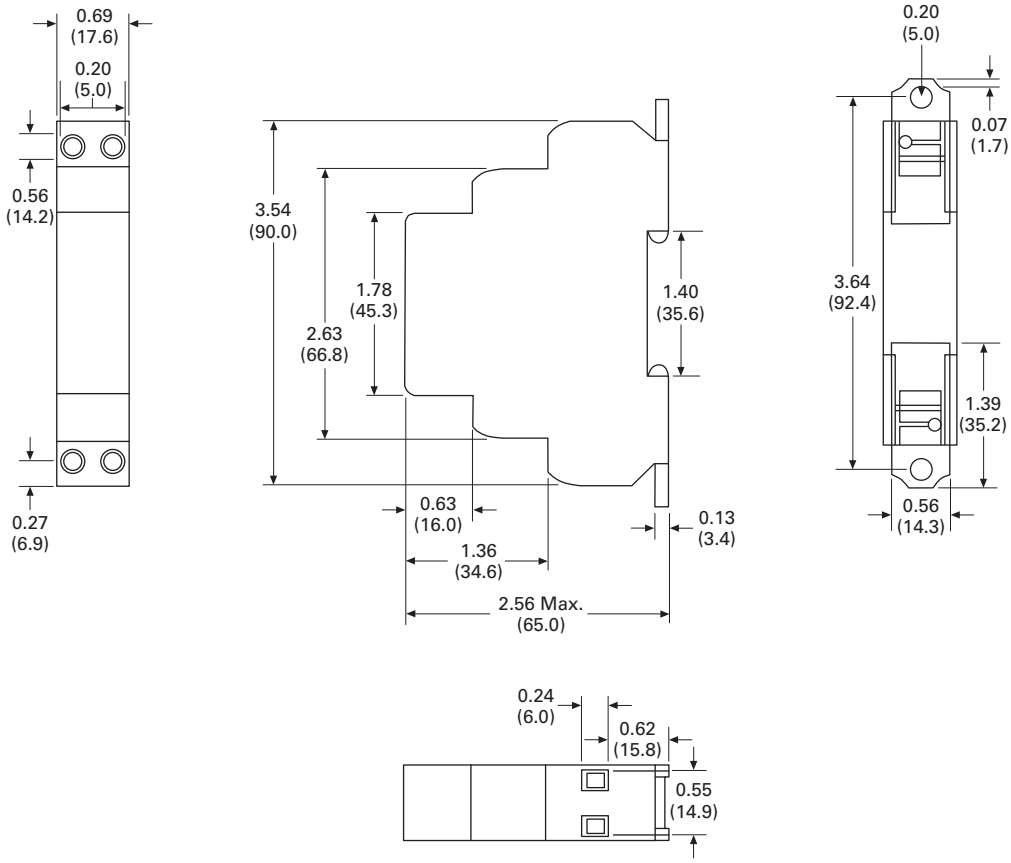
10 Amp Style



Dimensions

Approximate Dimensions in Inches (mm)

D96 Series



D99 Series—Solid-State Relays

Contents

D99 Series

Product Description

Eaton's D99 series of solid-state relays is a line of heavy-duty industrial relays with an integrated heat sink. The attached metal hardware can be used for DIN rail or panel mounting.

Models are available in a variety of input voltages in 10 A, 25 A and 40 A sizes.

Application Description

A solid-state relay (SSR) can perform many applications that an electromechanical relay can perform. The SSR differs in that it has no moving mechanical parts within it and has some distinct advantages over an electromechanical relay.

When used correctly in the intended application, the SSR provides a high degree of reliability, a long service life, significantly reduced electromagnetic interference, fast response and high vibration resistance.

Applications for the SSR typically include equipment that requires high cycling rates, low acoustical or electrical noise, or high vibration resistance. Some examples are medical equipment, heating/cooling equipment, lighting control and pumps/compressors, among others.

Features and Benefits

- All solid-state circuitry has no moving parts to wear
- Integral heat sink eliminates the need for added accessories and installation
- Flexible mounting allows DIN rail or panel mounting without additional hardware or tools
- Isolated input and output terminals protect the system from electrical noise
- Internal snubber circuitry protects the SSR from transients

Standards and Certifications

- UL/cUL listed—UL 508 (File E37317)
- CSA certified
- CE marked
- RoHS compliant

Listed

Product Selection

D99210ACZ1

D99 Series

Input Voltage	Output Voltage	Contact Configuration	Switching Type	Rated Current Load (Amps)	Catalog Number
90–280 Vac	24–280 Vac	SPST-NO	Zero cross	10	**D99210ACZ1**
3–32 Vdc	24–280 Vac	SPST-NO	Zero cross	10	**D99210ACZ2**
90–280 Vac	24–280 Vac	SPST-NO	Zero cross	25	**D99225ACZ1**
3–32 Vdc	24–280 Vac	SPST-NO	Zero cross	25	**D99225ACZ2**
90–280 Vac	24–280 Vac	SPST-NO	Zero cross	40	**D99240ACZ1**
3–32 Vdc	24–280 Vac	SPST-NO	Zero cross	40	**D99240ACZ2**
90–280 Vac	48–600 Vac	SPST-NO	Zero cross	10	**D99610ACZ1**
3–32 Vdc	48–600 Vac	SPST-NO	Zero cross	10	**D99610ACZ2**
90–280 Vac	48–600 Vac	SPST-NO	Zero cross	25	**D99625ACZ1**
3–32 Vdc	48–600 Vac	SPST-NO	Zero cross	25	**D99625ACZ2**
90–280 Vac	48–600 Vac	SPST-NO	Zero cross	40	**D99640ACZ1**
3–32 Vdc	48–600 Vac	SPST-NO	Zero cross	40	**D99640ACZ2**

Technical Data and Specifications

D99 Series

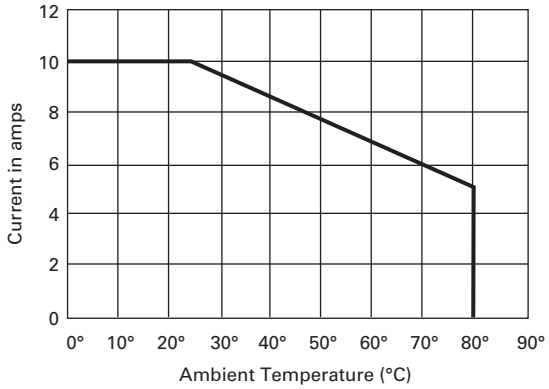
Description	Units	D99210ACZ1	D99210ACZ2	D99225ACZ1	D99225ACZ2	D99240ACZ1	D99240ACZ2
Output Characteristics							
Contact configuration		SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO
Switching device		SCR	SCR	SCR	SCR	SCR	SCR
Current rating	A	10	10	25	25	40	40
Switching type		Zero cross	Zero cross	Zero cross	Zero cross	Zero cross	Zero cross
Maximum zero turn-on voltage (Vpk)	V	35	35	35	35	35	35
Maximum rate of rise off state voltage (DV/DT)	V/us	500	200	500	500	500	500
Incandescent lamp ampere rating (rms)	A	8	8	16	16	20	20
Motor load rating (rms)	A	4.5	4.5	8	8	14	14
Min. load current to maintain on	mA	50	50	120	120	250	250
Non-repetitive surge current (1 cycle)	A	83	83	800	800	800	800
Max. rms overload current (1 second)	A	24	24	40	40	100	100
Max. off state leakage current (rms)	mA	10	10	10	10	10	10
Typical on state voltage drop (rms)	Vac	1.25	1.25	1.35	1.35	1.6	1.6
Max. on state voltage drop (rms)	Vac	1.6	1.6	1.8	1.8	1.6	1.6
Max. I^2t for fusing (A^2)		83	83	3700	3700	3700	83
Input Characteristics							
Must release voltage	V	10 AC	1 DC	10 AC	1 DC	10 AC	1 DC
Typical input impedance	ohms	16–25k	Current regulator	16–25k	Current regulator	13k	Current regulator
Nominal input current at 5 Vdc or 240 Vac	mA	12	12	12	12	16	16
Reverse polarity protection		NA	Yes	NA	Yes	NA	Yes
Performance Characteristics							
Operating time (response time)							
ON	ms	8.3	8.3	8.3	8.3	8.3	10
OFF	ms	8.3	8.3	8.3	8.3	8.3	10
Rated insulation voltage—input to input	Vac	4000	4000	4000	4000	4000	4000
Dielectric strength—terminal to chassis	Vac	4000	4000	4000	4000	4000	4000
Environment							
Product certifications		UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE
Ambient air temperature							
Storage	°C	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100
Operating	°C	–30 to 80	–30 to 80	–30 to 80	–30 to 80	–30 to 80	–30 to 80
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Miscellaneous Characteristics							
Thermal resistance (junction to case)	°C/W	1.5	1.5	1.5	0.43	1.5	0.43
Integral heat sink	°C/W	2.2	2.2	2.2	2.2	2.2	2.2
Weight	g (oz)	320 (11.3)	320 (11.3)	320 (11.3)	326 (11.5)	320 (11.3)	332 (11.7)
LED—input		Green	Green	Green	Green	Green	Green
Terminal wire capacity	AWG (mm^2)	8 (10)	8 (10)	8 (10)	8 (10)	8 (10)	8 (10)
Terminal torque (max.)	in-lb (Nm)	12.5 (1.4)	12.5 (1.4)	12.5 (1.4)	12.5 (1.4)	12.5 (1.4)	12.5 (1.4)

D99 Series, continued

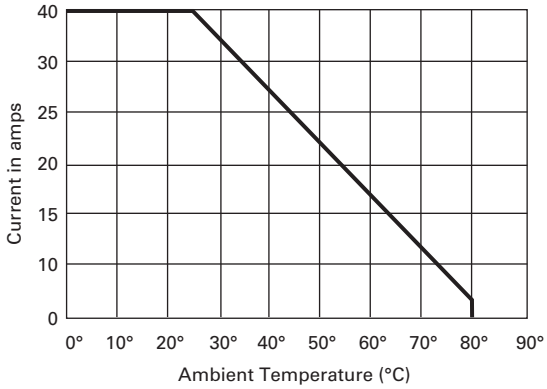
Description	Units	D99610ACZ1	D99610ACZ2	D99625ACZ1	D99625ACZ2	D99640ACZ1	D99640ACZ2
Output Characteristics							
Contact configuration		SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO
Switching device		SCR	SCR	SCR	SCR	SCR	SCR
Current rating	A	10	10	25	10	40	40
Switching type		Zero cross	Zero cross	Zero cross	Zero cross	Zero cross	Zero cross
Maximum zero turn-on voltage (Vpk)	V	35	35	35	35	35	35
Maximum rate of rise off state voltage (DV/DT)	V/us	200	200	700	700	500	500
Incandescent lamp ampere rating (rms)	A	8	8	16	16	20	20
Motor load rating (rms)	A	4.5	4.5	8	8	14	14
Min. load current to maintain on	mA	80	80	250	250	250	250
Non-repetitive surge current (1 cycle)	A	83	83	1000	1000	800	800
Max. rms overload current (1 second)	A	24	24	50	50	100	100
Max. off state leakage current (rms)	mA	10	10	10	10	10	10
Typical on state voltage drop (rms)	Vac	1.25	1.25	1.35	1.35	1.6	1.6
Max. on state voltage drop (rms)	Vac	1.6	1.6	1.6	1.6	1.6	1.6
Max. I^2t for fusing (A^2)		83	83	1700	1700	3700	3700
Input Characteristics							
Must release voltage	V	10 AC	1 DC	10 AC	1 DC	10 AC	1 DC
Typical input impedance	ohms	16–25k	Current regulator	16–25k	Current regulator	13k	Current regulator
Nominal input current at 5 Vdc or 240 Vac	mA	12	16	12	16	16	16
Reverse polarity protection		NA	Yes	NA	Yes	NA	Yes
Performance Characteristics							
Operating time (response time)							
ON	ms	8.33	8.3	8.33	8.3	10	10
OFF	ms	8.33	8.3	8.33	8.3	10	10
Rated insulation voltage—input to input	Vac	4000	4000	4000	4000	4000	4000
Dielectric strength—terminal to chassis	Vac	4000	4000	4000	4000	4000	4000
Environment							
Product certifications		UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE
Ambient air temperature							
Storage	°C	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100	–40 to 100
Operating	°C	–30 to 80	–30 to 80	–30 to 80	–30 to 80	–30 to 80	–30 to 80
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20
Miscellaneous Characteristics							
Thermal resistance (junction to case)	°C/W	1.8	1.8	0.43	0.43	0.43	0.43
Integral heat sink	°C/W	2.2	2.2	2.2	2.2	2.2	2.2
Weight	g (oz)	320 (11.3)	321 (11.3)	326 (11.5)	326 (11.5)	332 (11.7)	332 (11.7)
LED—input		Green	Green	Green	Green	Green	Green
Terminal wire capacity	AWG (mm^2)	8 (10)	9 (10)	8 (10)	8 (10)	8 (10)	8 (10)
Terminal torque (max.)	in-lb (Nm)	12.5 (1.4)	12.5 (1.4)	12.5 (1.4)	12.5 (1.4)	12.5 (1.4)	12.5 (1.4)

Temperature Derating Curves

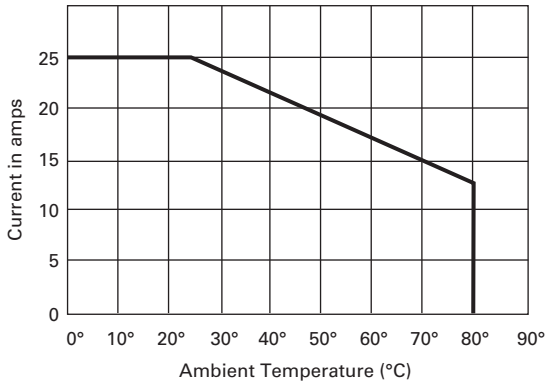
10 Amp Styles



40 Amp Styles



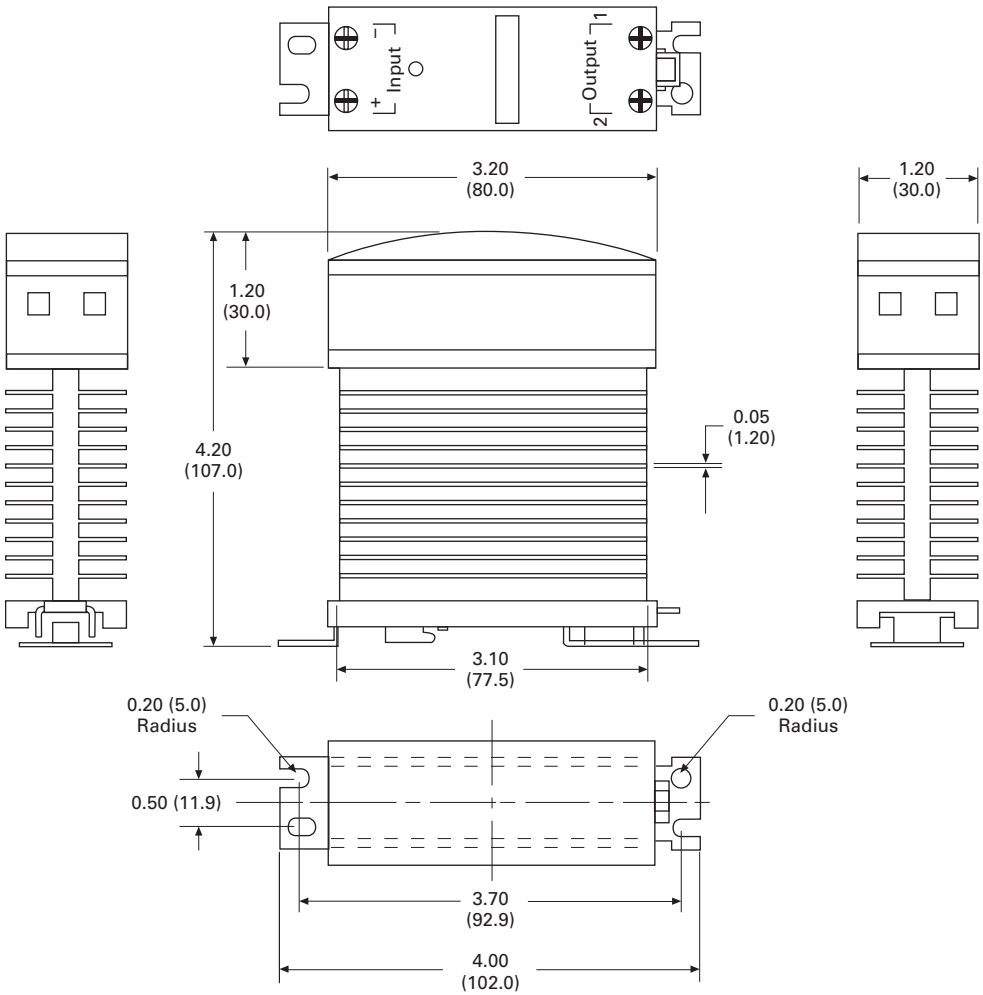
25 Amp Styles



Dimensions

Approximate Dimensions in Inches (mm)

D99 Series



XT **Relays**

Contents

XT Relays

Product Description

Eaton's new line of ***XT*** relays and timers includes mini and standard frame control relays and auxiliary contacts, mini electronic on-delay and multi-function timers and an electronic star-delta (wye-delta) timer for use in star-delta (wye-delta) combinations. Because ***XT*** meets UL®, CSA® and CE standards, it is the perfect product solution for IEC applications all over the world. The compact, space saving and easy to install ***XT*** line of IEC contactors and starters is the efficient and effective solution for customer applications.

Features

- For use with mini and standard frame size contactors and starters
- Control relays
  - AC control from 12 V to 550 V 50 Hz, 600 V 60 Hz
  - DC control from 12 V to 220 V
- On-delay and multi-function timers
  - 24–240 Vac/Vdc control
- Available with screw or spring cage terminals
- Four-pole configurations
- IP20 finger and back-of-hand proof
- Large ambient temperature range: –25 to 50 °C [–13 to 122 °F]
- The XTRE control relays have positively driven contacts between the relay and the auxiliary contact modules as well as within the auxiliary contact modules

Standards and Certifications

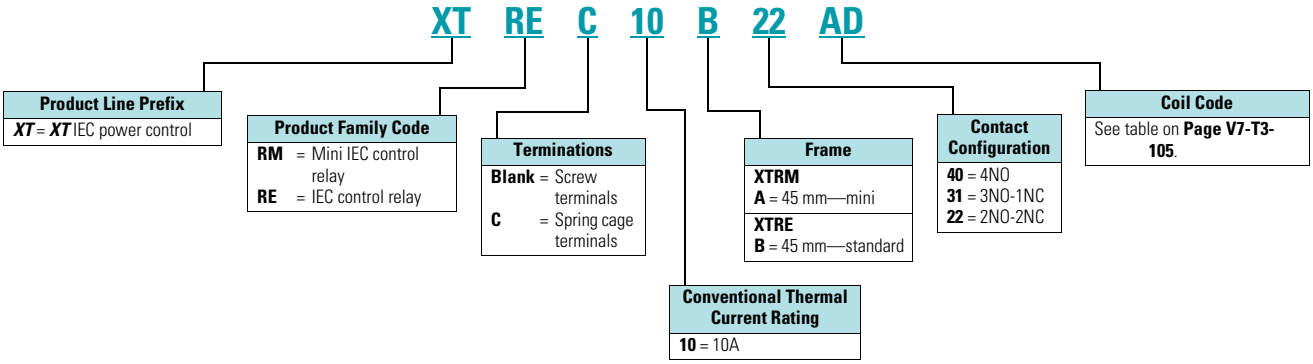
- IEC EN 60947
- CE approved
- UL
- CSA

Instructional Leaflets

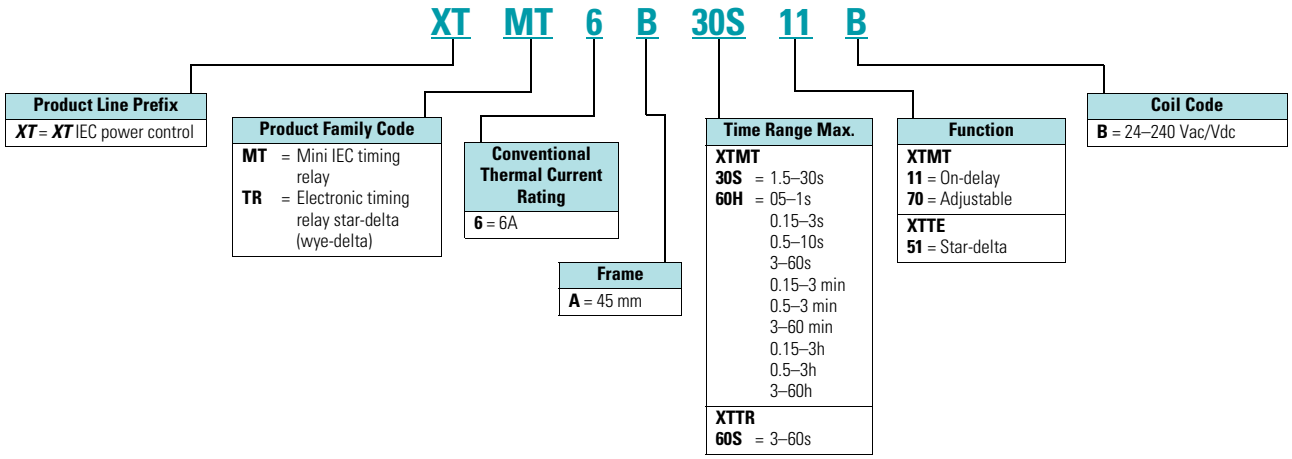
Pub51219	XTRM Mini Control Relays
Pub51210	XTRE Control Relays
Pub51244	XTTR Electronic Star-Delta (Wye-Delta) Timer
Pub51245	XTMT Mini Electronic On-Delay and Multi-Function Timers

Catalog Number Selection

XT—Relays



XT—Timers



Product Selection

When Ordering

- Orders must be placed in multiples of the package quantity listed
- DC operated control relays have a built-in suppressor circuit
- Contact terminal numbers to EN50011
- Coil terminal numbers to EN50005

XTRM10A_

Mini Control Relays

Conventional Thermal Current I_{th} (A)	Contact Configuration	Rated Operational Current AC-15 I_e (A) 220–240V	380–415V	500V	Circuit Symbol	Screw Terminal Catalog Number ①
10	4NO	6	3	1.5	A1 13 23 33 43 / A2 14 24 34 44	**XTRM10A40_**
10	3NO-1NC	6	3	1.5	A1 13 21 33 43 / A2 14 22 34 44	**XTRM10A31_**
10	2NO-2NC	6	3	1.5	A1 13 21 31 43 / A2 14 22 32 44	**XTRM10A22_** ②

XTREC10_

Control Relays

Conventional Thermal Current Open at 60°C I_{th} (A)	Contact Configuration	Rated Operational Current AC-15 I_e (A) 220–240V	380–415V	500V	Circuit Symbol	Screw Terminal Catalog Number ①	Spring Cage Terminal Catalog Number ①
16	4NO	6	4	1.5	A1 13 23 33 43 / A2 14 24 34 44	**XTRE10B40_**	**XTREC10B40_**
16	3NO-1NC	6	4	1.5	A1 13 21 33 43 / A2 14 22 34 44	**XTRE10B31_**	**XTREC10B31_**
16	2NO-2NC	6	4	1.5	A1 13 21 31 43 / A2 14 22 32 44	**XTRE10B22_** ③	**XTREC10B22_** ③

Coil Voltage Suffix

Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code	Coil Voltage	Suffix Code
110V 50 Hz, 120V 60 Hz	**A**	415V 50 Hz, 480V 60 Hz	**C**	380V 50 Hz, 440V 60 Hz	**L**	120 Vdc	**AD**
220V 50 Hz, 240V 60 Hz	**B**	550V 50 Hz, 600V 60 Hz	**D**	380V 60 Hz	**P**	220 Vdc	**BD**
230V 50 Hz	**F**	208V 60 Hz	**E**	12V 50/60 Hz	**R**	12 Vdc	**RD**
24V 50/60 Hz	**T**	190V 50 Hz, 220V 60 Hz	**G**	42V 50 Hz, 48V 60 Hz	**W**	48 Vdc	**WD**
24 Vdc	**TD**	240V 50 Hz, 277V 60 Hz	**H**	48V 50 Hz	**Y**		

Notes

① Underscore (_) indicates magnet coil suffix required. See Coil Voltage Suffix table above.
② DC operated control relays XTRM(C)10A22_ cannot be used with front mount auxiliary contacts.
③ DC operated control relays XTRE(C)10B22_ can only be combined with two-pole auxiliary contacts.

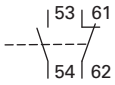
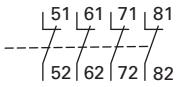
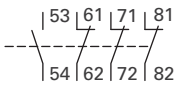
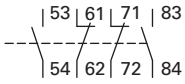
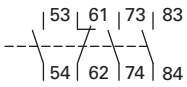
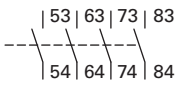
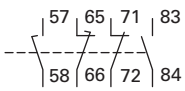
Accessories

Auxiliary Contacts

3

XTMCXF_

Front-Mount Auxiliary Contacts for Use with XTRM Mini Control Relays

Conventional Thermal Current, I_{th} Open (A)	Rated Operational Current AC-15 I_e (A) 220V 230V 240V	380V 400V 415V	500V	Contact Configuration	Contact Sequence	Pkg. Qty. ①	Screw Terminal Catalog Number
10	4	2	1.5	2NC		5	**XTMCXFA02**
10	4	2	1.5	1NO-1NC		5	**XTMCXFA11**
10	4	2	1.5	2NO		5	**XTMCXFA20**
10	4	2	1.5	4NC		5	**XTMCXFA04**
10	4	2	1.5	1NO-3NC		5	**XTMCXFA13**
10	4	2	1.5	2NO-2NC		5	**XTMCXFA22**
10	4	2	1.5	3NO-1NC		5	**XTMCXFA31**
10	4	2	1.5	4NO		5	**XTMCXFA40**
10	4	2	1.5	1NO-1NC $1NO_E$-$1NC_L$		5	**XTMCXFAL22** ②

Notes

① Orders must be placed in multiples of package quantity listed.

② One early-make contact (NO_E), one late-break contact (NC_L).

Front-Mount Auxiliary Contacts for Use with XTRE Control Relays ①

	Conventional Thermal Current, I_{th} (A), Open at 60°C	Poles	Rated Operational Current AC-15 I_e (A) 220V 230V 240V	380V 400V 415V	500V	Contact Configuration	Circuit Symbol	Pkg. Qty. ②	Screw Terminal Catalog Number
Two-Pole	16	2	6	3	1.5	2NO	53 63 / 54 64	5	**XTCEXFAC20**
	16	2	6	3	1.5	1NO-1NC	53 61 / 54 62	5	**XTCEXFAC11** ③
	16	2	6	3	1.5	2NC	51 61 / 52 62	5	**XTCEXFAC02**
	16	2	6	3	1.5	$1NO_E$-$1NC_L$	57 65 / 58 66	5	**XTCEXFALC11** ④
Four-Pole	16	4	6	3	1.5	4NO	53 63 73 83 / 54 64 74 84	5	**XTCEXFAC40** ③
	16	4	6	3	1.5	3NO-1NC	53 61 73 83 / 54 62 74 84	5	**XTCEXFAC31** ③
	16	4	6	3	1.5	2NO-2NC	53 61 71 83 / 54 62 72 84	5	**XTCEXFAC22** ③
	16	4	6	3	1.5	1NO-3NC	53 61 71 81 / 54 62 72 82	5	**XTCEXFAC13**
	16	4	6	3	1.5	4NC	51 61 71 81 / 52 62 72 82	5	**XTCEXFAC04**
	16	4	6	3	1.5	1NO-1NC $1NO_E$-$1NC_L$	57 65 71 83 / 58 66 72 84	5	**XTCEXFCLC22** ④

Notes

① Interlocked opposing contacts, to IEC/EN 60947-5-1 Annex L (positively driven), within the auxiliary contact modules (not NO_E and NC_L contacts) and between the auxiliary contacts and built-in contacts of the XTRE control relays.

② Orders must be placed in multiples of package quantity listed.

③ Catalog number is shown with screw type terminal. For spring cage, add a "**C**" before the last 2 digits. For example, to order a spring cage version of the XTCEXFAC22, change the catalog number to XTCEXFAC**C**22.

④ One early-make contact (NO_E), one late-break contact (NC_L).

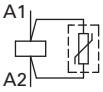
Suppressors

For AC operated contactors 50–60 Hz. On DC operated contactor relays and on XTRE10B, the suppressor circuit is built-in. Note dropout delay.

Varistor Suppressor ①②

XTCEXVSB_

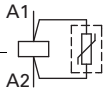
Varistor Suppressor for XTRE

Voltage	For Use with…	Contact Sequence	Pkg. Qty. ③	Catalog Number
24–48	XTRE(C)10B		10	**XTCEXVSBW**
48–130			10	**XTCEXVSBA**
130–240			10	**XTCEXVSBB**
240–500			10	**XTCEXVSBC**

XTMCXVS_

XTRM Relay with Installed Suppressor

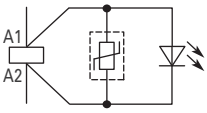
Varistor Suppressor for XTRM

Voltage	For Use with…	Circuit Symbol	Pkg. Qty. ③	Catalog Number
24–48	XTRM6A_, XTRM9A_		10	**XTMCXVSW**
48–130	XTRM6A_, XTRM9A_		10	**XTMCXVSA**
110–250	XTRM6A_, XTRM9A_		10	**XTMCXVSB**
380–415	XTRM6A_, XTRM9A_		10	**XTMCXVSN**

Varistor Suppressor with Integrated LED ①②

XTCEXVSLB_

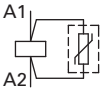
Varistor Suppressor for XTRE

Voltage	For Use with…	Contact Sequence	Pkg. Qty. ③	Catalog Number
24–48	XTRE(C)10B		10	**XTCEXVSLBW**
130–240			10	**XTCEXVSLBB**

RC Suppressor ①②

XTCEXRSB_

RC Suppressor for XTRE

Voltage	For Use with…	Contact Sequence	Pkg. Qty. ③	Catalog Number
24–48	XTRE(C)10B		10	**XTCEXRSBW**
48–130			10	**XTCEXRSBA**
110–240			10	**XTCEXRSBB**
240–500			10	**XTCEXRSBC**

Notes

① Note dropout delay.
② For AC operated contactors, 50/60 Hz. DC operated contactors have an integrated suppressor.
③ Orders must be placed in multiples of package quantity listed.

RC Suppressor [1][2]

XTMCXRS_

XTRM Relay with Installed Suppressor

RC Suppressor for XTRM [3]

Voltage	For Use with…	Circuit Symbol	Pkg. Qty. [4]	Catalog Number
24–48	XTRM6A_, XTRM9A_		10	**XTMCXRSW**
48–130	XTRM6A_, XTRM9A_		10	**XTMCXRSA**
110–250	XTRM6A_, XTRM9A_		10	**XTMCXRSB**

Free-Wheel Diode Suppressor

In addition to the built-in suppressor circuit for DC actuated contactors. Prevents negative breaking voltage when contactors are used in combination with a safety PLC.

XTCEXVSLBB

Free-Wheel Diode Suppressor for XTRE

Voltage	For Use with…	Pkg. Qty. [4]	Catalog Number
130–240	XTRE10B	10	**XTCEXVSLBB**

Connector [5]

Connector

XTCEXCNC

XTMCXCN

For Use with…	Pkg. Qty. [4]	Catalog Number
XTRE(C)10B	50	**XTCEXCNC**
XTRM10A	50	**XTMCXCN**

Mechanical Interlock [6]

Mechanical Interlock

XTCEXMLB

XTMCXML

For Use with…	Pkg. Qty. [4]	Catalog Number
XTRE10B_	5	**XTCEXMLB**
XTRM10A_	5	**XTMCXML**

Notes

① Note dropout delay.
② For AC operated contactors, 50/60 Hz. DC operated contactors have an integrated suppressor.
③ For AC operated contactors, 50/60 Hz. Note dropout delay.
④ Orders must be placed in multiples of package quantity listed.
⑤ For mechanically arranging contactors in combinations. Distance between contactors is 0 mm.
⑥ For two contactors with AC or DC operated magnet system that are horizontally or vertically mounted. For Frame B, mechanical lifespan is 2.5 x 10^6 operations and the distance between contactors is 0 mm.

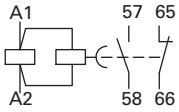
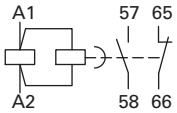
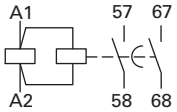
Electronic Timer Modules

Front- (top-) mounted timer modules for use with XTRE10B control relays. Can not be combined with top-mount auxiliary contacts, XTCEXF_.

3

XTCEXT_

Electronic Timer Modules for XTRE

Voltage	Contact Sequence	Timing Range	For Use with…	Pkg. Qty. ①	Catalog Number
On-Delay					
24 Vac/Vdc		0.05–1s 0.5–10s 15–100s	XTRE10B_	1	**XTCEXTEEC11T**
100–130 Vac					**XTCEXTEEC11A**
200–240 Vac					**XTCEXTEEC11B**
Off-Delay					
24 Vac/Vdc		0.05–1s	XTRE10B_	1	**XTCEXTED1C11T**
100–130 Vac					**XTCEXTED1C11A**
200–240 Vac					**XTCEXTED1C11B**
24 Vac/Vdc		0.5–10s	XTRE10B_	1	**XTCEXTED10C11T**
100–130 Vac					**XTCEXTED10C11A**
200–240 Vac					**XTCEXTED10C11B**
24 Vac/Vdc		5–100s	XTRE10B_	1	**XTCEXTED100C11T**
100–130 Vac					**XTCEXTED100C11A**
200–240 Vac					**XTCEXTED100C11B**
Star-Delta					
24 Vac/Vdc		1–30s	XTRE10B_	1	**XTCEXTEYC20T**
100–130 Vac					**XTCEXTEYC20A**
200–240 Vac					**XTCEXTEYC20B**
Sealable Shroud					
	Transparent sealable shroud used to protect electronic timer modules from unwanted access.		XTCEXTEE, XTCEXTED, XTCEXTEY	1	**XTCEXTESHRD**

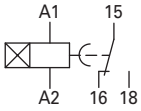
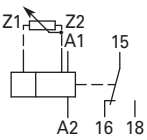
Note

① Orders must be placed in multiples of package quantity listed.

Mini Electronic Timers

XTMT6A_

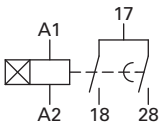
Mini Electronic On-Delay Timers

Conventional Thermal Current I_e (A)	Rated Operational Current I_e AC-11 Amps 220/230/240V	380/400/440V	Time Range	Function	Terminal Marking According to EN 50042	Catalog Number
6	3	3	1.5–30 sec	Fixed, on-delay		**XTMT6A30S11B**
6	3	3	0.05–1 sec 0.15–3 sec 0.5–10 sec 3–60 sec 0.15–3 min 0.5–10 min 3–60 min 0.15–3h 0.5–10h 3–60h	Adjustable: on-delay; fleeting contact on energization; flashing; pulse generating; ON-OFF		**XTMT6A60H70B**

Electronic Star-Delta (Wye-Delta) Timers

XTTR6A60S51

Electronic Star-Delta (Wye-Delta) Timers

Conventional Thermal Current I_e (A)	Rated Operational Current I_e AC-11 Amps 230V	400V	Time Range	Function	Terminal Marking According to EN 50042	Catalog Number
6	3	3	3–60 sec	Fixed, star-delta		**XTTR6A60S51B**

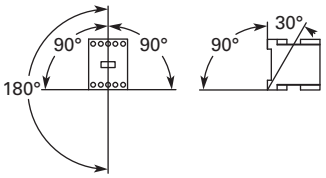
Actuating Voltage
24–240 50/60 Hz
24–240 Vdc

Admissible Cable Length
Cable unscreened, with cable cross-section 0.5–1.5 mm^2
Two-core cable
Two-core cable in the same cable duct with the main cable, 50/60 Hz

Connection to
Y1/Y2, Z1/Z2
M250
M50

Technical Data and Specifications

Relays and Timers

Description	XTRE	XTCEXFAC_	XTCEXTE_	XTRM	XTMCXFA_
General					
Standards	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	DIN EN 61812, IEC/EN 60947, VDE 060, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA	IEC/EN 60947, VDE 0660, UL, CSA
Lifespan, mechanical—operations					
AC operated	20,000,000	10,000,000	3,000,000	10,000,000	10,000,000
DC operated	20,000,000	10,000,000	3,000,000	20,000,000	20,000,000
Maximum operating frequency (ops/hr)	9000	9000	—	9000	9000
Climatic proofing	①	①	①	①	①
Ambient temperature					
Open (°C, min./max.)	–25/60	–25/60	–40/80	–25/50	–25/50
Enclosed (°C, min./max.)	–25/40	–25/40	–25–60	–25/40	–25/40
Ambient temperature for storage (°C, min./max.)	–40/80	–40/80	–25–40	—	—
Mounting position			As required, not suspended	As required, except vertically A1/A2 at the bottom	As required, except vertically A1/A2 at the bottom
Mechanical shock resistance (IEC/EN 60068-2-27) Half-sinusoidal shock 10 ms Base unit with auxiliary contact module					
Make contact	7g	7g	6g	10g	10g
Break contact	5g	5g	6g	8g	8g
Degree of protection	IP20	IP20	IP20	IP20	IP20
Protection against direct contact from the front when actuated by a perpendicular test finger (IEC 536)	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof	Finger and back-of-hand proof
Weight					
AC operated (kg)	0.23	0.05	0.08	0.17	—
DC operated (kg)	0.28	0.05	0.08	0.20	—
Terminal capacity					
Screw terminals					
Solid (mm^2)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–4) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–1.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with ferrule (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–1.5) 2 x (0.75–1.5)	1 x (0.75–1.5) 2 x (0.75–1.5)	1 x (0.75–1.5) 2 x (0.75–1.5)
Solid or stranded (AWG)	18–14		18–14	18–14	
Terminal screw	M3.5	M3.5	M3.5	M3.5	M3.5
Pozidriv screwdriver	Size 2	Size 2	Size 2	Size 2	Size 2
Standard screwdriver (mm)	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6	0.8 x 5.5 1 x 6
Max. tightening torque (Nm)	1.2	1.2	1.2	1.2	1.2
Spring cage terminals					
Solid (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	— —	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Flexible with or without ferrule DIN 46228 (mm^2)	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)	— —	1 x (0.75–2.5) 2 x (0.75–2.5)	1 x (0.75–2.5) 2 x (0.75–2.5)
Solid or stranded (AWG)	18–14	18–14	—	18–14	18–14
Standard screwdriver (mm)	0.6 x 3.5	0.6 x 3.5	—	0.6 x 3.5	0.6 x 3.5

Note

① Damp heat, constant, to IEC 60068-2-78; damp heat, cyclical, to IEC 60068-2-30.

Relays and Timers, continued

Description	XTRE	XTCEXFAC_	XTCEXTE_	XTRM	XTMCXFA_
Contacts					
Interlocked opposing contacts to ZH 1/457, including auxiliary contact module	Yes	Yes	No	Yes	Yes
Rated impulse withstand voltage (U_{imp}) Vac	6000	6000	6000	6000	6000
Overvoltage category/pollution degree	III/3	III/3	III/3	III/3	III/3
Rated insulation voltage (U_i) Vac	690	690	600	690	690
Rated operational voltage (U_e) Vac	690	500	400	600	600
Safe isolation to VDE 0106 Part 101 and Part 101/A1					
Between coil and auxiliary contacts (Vac)	400	400	250	300	300
Between the auxiliary contacts (Vac)	400	400	250	300	300
Rated operational current					
AC-15 220/240V I_e	6	6	Please inquire	6	4
380/415V I_e	4	3	Please inquire	3	2
500V I_e	1.5	—	—	1.5	1.5
DC-13 ①					
DC13 L/R ≤15 ms					
Contacts in series—voltage:					
1—24V	10	10	—	2.5	2.5
1—60V	6	6	—	—	—
2—60V	10	10	—	2.5	2.5
1—110V	3	3	—	—	—
3—110V	6	6	—	1.5	1.5
1—220V	1	1	—	—	—
3—220V	5	5	—	0.5	0.5
DC13 L/R ≤50 ms					
Contacts in series—voltage:					
3—24V	4	—	—	—	—
3—60V	4	—	—	—	—
3—110V	2	—	—	—	—
3—220V	1	—	—	—	—
Control circuit reliability (at U_e = 24 Vdc, U_{min} = 17, I_{min} = 5.4 mA)	Failure rate = $<10^{-8}$, <1 failure in 100 million operations		—	Failure rate = $<10^{-8}$, <1 failure in 100 million operations	
Conventional thermal current (I_{th})	16	16	6	10	10
Short-circuit rating without welding					
Maximum overcurrent protective device					
220/240V–XTPR Frame B	4	—	—	4	4
380/415V–XTPR Frame B	4	—	—	4	4
Short-circuit protection, max. fuse					
500V (A gG/gL)	10	10	6	6	6
500V (A fast)	—	—	—	10	10
Current heat losses at load of I_{th}					
AC operated (W)	0.3	0.3	—	0.2	0.2
DC operated (W)	0.3	0.3	—	0.3	0.3

Note

① Making and breaking conditions to DC13, time constant as stated.

Relays and Timers, continued

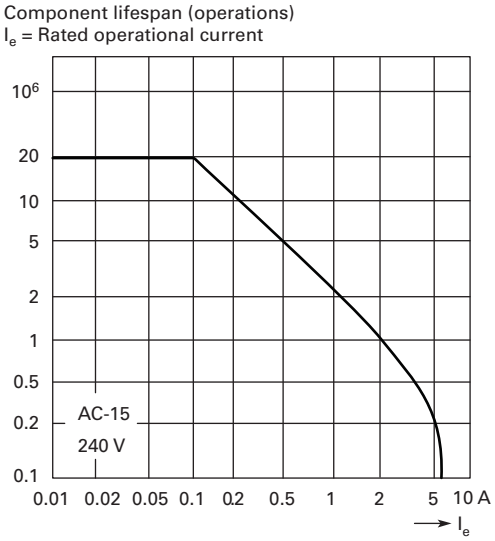
Description	XTRE	XTCEXFAC_	XTCEXTE_	XTRM	XTMCXFA_
Magnet Systems					
Pickup and dropout values					
AC operated					
Single-voltage coil 50 Hz and dual-voltage coil 50 Hz, 60 Hz (pickup x U_c)	0.8–1.1	—	0.85–11	0.8–1.1	—
Dual-frequency coil 50/60 Hz (pickup x U_c)	0.8–1.1	—	—	0.85–1.1	—
DC operated ①					
Pickup voltage (pickup x U_c)	0.8–1.1	—	0.7–1.2	0.85–1.3	—
At 24V: without auxiliary contact module (40°C) (pickup x U_c)	0.7–1.3	—	—	0.7–1.3	—
Power consumption					
Single-voltage coil 50 Hz and dual-voltage coil 50 Hz, 60 Hz					
Pickup VA	24	—	—	25	—
Pickup W	19	—	—	22	—
Sealing VA	3.4	—	2	4.6	—
Sealing W	1.2	—	1.8	1.3	—
Dual-frequency coil 50/60 Hz at 50 Hz					
Pickup VA	27	—	—	30	—
Pickup W	22	—	—	26	—
Sealing VA	4.2	—	—	5.4	—
Sealing W	1.4	—	—	1.6	—
Dual-frequency coil 50/60 Hz at 60 Hz					
Pickup VA	25	—	—	29	—
Pickup W	21	—	—	24	—
Sealing VA	3.3	—	—	3.9	—
Sealing W	1.2	—	—	1.2	—
DC operated					
Pull-in = sealing (W)	3	—	—	2.6	—
Duty factor (% DF)	100	—	100	100	—
Switching times at 100% U_c (approximate values)					
AC operated closing delay (ms)	≤21	—	—	14–21	—
AC operated NO contact opening delay (ms)	≤18	—	—	8–18	—
AC operated with auxiliary contact module, max. closing delay (ms)	—	—	—	45	45
DC operated closing delay (ms)	≤31	—	—	26–35	—
DC operated NO contact opening delay (ms)	≤12	—	—	15–25	—
DC operated with auxiliary contact module, max. closing delay (ms)	—	—	—	70	70

Note

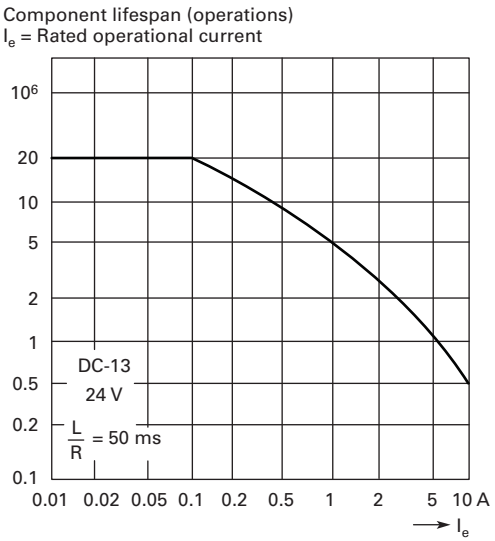
① Smoothed DC or three-phase bridge rectifier.

Control Relays—Characteristic Curves

XTRE (AC-15)



XTRE (DC-13) ①



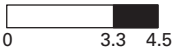
The diagrams show the closing and opening travel of the contact of the contactor relays and auxiliary contacts at no load. Tolerances are not taken into consideration.

Contact Travel Diagrams

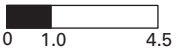
XTRE

XTRE_ — AC Operation

Normally open contact

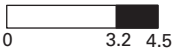


Normally closed contact

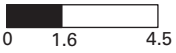


XTCEXFAC_ — AC Operation

Normally open contact



Normally closed contact



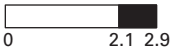
XTCEXFALC_ — AC Operation

Normally open contact (early make)

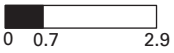
Normally closed contact (late make)

XTRE — DC Operation

Normally open contact

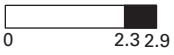


Normally closed contact

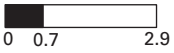


XTCEXFAC_ — DC Operation

Normally open contact



Normally closed contact



XTCEXFALC_ — DC Operation

Normally open contact (early make)

Normally closed contact (late make)

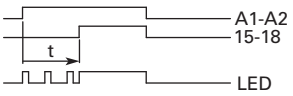
Note

① Making and breaking conditions to DC-13, time constant as stated.

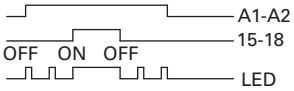
3

Flow Diagrams—Electronic Timers, XTMT Mini Timers

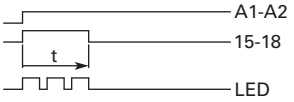
On-Delay



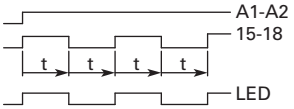
ON-OFF Function



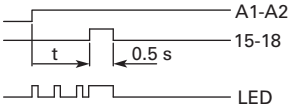
Fleeting Contact on Energization



Flashing, Pulse Initiating

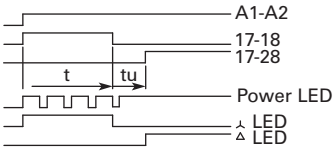


Pulse Generating



Star-Delta (Wye-Delta) Timer

Star-Delta



Rating Data

Rating Data for Approved Types

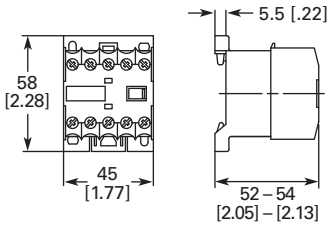
Pilot Duty	General Use
Control Relays—XTMR	
A600, P300	10A–600 Vac 0.5A–250 Vdc
Timers—XTMT, XTTR	
B300	6A–250 Vac

Dimensions

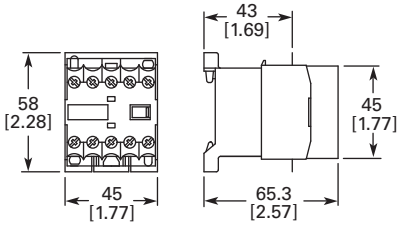
Approximate Dimensions in mm [in.]

Mini Contactor Relays

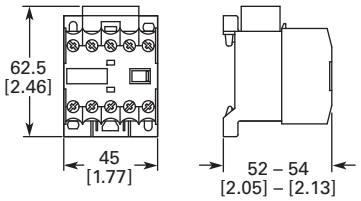
Mini Control Relay XTRM



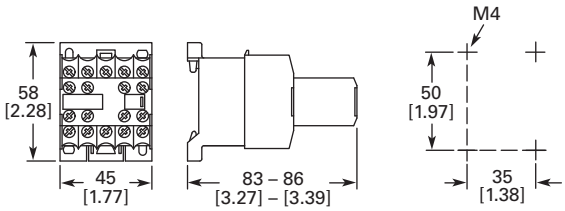
XTRM Mini Control Relay with IP40 XTMCX Shroud



XTRM Mini Control Relay with RC or Varistor Suppressor



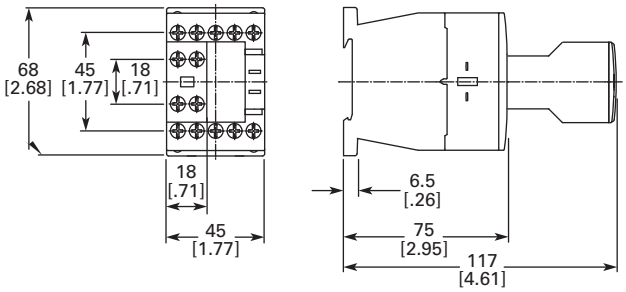
XTRM Mini Control Relay with XTMCXFA Auxiliary Contact



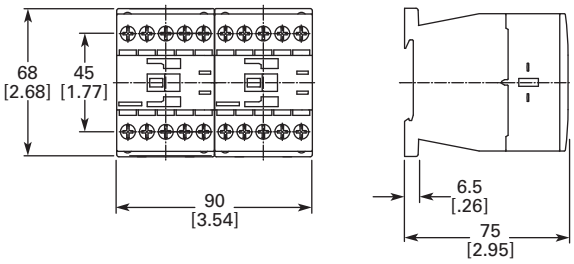
Approximate Dimensions in mm [in.]

Control Relays

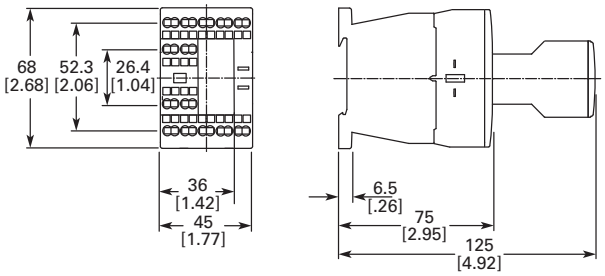
Control Relay XTRE with XTCEXFA Auxiliary Contact



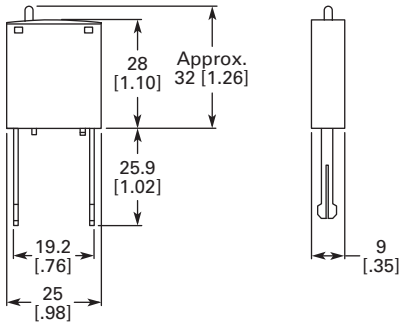
Control Relay XTRE with XTCEXMLB Mechanical Interlock



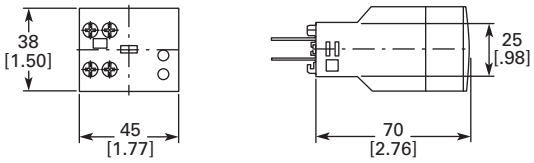
Control Relay with Spring Cage Terminals XTREC with XTCEXFA Auxiliary Contact



Coil Suppressors for Use with XTRE Control Relays



Electronic Timer Module XTCEXTE



3

Machine Tool Relays

Contents

Product Overview

Eaton's machine tool relay offering includes a variety of NEMA type relays. Included in this are open style relays and relays with convertible or side-mount contacts. Also included in this family are a variety of accessories to match the application, including suppressors, timing contacts and enclosures. The relay coils are available in a variety of line and control level voltages.

D15 Series—Freedom 600 V Multipole

Contents

D15 Series—Freedom 600 V Multipole

Product Description

Contact poles on the D15 relay are of the fixed design and are not convertible. The basic four-pole relay will accept a front-mounted contact pole deck and/or side-mounted contact blocks (one per side). In addition, a side-mounted solid-state timer or a front-mounted pneumatic timer can be added to the relay. Only one front-mounted attachment can be added to the basic relay.

Application Description

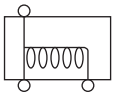
Side-mounted contact blocks can be used to provide additional poles in applications where a pneumatic timer is installed on the front of the relay. They can also be used where panel depth is restricted.

The maximum number of contacts recommended per relay is eight, six of which can be NC. When a pneumatic timer is used, the maximum recommended number of NC contacts is three.

Relays with DC coils are supplied with a coil clearing NC contact mounted on the side of the relay.

Features and Benefits

- 600 V, 10 A continuous thermal current
- State indicator visually shows relay ON or OFF status
- Relay base has mounting holes on 35 x 60 mm centers, permitting direct replacement of competitive relays
- Relay also mounts on 35 mm DIN rail as standard
- Magnet coil has three terminals, permitting either top or diagonal wiring—easy to replace European or U.S. relays without changing wiring layout



- Contact pole terminals have captive, backed-out, self-lifting pressure plates with ± screws—reduced wiring time
- All terminals are shrouded or “finger-proofed” to reduce possibility of electrical shock

Standards and Certifications

- UL
- CSA certified

Product Selection

When Ordering, Specify

Catalog number and magnet coil code letter. Example: For a four-pole relay having 4NO contacts with a 120 V 60 Hz coil, order Catalog Number D15CR40**A**B.

Factory-Assembled Multipole Relays

	Number of Poles	Type of Contacts NO	NC	Open Type Catalog Number ①
D15CR40_B 	4	4	0	**D15CR40_B**
		3	1	**D15CR31_B**
		2	2	**D15CR22_B**
		1	3	**D15CR13_B**
		0	4	**D15CR04_B**
D15CR60_B 	6 (four-pole relay with two-pole front-mounted deck)	6	0	**D15CR60_B**
		5	1	**D15CR51_B**
		4	2	**D15CR42_B**
		3	3	**D15CR33_B**
		2	4	**D15CR24_B**
		1	5	**D15CR15_B** ②
		0	6	**D15CR06_B** ②
D15CR80_B 	8 (four-pole relay with four-pole front-mounted deck)	8	0	**D15CR80_B**
		7	1	**D15CR71_B**
		6	2	**D15CR62_B**
		5	3	**D15CR53_B**
		4	4	**D15CR44_B**
		3	5	**D15CR35_B** ②
		2	6	**D15CR26_B** ②

Additional Contact Poles

Description	Catalog Number
Front Contact Pole Deck	
1NO-1NC	**C320KGT3**
2NO	**C320KGT4**
2NC	**C320KGT5**
1NO (early closing)–1NC (late opening)	**C320KGT7**
4NO	**C320KGT13**
3NO-1NC	**C320KGT14**
2NO-2NC	**C320KGT15**
1NO-3NC	**C320KGT16**
4NC	**C320KGT17**
Side-Mounted Contact Blocks	
1NO-1NC	**C320KGS3**
2NO	**C320KGS4**
2NC	**C320KGS5**
1NO (early closing)–1NC (late opening)	**C320KGS7**

Magnet Coil Selection

AC Coils Volts and Hertz	Code Suffix
120/60 or 110/50	**A**
240/60 or 220/50	**B**
480/60 or 440/50	**C**
600/60 or 550/50	**D**
208/60	**E**
277/60	**H**
208–240/60	**J**
24/60	**T**

DC Coils Volts	Code Suffix
12	**R1**
24	**T1**
48	**W1**
120	**A1**

Notes

① Underscore indicates missing code suffix for magnet coil—see Magnet Coil Selection table above.

② Not all suffix codes available: consult Customer Support Center.

Accessories

C320 Pneumatic Timer Attachment

Pneumatic Timer Attachment

Timing Range	Catalog Number
0.1 to 30 seconds	**C320TP1**
10 to 180 seconds	**C320TP2**

Maximum Ampere Ratings

	Volts AC			
Description	**120**	**240**	**480**	**600**
Make	30	15	7.5	6
Break	3	1.5	0.75	0.6

Attachment mounts on top of any Freedom Series relay (top-mounted auxiliary contacts can not be installed on device when timer is used). Timer unit has DPST timed contacts—circuits in each pole must be the same polarity. Units are convertible from OFF to ON delay or vice-versa.

Finger Protection Shields

Application	Catalog Number
D15	**C320LS1**

Snap-on shields for both contactors and starters provide IEC Type IP20 Finger Protection. Prevents accidental contact with line/load terminals.

Adhesive Dust Cover

Description	Catalog Number
25 to a package	**C320DSTCVR**

These adhesive stickers come 25 to a package and provide extra protection from contaminants when applied to the sides of Freedom D15. Adhesive covers are easily applied to side opening where auxiliaries are not installed and provide extra protection from metal filings and other debris.

Solid-State Timer

Solid-State ON DELAY Timer ①

Timing Range	Catalog Number ②③④
0.1 to 1.0 seconds	**C320TDN1_**
1 to 30 seconds	**C320TDN30_**
30 to 300 seconds	**C320TDN300_**
5 to 30 minutes	**C320TDN3000_**

This timer is designed to be **wired in series with the load** (typically a coil). When the START button is pushed (power applied to timer), the ON delay timing function starts. At the completion of the set timing period, timer and series wired load will both be energized.

C32MP1

Metal Mounting Plate

Description	Catalog Number
Metal mounting plate	**C321MP1**

Fits all D15 multipole relays.

DIN Rail

Mounting Channel (DIN Rail)

Description	Catalog Number
1 meter length	**XBANS3575P**

Designed for DIN rail mounting of Freedom Series relays.

C320TS2

Transient Suppressor Kits

Description	Coil Voltage 50/60 Hz ⑤	Catalog Number
Transient	24/120 V	**C320TS1**
Suppressor	208/240 V	**C320TS2**
	277/480 V	**C320TS3**

These kits limit high voltage transients produced in the control circuit when power is removed from the contactor or starter coil.

There are three separate suppressors for use on 24–120 V, 208–240 V or 27–480 V coils respectively.

These devices mount directly to the coil terminals.

Notes

① Side mounted on Freedom Series NEMA 00–2, D15, IECA-K and C25D, C25E and C25F frame.
② Add operating voltage suffix to catalog number; **A** = 120 V, **B** = 240 V, **E** = 208 V.
③ Rated 0.5 ampere pilot duty—not to be used on larger contactors.
④ Terminal connections are quick connects only. Two per side.
⑤ Suppressor is compatible with coil voltages/ranges as shown, both 50 and 60 Hz.

C320DC

AC/DC Interface Module—Controller Coil Voltage Ranges

Controller Catalog Number Prefix	Controller Size or Rating	Coil Range Volts AC
AE16, AE17, AE56, AE57, CE15, CE55	A–F	24–240
	G–K	48–240
	L–N	110–240
AN16, AN56, CN15, CN55	00–0	24–240
	1–2	48–240
	3	110–240
CN35	10–30 A	24–240
	60 A	48–240
	100 A	110–240

The Catalog Number C320DC Interface Module is an optically isolated solid-state switch that provides a means of operating AC coils with a 24 Vdc control signal. It acts as a space-saving interposing relay that can switch a specified 50/60 Hz AC source to the contactor or starter coil.

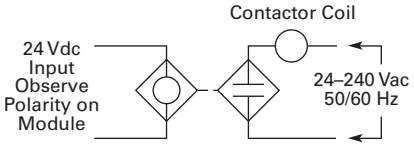
The module may be directly attached to the coil terminals of any Freedom Series contactor or starter—NEMA Sizes 00–3, D15, IEC Sizes A–N and lighting contactors 10–100 A. It also has provisions for DIN rail mounting.

The module will operate coils within the voltage ranges shown in the table to the left.

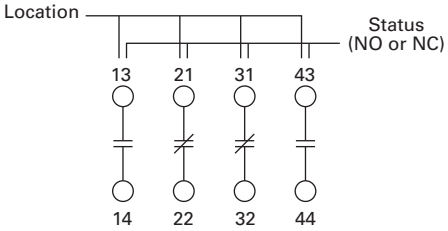
Design Characteristics

- DC input: 24 V ±10% at mA nominal
- AC operating voltage: 24–240 Vac ±10% 50/60 Hz
- AC current rating: 10 A make (inrush), 1 A break (sealed)

Typical Application—Solid-State Switch



Example of Terminal Marking with 2NO and 2NC Contacts



Relay terminals are identified by a two-digit number in accordance with International Standards approved by CENELEC (European Committee for Electro-technical Standardization). The number is marked on the relay and is used to identify location and status of the contacts.

The first digit indicates the location of the contact on the relay. The numbering begins with 1 and continues without a break from left to right.

The second digit indicates the status of the contacts (NO or NC). Terminal marking 1 and 2 mean NC and 3 and 4 mean NO.

Technical Data and Specifications

Contact Ratings—NEMA A600

Continuous Thermal Rating: 10 A

AC Volts	Make	Break
120	60	6.0
240	30	3.0
480	15	1.5
600	12	1.2

Contact Ratings—NEMA P300

Continuous Thermal Rating: 5 A

DC Volts	Make/Break Amperes
125	1.1
250	0.55

Magnet Coil Data

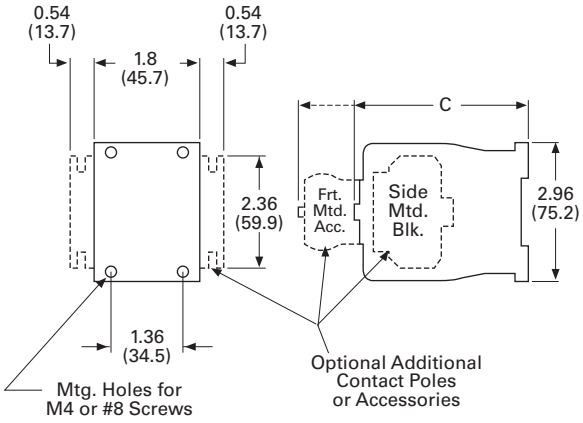
AC Voltage	Pickup VA	Pickup Watts	Sealed VA	Sealed Watts
12–600 V	80	49	7.5	2.4

DC Voltage	Pickup Amps	Pickup Watts	Sealed VA	Sealed Watts
12	6.4	76.8	0.28	3.36
24	3.2	76.8	0.14	3.36
48	1.6	76.8	0.07	3.36
120	0.64	76.8	0.028	3.36

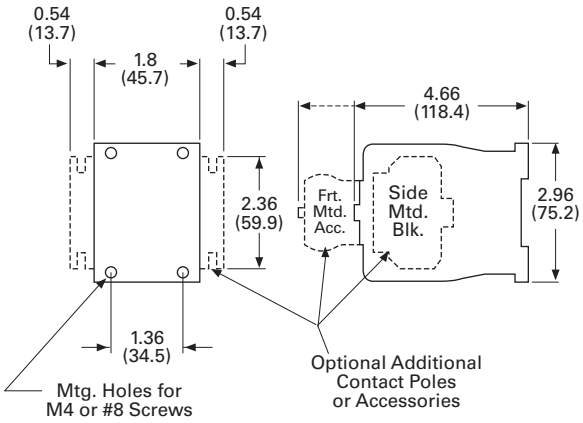
Dimensions

Approximate Dimensions in Inches (mm)

D15 Four-Pole Relay



D15 Six- and Eight-Pole Relays



Dimensions and Shipping Weights

Description	Dimension C	Shipping Weights Lb (kg)
Relay only	3.30 (83.8)	1.3 (0.6)
Relay with timer attachment	5.55 (141.0)	1.5 (0.7)
Relay with front contact pole deck	4.66 (118.4)	1.7 (0.8)

3

BF/BFD Series—Fixed Contact Industrial Control

Contents

BF/BFD Series—Fixed Contact Industrial Control

Product Description

Type BF is AC operated, 300 V maximum, and the BFD is DC operated, 250 V. Fixed contact relays are available in any combination of NO and NC from two to 12 poles. BF and BFD relays have captive clamp terminals fully accessible from the front, a molded coil with low operating temperature and silver alloy contacts suitable for low voltage circuits.

Features and Benefits

Wiring to Relay

- In parallel with coil—one timed and up to 12 instantaneous contacts, or
- In series with coil—up to 12 timed contacts in one relay

Permanent Magnet Latch

- Field mountable on Catalog Number BF; factory installed on BFD
- Latch coil continuously rated
- Latch plunger adjustable for optimum performance

Standards and Certifications

- UL recognized, UL File No. E19223 (AC relays only)
- CSA certified, File No. LR39402-6, LR28548-10, 11 (AC and DC relays)

Product Selection

When Ordering, Specify

- Catalog number of basic relay
- If a coil voltage other than listed is required, select the suffix code from the Coil Voltage table and substitute it for the last letter in the catalog number. Example: BF80**V** for a 110/60 AC coil

Type BF

Type BFD

Complete Relay—Type BF and BFD, Two-, Three-, Four- and Six-Pole ①

Number of Poles	Type of Contact NO (Form A)	NC (Form B)	BF 300 Vac Basic Relays 120/60, 110/50 AC Coil Catalog Number	BFD 250 Vdc Basic Relays 120 DC Coil Catalog Number
2	2	0	**BF20F**	**BFD20S**
	1	1	**BF11F**	**BFD11S**
	0	2	**BF02F**	**BFD02S**
3	3	0	**BF30F**	**BFD30S**
	2	1	**BF21F**	**BFD21S** ②
	1	2	**BF12F**	**BFD12S**
	0	3	**BF03F**	**BFD03S**
4	4	0	**BF40F**	**BFD40S**
	3	1	**BF31F**	**BFD31S**
	2	2	**BF22F**	**BFD22S**
	1	3	**BF13F**	**BFD13S**
	0	4	**BF04F**	**BFD04S**
6	6	0	**BF60F**	**BFD60S**
	5	1	**BF51F**	**BFD51S**
	4	2	**BF42F**	**BFD42S**
	3	3	**BF33F**	**BFD33S**
	2	4	**BF24F**	**BFD24S**
	0	6	**BF06F**	**BFD06S**

Coil Voltage

BF Coils

Volts AC	Hz	Suffix Code
12	60	**H**
24	60	**I**
48	60	**J**
110	60	**V**
110/120	50/60	**F**
208	60	**K**
220/240	50/60	**G**
440	60	**C**

BFD Coils

Volts DC	Suffix Code
6	**C**
12	**D**
24	**L**
38	**N**
48	**M**
72	**E**
95	**B**
120	**S**
130	**U**
240	**T**

Notes

① Relays listed above with equal number of NO and NC contact poles are specially priced—1NO and 1NC pole are supplied at no additional charge.

② Consult Customer Support Center for availability.

- Catalog number of basic relay
- If a coil voltage other than listed is required, select the suffix code from the Coil Voltage table and substitute it for the last letter in the catalog number. Example: BF80**V** for a 110/60 AC coil

Type BF

Type BFD

Complete Relay—Type BF and BFD, Eight-, 10- and 12-Pole ①

Number of Poles	Type of Contact NO (Form A)	Type of Contact NC (Form B)	BF 300 Vac Basic Relays 120/60, 110/50 AC Coil Catalog Number	BFD 250 Vdc Basic Relays 120 DC Coil Catalog Number
8	8	0	**BF80F**	**BFD80S**
	7	1	**BF71F**	**BFD71S**
	6	2	**BF62F**	**BFD62S**
	5	3	**BF53F**	**BFD53S**
	4	4	**BF44F**	**BFD44S**
	0	8	**BF08F**	**BFD08S**
10	10	0	**BF100F**	**BFD100S**
	8	2	**BF82F**	**BFD82S** ②
	7	3	**BF73F** ②	**BFD73S**
	6	4	**BF64F**	**BFD64S**
	5	5	**BF55F**	**BFD55S** ②
	4	6	**BF46F**	**BFD46S**
	2	8	**BF28F**	**BFD28S**
12	12	0	**BF120F**	**BFD120S**
	8	4	**BF84F**	**BFD84S**
	7	5	**BF75F**	**BFD75S**
	6	6	**BF66F**	**BFD66S**
	5	7	**BF57F**	**BFD57S**
	4	8	**BF48F**	**BFD48S**

Coil Voltage

BF Coils

Volts AC	Hz	Suffix Code
12	60	**H**
24	60	**I**
48	60	**J**
110	60	**V**
110/120	50/60	**F**
208	60	**K**
220/240	50/60	**G**
440	60	**C**

BFD Coils

Volts DC	Suffix Code
6	**C**
12	**D**
24	**L**
38	**N**
48	**M**
72	**E**
95	**B**
120	**S**
130	**U**
240	**T**

Notes

① Relays listed above with equal number of NO and NC contact poles are specially priced—1NO and 1NC pole are supplied at no additional charge.

② Consult Customer Support Center for availability.

Permanent Magnet Latch, Relay Mounted

Permanent Magnet Latch

Coil Volts	Coil Hz	Catalog Number	Coil Volts	Coil Hz	Catalog Number
AC Relays			**DC Relays**		
24	60	**BFMLI** ②	24	—	**BFMLL**
48	60	**BFMLJ** ②	48	—	**BFMLM**
110/120	50/60	**BFMLF**	120	—	**BFMLS**
220/240	50/60	**BFMLG**	240	—	**BFMLT**

Options

FASTON Push-On Terminals

Description	Code Letter	Catalog Number
Insert letter **F** after relay type designation in listed catalog number. Example: BF**F**20F or BFD**F**20S	**F**	—

Overlapping Contacts

Description	Code Letter	Catalog Number
NO contact closes before corresponding NC contact opens—supplied as NO/NC set(s). Insert letter **A** after relay type designation in listed catalog number. Example: BF**A**22F or BFD**A**F22S	**A**	—

NEMA 1 Enclosure for Relay Types

Description	Code Letter	Catalog Number
BF, AR—all poles	—	**4977D40G04**
BFD—4–8 poles	—	**4977D40G04**
ARD—4–8 poles	—	**4977D40G04**

Technical Data and Specifications

General Specifications

BF Relay Electrical Ratings—NEMA A300

	Maximum Current			Maximum VA	
Volts	Cont.	Make	Break	Make	Break
120	10	60	6	7200	720
240	10	30	3	7200	720

Horsepower Ratings (UL Recognized)

	AC Volts		DC Rating—NEMA P300				
				Maximum Current			Max. Make
Phase	115	230	Volts	Cont.	Make	Break	or Break (VA)
1	1/6	1/2	125	5.0	1.1	1.1	138
3	—	1	250	5.0	0.55	0.55	138

Resistive Rating

125 Vdc	3 A
250 Vdc	1.5 A

Coil Power Requirements

AC	72 VA open, 22 VA closed
DC	12 watts (nominal), 250 V max.

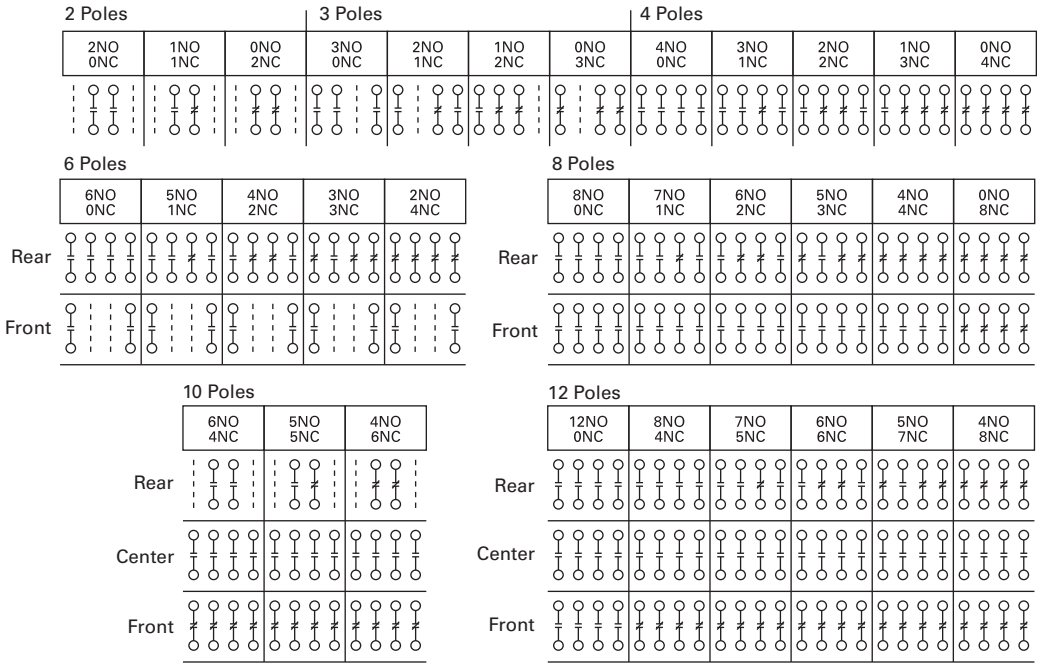
Permanent Magnet Latch Specifications

Item	Specification
Unlatching power requirements	Open gap: 24 VA AC Closed gap: 7 VA Burden: 4 watts (AC)

Notes

① For panel mount, add Suffix **F**.
② Consult Customer Support Center for availability.

Contact Arrangements—BF and BFD Relays

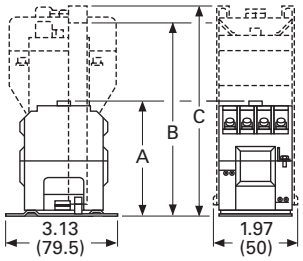


Note: NO = Normally Open NC = Normally Closed

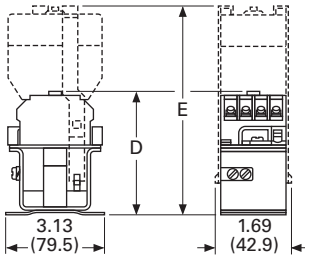
Dimensions

Approximate Dimensions in Inches (mm)

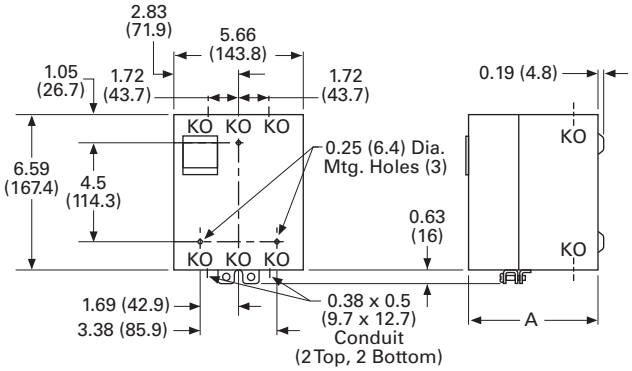
BF Relay with Permanent Magnet Latch and Solid-State Timer



BFD Relay with Solid-State Timer



Enclosures—NEMA 1 for BF, BFD, AR and ARD



BF and BFD Relay Dimensions

Number of Poles	A BF Only	B BF w/Latch	C BF w/Timer	D BFD Only	E BFD w/Timer
4	3.22 (81.8)	6.22 (158.0)	5.88 (149.4)	4.03 (102.4)	7.06 (179.3)
8	4.19 (106.4)	7.19 (182.6)	6.88 (174.8)	4.97 (126.2)	8.00 (203.2)
12	4.81 (122.2)	7.81 (198.4)	7.50 (190.5)	5.63 (143.0)	8.66 (220.0)

NEMA 1 for BF, BFD, AR and ARD Dimensions

Poles	Catalog Number	A NEMA 1
Relays without Attachments		
All	**BF, AR, ARD**	5.34 (135.6)
4 – 8	**BFD**	5.34 (135.6)
10, 12	**BFD**	7.97 (202.4)
Relays with Attachments		
All	**BF, AR, ARD**	7.97 (202.4)

AR/ARD Series—Convertible Contact Industrial Control

Contents

AR/ARD Series—Convertible Contact Industrial Control

Product Description

The AR/ARD relays are electromechanical convertible contact relays. AR relays are AC devices and the ARD is for DC applications.

Application Description

Type AR and ARD relays are designed for use on machine tools, process lines, conveyors and similar automatic and semi-automatic equipment.

Features and Benefits

Permanent Magnet Latch

By energizing the relay coil, the latch attachment "sets" (when the base relay's armature/crossbar assembly has closed) holding the relay ON, even after the relay coil has been de-energized. The clearing coil on the latch is energized to release the armature/crossbar assembly.

- Field mountable to four- and six-pole
- Latch plunger is adjustable
- Latch coil continuously rated
- Unlatching power requirements
  - Open gap: 24 VA
  - Closed gap: 7 VA
  - Burden: 4 watts AC, 6 watts DC

Surge Suppressor

- Mounts in contact cavity of AR relays
- Limits high transient voltages resulting from de-energizing relay coil or other electromechanical devices
- Protects sensitive instruments and solid-state devices
- 120 Vac maximum, not used on Vdc
- For noise suppression, see Catalog Number SS-56 starter mounted surge suppressor.

Operation

AR relays are available in either four- or six-pole configurations. AR relays are easily converted to eight- or 10-poles simply by adding a four-pole deck. In addition, mechanical latch attachments are available with four- and six-pole relays.

Contacts are convertible from NO to NC, to provide any combination desired up to a maximum of 10. For the ARD, the number of poles cannot exceed **four** NC in any pole configuration. Wide spacing of contacts simplifies installation, contact testing and maintenance. Contacts are electrically and mechanically isolated from each other. Overlap contacts are also available in one or two sets. These contacts should be mounted in the center pole positions. AC and DC contact cartridges should not be used in the same relay.

Standards and Certifications

- UL File No. E19223
- CSA File No. LR39402-6, LR54517 and LR54520

Reference Information

- ART, ARTD: IL 14510, IL 14485

Product Selection

When Ordering, Specify

- Catalog number of basic relay with 120/60, 110/50 AC coil from AR/ARD Relays table.
- If a coil voltage other than listed is required, select the suffix code from the Coil Voltage table below and substitute it for the last letter in the catalog number. Example: AR64**V** for a 110/60 AC coil.

AR/ARD Relays

AR/ARD Relays

Number of Poles	Contact NO	Contact NC	Blank Cavities	AR 600 Vac Relays 120/60, 110/50 AC Coil Catalog Number	ARD 600 Vdc Relays 120 DC Coil Catalog Number
4	0	0	4	**AR4A**	**ARD4S**
	2	0	2	**AR420A**	**ARD420S**
	4	0	0	**AR440A**	**ARD440S**
6	0	0	6	**AR6A**	**ARD6S**
	4	0	2	**AR640A**	—
	6	0	0	**AR660A**	**ARD660S**
8 ①	6	0	2	**AR860A**	**ARD860S** ②
	8	0	0	**AR880A**	**ARD880S**
10 ①	10	0	0	**AR10100A**	**ARD10100S**

Coil Voltage

AR Coils

Volts AC	Hz	Suffix Code
12	60	**F**
24	60	**I**
48	60	**G**
110	60	**V**
110/120	50/60	**A**
208	60	**B**
220/240	50/60	**W**
277	60	**C**
380/440	50/60	**H**
440/480	50/60	**X**
550	60	**D**
550/600	50/60	**E**

ARD Coils

Volts DC	Suffix Code
12	**D**
24	**L**
48	**M**
95	**B**
120	**S**
130	**U**
240	**T**

Contact Cartridges—600 V

Terminal Type	Standard Contact Cartridge Catalog Number ③	Overlap Contact Cartridge Catalog Number ④
AC Cartridges		
With clamp terminals	**ARC**	**AROC**
With screw terminals	**ARCR**	**AROCR**
DC Cartridges		
With clamp terminals	**ARDC**	**ARDOC**
With screw terminals	**ARDCR**	**ARDOCR**

Notes

① Will not accept top-mounted latch or timers.
② Contact Customer Support Center for availability.
③ Standard cartridges are sold in cartons of four cartridges. Catalog number is for single cartridge.
④ Overlap contact cartridges are sold in sets of two cartridges. Catalog number is for sets of two.

ARML Permanent Magnet Latch for AR/ARD Relays

Permanent Magnet Latch

Operating Volts	Coil Hz	Catalog Number
For AC Control Circuits		
24	60	**ARMLI**
48	60	**ARMLG**
120	60/50	**ARMLA**
240	60/50	**ARMLW**
For DC Control Circuits		
24	—	**ARMLL**
48	—	**ARMLM**
120	—	**ARMLS**
240	—	**ARMLT**

Accessories

Four-Pole Top Deck Adder

- Increases contact capacity from four/six-poles to eight/10-poles
- Mounts on top of basic relay using three screws
- Will not interfere with wiring, testing or convertible cartridges
- Screw terminals for ring connectors available; to order, add Suffix **R** to catalog number listed below

Four-Pole Top Deck Adder

Four-Pole Top Deck Adder

No. of Poles	Contacts NO	NC	Blank Cavities	Catalog Number
With 600 Vac Cartridges				
4	2	0	2	**ARA20**
	4	0	0	**ARA40**
With 600 Vdc Cartridges				
4	2	0	2	**ARDA20**
	4	0	0	**ARDA40**

ARSS Surge Suppressor for AR Relays

Surge Suppressor

	Catalog Number
Surge Suppressor	**ARSS**

Options

Convertible Contacts

Description	Code Letter	Catalog Number
AR and ARD relays listed are supplied with NO contacts that are easily converted to NC. If both NO and NC poles are required, order by catalog number. Example: four-pole relay with 1NO and 3NC contacts, order AR4**13**A.	①	—

Screw Terminals

Description	Code Letter	Catalog Number
For ring-type connectors, add suffix **R** to the catalog number. Example: AR420A**R**.	**R**	—

Overlapping Contacts

Description	Code Letter	Catalog Number
NO contact closes before corresponding NC contact opens — supplied as NO/NC sets of two cartridges. Insert letter **S** after relay type designation in listed catalog number. Example: AR402A**S**. Specify the number of sets required: **S** for one set and **S2** for two sets.	**S** or **S2** ①	—

Note

① Consult Customer Support Center for availability.

Technical Data and Specifications

General

Contact Ratings—600 Vac Cartridge NEMA A600

	Maximum Current			Maximum VA	
Volts	Cont.	Make	Break	Make	Break
120	10	60	6	7200	720
240	10	30	3	7200	720
480	10	15	1.5	7200	720
600	10	12	1.2	7200	720

DC Cartridges—NEMA P600

	Maximum Current		Maximum VA
Volts	Continuous	Make or Break	Make or Break
125	5	1.10	138
250	5	0.55	138
600	5	0.20	138

Resistive Rating

125 Vdc	3 A
250 Vdc	1.5 A

Coil Power Requirements

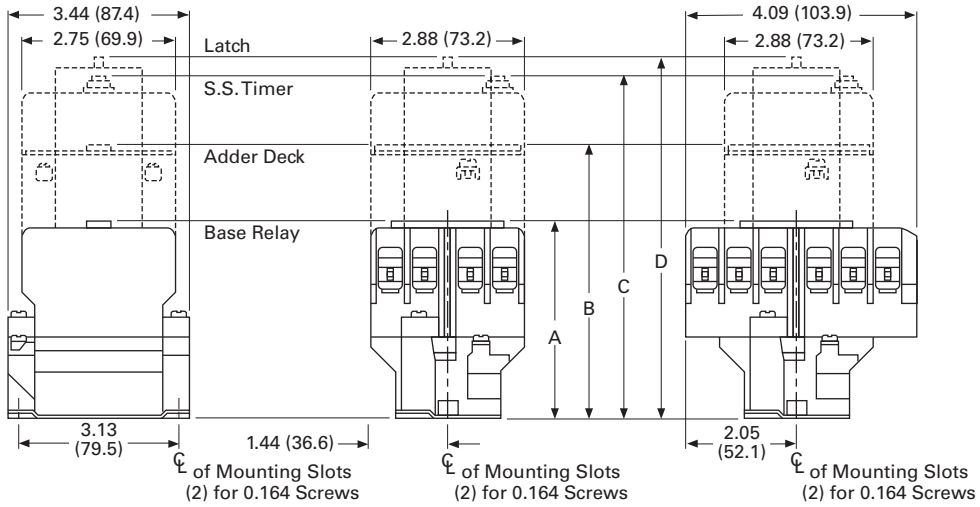
AC	96 VA open, 14 VA closed
DC	14 watts open, 250 V max.

Voltage	AR Relays	ARD Relays
Pickup voltage (max.)	85%	65%
Dropout voltage (min.)	60%	15%
Voltage (max.)	110%	110%

Dimensions

Approximate Dimensions in Inches (mm)

Four- and Six-Pole with Four-Pole Adder, Solid-State Timer and Mechanical Latch

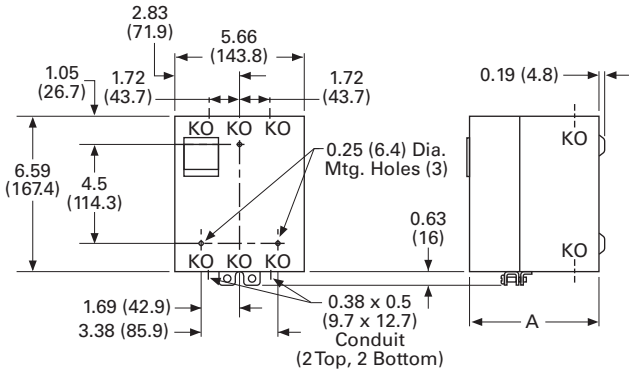


End View, 4- and 6-Pole **Side View, 4-Pole** **Side View, 6-Pole**

Four- and Six-Pole with Four-Pole Adder, Solid-State Timer and Mechanical Latch

Relay Catalog Number	A Four-, Six-Pole Relays	B Relay Adder	C Relay with Timer	D Relay with Latch
AR	3.56 (90.4)	4.94 (125.5)	6.00 (152.4)	6.39 (162.3)
ARD	4.63 (117.6)	6.00 (152.4)	7.06 (179.3)	7.45 (189.2)

Enclosures—NEMA 1 for BF, BFD, AR and ARD



Enclosures—NEMA 1 for BF, BFD, AR and ARD

Poles	Catalog Number	Dimension A NEMA 1
Relays without Attachments		
All	**BF, AR, ARD**	5.34 (135.6)
4–8	**BFD**	5.34 (135.6)
10, 12	**BFD**	7.97 (202.4)
Relays with Attachments		
All	**BF, AR, ARD**	7.97 (202.4)

3

D26 Series—Type M, 600 Vac Multipole with Convertible Contacts

Contents

D26 Series—Type M, 600 Vac Multipole with Convertible Contacts

Product Description

Relays can be ordered as complete devices in any pole combination up to a maximum of 12NO or 8NC and 4NO poles, or can be assembled from components shown on **Page V7-T3-136**.

Relay base assembly (**D26MB**) will accept from 1 to 4 rear poles (**D26MPR**, **D26MPS** and/or **D26MPL**).

Features

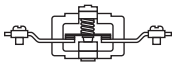
Contact poles D26MPR and D26MPF in 2- through 8-pole relays are convertible NO to NC or vice versa. Simply reverse the terminal screws and rotate the unit pole 180 ° (in either direction).

Options

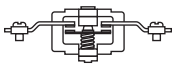
Adding a front deck, the total number of poles can be increased to 8, all convertible NO to NC.

Adding a **D26MF**, 4-pole fixed NO attachment, builds a 12-pole relay with 8 convertible poles and 4 fixed NO poles.

Relays with mechanical latch are available in any convertible pole combination up to eight poles maximum.



Normally Closed Contact



Normally Open Contact

To obtain overlapping contacts, use **D26MPS** (NO early closing) and **D26MPL** (NC late opening) rear poles, in related circuits.

Standards and Certifications

- UL listed—Class No. NKCR2, File E1230(N)
- CSA certified—File LR353

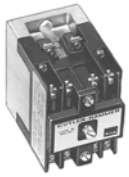
Product Selection

Complete AC Relays

When Ordering, Specify

- Catalog number and magnet coil suffix letter.
- Example: For a 4-pole relay having 4NO contacts, order Catalog Number **D26MR40**, with a 120 V, 60 Hz coil, order **D26MR40A**.
- For fast delivery and minimum inventory, it is recommended that component parts or complete relays with NO poles be ordered.

4-Pole



4-Pole with Latch

4-Pole with Pneumatic Timer Attachment

Complete AC Relays—Open Type

Number of Contacts	Type of Contact NO (Form A)	NC (Form B)	Relay Only Catalog Number	Relay with Mechanical Latch Catalog Number
2	2	0	**D26MR20**	**D26MR202**
	1	1	**D26MR11**	**D26MR112**
	0	2	**D26MR02**	**D26MR022**
3	3	0	**D26MR30**	**D26MR302**
	2	1	**D26MR21**	**D26MR212**
	1	2	**D26MR12**	**D26MR122**
	0	3	**D26MR03**	**D26MR032**
4	4	0	**D26MR40**	**D26MR402**
	3	1	**D26MR31**	**D26MR312**
	2	2	**D26MR22**	**D26MR222**
	1	3	**D26MR13**	**D26MR132**
	0	4	**D26MR04**	**D26MR042**
6 ①	6	0	**D26MR60**	**D26MR602**
	5	1	**D26MR51**	**D26MR512**
	4	2	**D26MR42**	**D26MR422**
	3	3	**D26MR33**	**D26MR332**
	2	4	**D26MR24**	**D26MR242**
	1	5	**D26MR15**	**D26MR152**
	0	6	**D26MR06**	**D26MR062**
8 ①	8	0	**D26MR80**	**D26MR802**
	7	1	**D26MR71**	**D26MR712**
	6	2	**D26MR62**	**D26MR622**
	5	3	**D26MR53**	**D26MR532**
	4	4	**D26MR44**	**D26MR442**
	3	5	**D26MR35**	**D26MR352**
	2	6	**D26MR26**	**D26MR262**
	1	7	**D26MR17**	**D26MR172**
	0	8	**D26MR08**	**D26MR082**

Magnet Coil Selection

Volts/Hertz	Suffix Code
120/60–110/50	**A**
240/60–220/50	**B**
208/60 ②	**E**
24/60	**T**
277/60	**H**

Volts/Hertz	Suffix Code
32/60 ②	**V**
12/60 ②	**R**
6/60	**P**
380/50 ②	**L**
480/60 or 440/50	**C**
600/60 or 550/50 ②	**D**

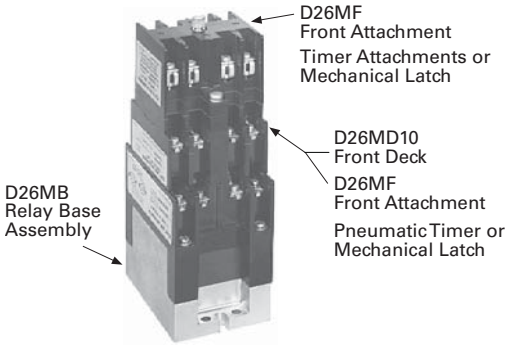
Notes

① **10- and 12-Poles**: The 6 and 8 contact relays (without mechanical latch only) listed above can be provided with four additional NO non-convertible contacts. Add suffix number **4** to above listed catalog number plus magnet coil suffix. Example: For a 12 contact relay, order D26MR80**4A**.

② Consult Customer Support Center for availability.

3

Relay Component Parts Location



Relay with Pneumatic Timer Attachment Factory Installed (without Relay Contacts)

Contact Positions ①	Timer Operation	Catalog Number ②
4	ON delay	**D26MR005**
4	OFF delay	**D26MR006**

The relays listed above will accept up to four catalog number D26MPR contacts (convertible—NO or NC) for instantaneous operation. Order contacts separately.

For additional information on timer attachment, see **Page V7-T3-137**.

For assembly of relays from component parts and relay accessories, see components tables below.

Rear Pole

Front Pole

Separate Contacts ③

Description	Catalog Number
Convertible Contacts	
Rear pole—NO	**D26MPR**
Rear pole—NC	**D26MPR02**
Front pole—NO	**D26MPF**
Front pole—NC	**D26MPF02**
Gold plated (for low power circuits)	
Front pole—NO	**D26MPF03**
Non-Convertible Contacts	
Rear pole NO early closing ④	**D26MPS**
Rear pole NC late opening ④	**D26MPL**

Relay Base Assembly

Relay Base Assembly (without Poles)

Description	Catalog Number
Relay base assembly	**D26MB** ⑤

Basic four-pole D26 relay without contacts. Provision for adding one to four poles as needed, **D26MPR, D26MPL** and/or **D26MPS** rear pole type.

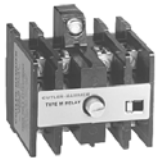
Rear Pole

Front Deck (Convertible Contact Poles)

Description	Catalog Number
Front Deck with ...	
1NO contact pole	**D26MD10**
2NO contact poles	**D26MD20**
4NO contact poles	**D26MD40**

Provides up to four additional front pole type D26MPF contacts. Convertible, NO to NC.

Four-Pole Front Attachment



Four-Pole Front Attachment (4NO Fixed Circuit)

Description	Catalog Number
Front attachment	**D26MF**

Can be added to any two- to eight-pole Type M, D26 relay to provide up to a 12-pole relay. Four NO, non-convertible contacts are included in this assembly.

Notes

① Number of available instantaneous contact positions (order contacts separately—Catalog Number D26MPR).
② Consult Customer Support Center for availability.
③ Rear pole contacts are usable in the base assembly. Front pole contacts are usable in the front deck.
④ To obtain overlapping contacts, these two special poles must be used in related circuits.
⑤ Add magnet coil suffix letter, see **Page V7-T3-135**. Example: D26MB**A**.

Relay State Indicating Light

Relay State Indicating Light

Description	Catalog Number
120 Vac, 50/60 Hz	**D26MAP120**
240 Vac, 50/60 Hz	**D26MAP240**

Light provided with leads and bracket for mounting on two- to 12-pole relays. May be used to monitor state of magnet coil or relay contact operation.

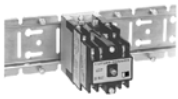
Pneumatic Timer Attachment

Pneumatic Timer Attachment

Description	Catalog Number
ON delay	**D26MTE**
OFF delay	**D26MTD**

Attachment mounts on any 0- to four-pole D26 relay without latch. Timer unit has DPDT timed contacts (circuits in each pole must be the same polarity). Adjustable timing range—0.1 to 180 seconds, repeat accuracy ±10%. Units are convertible from OFF delay to ON delay or vice versa.

Mounting Channel



Mounting Channel

Description	Catalog Number
10 in length for 4 relays	**D26MC4**
20 in length for 8 relays	**D26MC8**
30 in length for 12 relays	**D26MC12**
40 in length for 16 relays	**D26MC16**

Pre-spaced mounting for adjacent relay installation. Indexed for cutting to desired length. Captive mounting screws provided in channel for easier installation.

Manual Test Accessory

Manual Test Accessory

Description	Catalog Number
Manual test accessory	**D26MTA**

Tool to manually hold relays in the energized position for circuitry testing on completed panel.

Transient Suppressor

Transient Suppressor

Description	Catalog Number
Magnet coil transient suppressor	**D26MAS1**
Latch coil transient suppressor	**D26MAS2**

May be mounted on any 120 Vac relay magnet coil or latch coil or 120 Vdc latch coil—connects directly across coil terminals. All DC magnet coils have a built-in varistor for transient suppression. Limits high voltage transients produced in the circuit when power is removed from the coil.

Technical Data and Specifications

General

Contact Ratings (Amperes) A600

AC Volts ①	Make and Emergency Interrupting Capacity	Break	Continuous Thermal Rating
120	60	6	10
240	30	3	10
480	15	1.5	10
600	12	1.2	10

Coil Power

Relay	Watts Inrush	Watts Sealed	VA Inrush	VA Sealed	Operating Time Range in Milliseconds
Two- to 12-pole	95.0	9	155	22	Pickup: 6–13
Latch coil	18.5	11	41	17	Dropout: 8–26

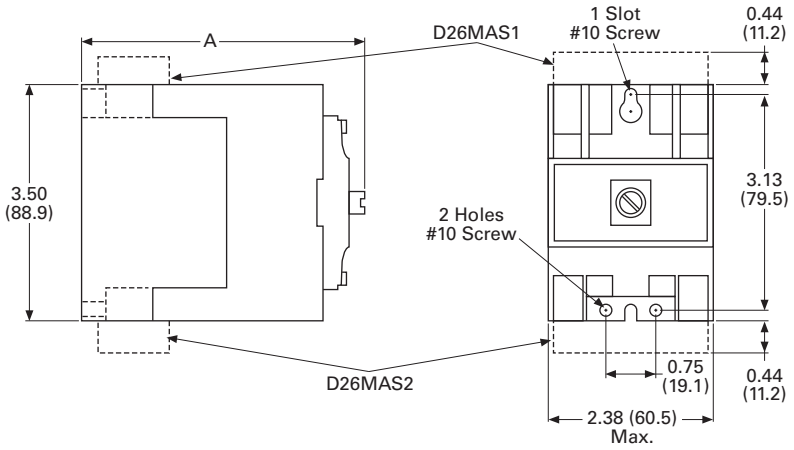
Note

① For DC contact ratings, see **Page V7-T3-141**.

Dimensions

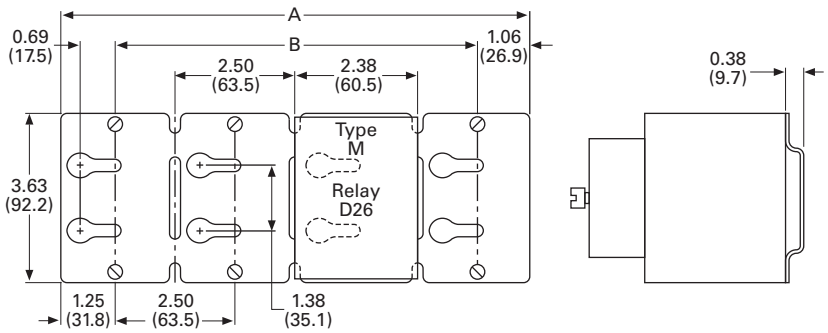
Approximate Dimensions in Inches (mm)

AC and DC D26 Relays



AC Relay D26	DC Relay D26	Dimension A	Ship. Wt. Lb (kg)
1–4 poles	1–3 poles	4.00 (101.6)	2.5 (1.1)
1–4 poles with timer D26 or D87	1–3 poles with timer D26 or D87	6.00 (152.4)	3.3 (1.5)
1–4 poles with latch	1–2 poles with latch	6.13 (155.7)	3.5 (1.6)
1–4 poles with D26MF	1–3 poles with D26MF	5.81 (147.6)	2.8 (1.3)
5–8 poles	4–7 poles	5.25 (133.4)	2.8 (1.3)
5–8 poles with timer D87	4–7 poles with timer D87	7.25 (184.2)	3.5 (1.6)
5–8 poles with latch	3–6 poles with latch	7.31 (185.7)	3.8 (1.7)
9–12 poles	8–11 poles	7.00 (177.8)	3.0 (1.4)

Mounting Channel



Catalog Number	Dimension A	Dimension B
D26MC16	40 (1016)	37.5 (952.5)
D26MC12	30 (762)	27.5 (698.5)
D26MC8	20 (508)	17.5 (444.5)
D26MC4	10 (254)	7.5 (190.5)

Note: Channel mounts through keyholes with #10 screws (two each end and one every fourth relay). Relays mount with screws captive in channel. All screws must be tightened firmly.

D26 Series—Type M, DC Multipole with Convertible Contacts

Contents

D26 Series—Type M, DC Multipole with Convertible Contacts

Product Description

Type M, DC multipole relays are physically and mechanically similar to the (D26) Type M AC relays described on **Page V7-T3-135**. They differ only in the electrical ratings and available pole combinations due to the use of a normally closed late opening, coil clearing contact, factory wired to the pickup winding of the magnet coil. (Contact is shown as L in figure to the right.) Magnet coil has built-in varistor for transient suppression.

The mechanically latched relay has one extra contact, normally open early closing, factory wired in series with the winding of the intermittent rated latch coil. (Contact is shown as S in figure to the right.)

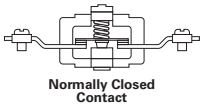
Component parts for these relays are the same as those listed for the (D26) Type M AC relays on **Page V7-T3-135**, except for the Indicating Light, which is not applicable to a DC relay.

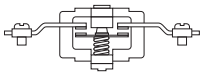
Contact poles D26MPR and D26MPF in 2- to 7-pole relays are convertible NO to NC or vice versa. Simply reverse the terminal screws and rotate the unit pole 180 ° (in either direction).

Latch Operation

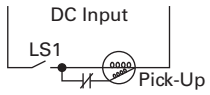
With the latch coil de-energized, energizing the relay coil will pick up the relay and mechanically latch it in the pickup position. With the relay coil de-energized, energizing the latch coil will allow the relay to drop out.

Convertible Contacts



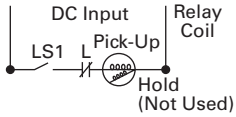


DC Type M Relay

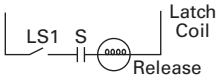


L = NC Late Opening

DC Type M Relay with Latch



L = NC Late Opening



S = NO Early Closing

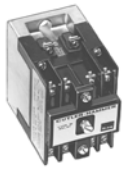
Product Selection

Complete DC Relays

When Ordering, Specify

- Catalog number and magnet coil suffix letter.
- Example: For a 4-pole relay having 4NO contacts, order Catalog Number **D26MRD40**, with a 120 Vdc coil, order **D26MRD40A1**.

3-Pole



3-Pole with Latch

Complete DC Relays—Open Type

Number of Contacts	Type of Contact ① NO (Form A)	NC (Form B)	Relay Only Catalog Number	Relay with Mechanical Latch Catalog Number
2	2	0	**D26MRD20**	**D26MRD202**
	1	1	**D26MRD11**	**D26MRD112**
	0	2	**D26MRD02**	**D26MRD022**
3	3	0	**D26MRD30**	**D26MRD302**
	2	1	**D26MRD21**	**D26MRD212**
	1	2	**D26MRD12**	**D26MRD122**
	0	3	**D26MRD03**	**D26MRD032**
4	4	0	**D26MRD40**	**D26MRD402**
	3	1	**D26MRD31**	**D26MRD312**
	2	2	**D26MRD22**	**D26MRD222**
	1	3	**D26MRD13**	**D26MRD132**
	0	4	**D26MRD04**	**D26MRD042**
6 ②	6	0	**D26MRD60**	**D26MRD602**
	5	1	**D26MRD51**	**D26MRD512**
	4	2	**D26MRD42**	**D26MRD422**
	3	3	**D26MRD33**	**D26MRD332**
	2	4	**D26MRD24**	**D26MRD242**
	1	5	**D26MRD15**	**D26MRD152**
	0	6	**D26MRD06**	**D26MRD062**
7 ②	7	0	**D26MRD70**	—
	6	1	**D26MRD61**	—
	5	2	**D26MRD52**	—
	4	3	**D26MRD43**	—
	3	4	**D26MRD34**	—
	2	5	**D26MRD25**	—
	1	6	**D26MRD16**	—
	0	7	**D26MRD07**	—

Magnet Coil Selection

Volts/Hertz	Suffix Code	Volts/Hertz	Suffix Code
12	**R1**	120	**A1**
24	**T1**	240	**B1**
48	**W1**		

Notes

① Relay has additional factory wired normally closed coil clearing contact (see diagram).

② **10- and 11-Poles**: The 6 and 7 contact relays (without mechanical latch only) listed above can be provided with four additional NO non-convertible contacts. Add suffix number **4** to above listed catalog number plus magnet coil suffix. Example: For an 11 contact relay, order D26MRD70**4A1**.

3-Pole with Timer Attachment

Relay with Pneumatic Timer Attachment (without Relay Contacts)

Contact Positions ①	Timer Operation	Catalog Number
3	ON delay	**D26MRD005**
3	OFF delay	**D26MRD006**

The relays listed above will accept up to three catalog number D26MPR contacts (convertible—NO or NC) for instantaneous operation.

Order contacts separately. For additional information on timer attachment, see **Page V7-T3-137**.

Technical Data and Specifications

General

Contact Ratings (Amperes) ②

DC Volts	Inductive Make/Break	Resistive Make/Break
28	7.0	10.0
48	2.5	10.0
120	1.1	2.0
240	0.2	0.4

Coil Power			Operating Time
	Watts		
Relay	Inrush	Sealed	Average Milliseconds
Two- to 11-pole	168	13.2	Pickup: 10
Latch coil	21.6 intermittent	21.6 intermittent	Dropout: 16

Notes

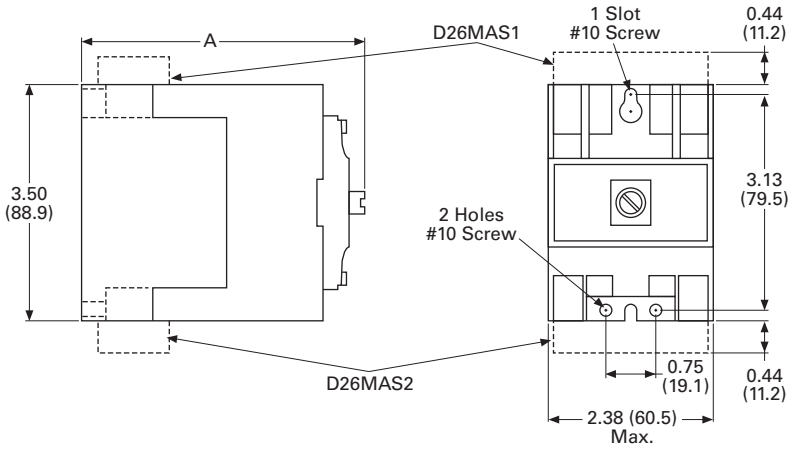
① Number of available instantaneous contact positions (order contacts separately—Catalog Number D26MPR).

② Contact ratings do not apply to contacts D26MPL and D26MPS. For AC contact ratings, see **Page V7-T3-137**.

Dimensions

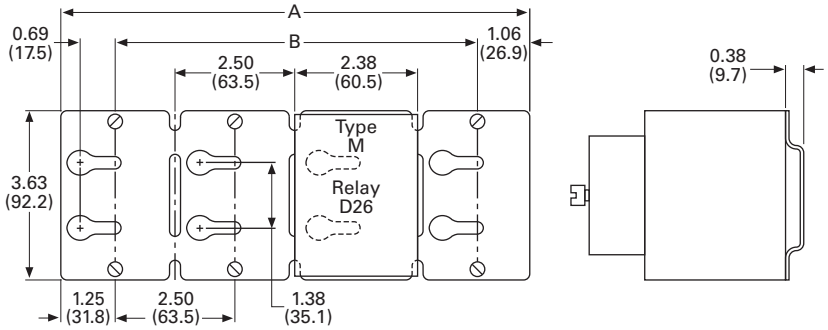
Approximate Dimensions in Inches (mm)

AC and DC D26 Relays



AC Relay D26	DC Relay D26	Dimension A	Ship. Wt. Lb (kg)
1–4 poles	1–3 poles	4.00 (101.6)	2.5 (1.1)
1–4 poles with timer D26 or D87	1–3 poles with timer D26 or D87	6.00 (152.4)	3.3 (1.5)
1–4 poles with latch	1–2 poles with latch	6.13 (155.7)	3.5 (1.6)
1–4 poles with D26MF	1–3 poles with D26MF	5.81 (147.6)	2.8 (1.3)
5–8 poles	4–7 poles	5.25 (133.4)	2.8 (1.3)
5–8 poles with timer D87	4–7 poles with timer D87	7.25 (184.2)	3.5 (1.6)
5–8 poles with latch	3–6 poles with latch	7.31 (185.7)	3.8 (1.7)
9–12 poles	8–11 poles	7.00 (177.8)	3.0 (1.4)

Mounting Channel



Catalog Number	Dimension A	Dimension B
D26MC16	40 (1016)	37.5 (952.5)
D26MC12	30 (762)	27.5 (698.5)
D26MC8	20 (508)	17.5 (444.5)
D26MC4	10 (254)	7.5 (190.5)

Note: Channel mounts through keyholes with #10 screws (two each end and one every fourth relay). Relays mount with screws captive in channel. All screws must be tightened firmly.

Timing Relays

Contents

Product Selection Guide

Function Code Cross-Reference Guide

Function	Description	Timer Series Universal TR	TR	TMR5	TMR6	TMRP	E5-248 ③
1	Asymmetrical flasher, pause first	Ip	—	R/P	—	—	RC DLY
2	Asymmetrical flasher, pulse first	Ii	—	Y	—	—	RC
3	ON delay and OFF delay with control contact	ER	—	—	—	—	—
4	ON delay and single shot leading edge voltage controlled	EWu	—	—	—	—	—
5	ON delay and single shot leading edge control contact	EWs	—	—	—	—	—
6	Single shot leading and single shot trailing edge with control contact	WsWa	—	—	—	—	—
7	Pulse sequence monitoring	Wt	—	—	—	—	—
8	ON delay, power triggered	E	A ①	N	—	A	—
9	Single shot leading edge voltage controlled	Wu	B ①	T	—	C	—
10	OFF delay/signal OFF delay	R	E ②	F	—	D	OFF DLY
11	Single shot leading edge with control input	Ws	F ②	C/G	—	H	SS
12	Single shot trailing edge with control input	Wa	—	—	—	—	—
13	ON delay control signal start, trailing edge OFF	Es	—	—	—	—	—
14	Flasher, pause first	Bp	C ①	L	—	B	—
15	Retriggerable single shot	—	—	W/D	—	E	SS
16	Flasher, ON first	—	D ①	—	—	F	—
17	ON delay control signal start, leading edge OFF	—	A ②	—	—	—	ON DLY
18	Flasher—control signal start, pause first	—	B ②	—	—	—	RC DLY
19	Flasher—control signal start, ON first	—	C ②	—	—	—	RC
20	Signal ON/OFF delay	—	D ②	—	—	—	—
21	ON/OFF delay	—	—	—	—	I	—
22	Single pulse generator	—	—	—	—	G	OS
23	Memory latch	—	—	—	—	J	—
24	True OFF delay	A	—	—	X	—	—
25	Pulse sequence monitoring edge triggered	Wtf					
26	Pulse sequence monitoring edge triggered with on state	Wto					
27	Maintained single shot trailing edge	nWa					
28	Maintained single shot leading edge	nWu					
29	Maintained single shot leading and single shot trailing edge	nWuWa					

Notes

① Applies to TRN model only.
② Applies to TRF model only.
③ The E5-248 is battery powered and has three programmable trigger functions. This product may perform somewhat differently from the standard timing relays. Refer to the operator instructions for details.

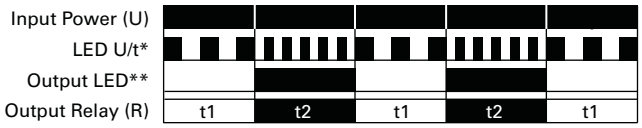
Product Overview

Timer Function Descriptions

Function #1—Universal TR, TMR5, E5-248

Asymmetrical Flasher, Pause First
Repeat Cycle, OFF/ON Delay

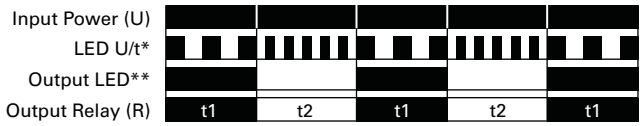
When the supply voltage U is applied, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position and the set interval t2 begins. After the interval t2 has expired, the output relay switches into OFF position. The output relay is triggered at the ratio of t1:t2 until the supply voltage is interrupted.



Function #2—Universal TR, TMR5, E5-248

Asymmetrical Flasher, Pulse First
Repeat Cycle, ON/OFF Delay

When the supply voltage U is applied, the output relay R switches into the ON position and the set interval t1 begins. After the interval t1 has expired, the output relay R switches into OFF position and the set interval t2 begins. After the interval t2 has expired, the output relay switches into ON position. The output relay is triggered at the ratio of t1:t2 until the supply voltage is interrupted.



Function #3—Universal TR

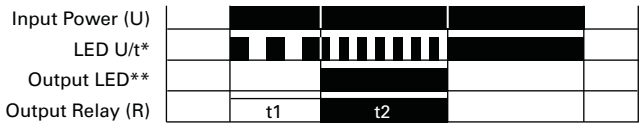
ON Delay and OFF Delay with Control Contact

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position. If the control contact is opened, the set interval t2 begins. After the interval t2 has expired, the output relay R switches into OFF position. If the control contact is opened before the interval t1 has expired, the interval already expired is erased and is restarted with the next cycle.

Function #4—Universal TR

ON Delay and Single Shot Leading Edge Voltage Controlled

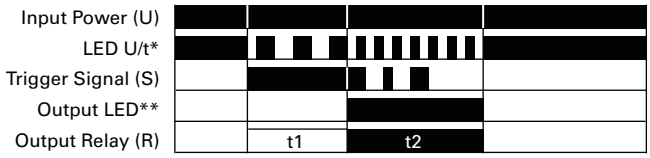
When the supply voltage U is applied, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position and the set interval t2 begins. After the interval t2 has expired, the output relay switches into OFF position. If the supply voltage is interrupted before the interval t1 + t2 has expired, the interval already expired is erased and is restarted when the supply voltage is next applied.



Function #5—Universal TR

ON Delay and Single Shot Leading Edge Control Contact

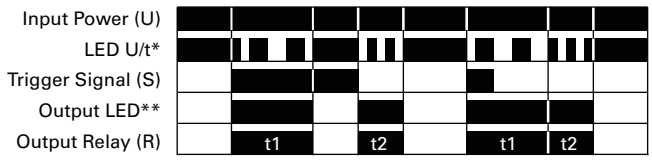
The supply voltage U must be constantly applied to the device. When the control contact S is closed, the set interval t1 begins. After the interval t1 has expired, the output relay R switches into ON position and the set interval t2 begins. After the interval t2 has expired, the output relay R switches into OFF position. During the interval, the control contact is ignored. A new cycle can only be initiated when the cycle has been completed.



Function #6—Universal TR

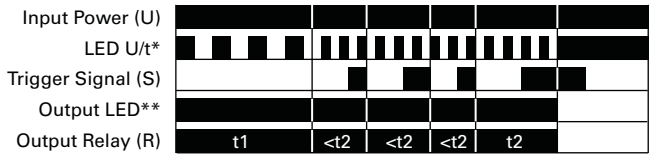
Single Shot Leading and Single Shot Trailing Edge with Control Contact
Asymmetrical Signal ON/OFF Delay

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the output relay R switches to the ON position and the set interval t1 begins. After the interval t1 has expired, the output relay R switches into OFF position. If the control contact S is opened, the output relay again switches to the ON position and the set interval t2 begins. After the interval t2 has expired, the output relay R switches into OFF position. During the interval, the control contact is ignored. During the interval, the control contact can be operated any number of times.



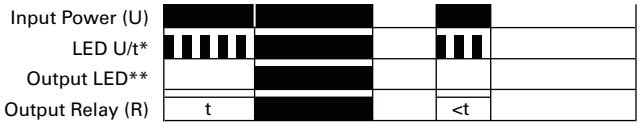
Function #7—Universal TR
Pulse Sequence Monitoring

When the supply voltage U is applied, the set interval t1 begins and the output relay R switches to the ON position. After the interval t1 has expired, the interval t2 begins. As long as the control switch S is closed and opened within the interval t2, the relay will remain in the ON position. If the control switch is not closed and opened within the interval t2, the relay will change to the OFF position until supply voltage U is interrupted and reapplied.



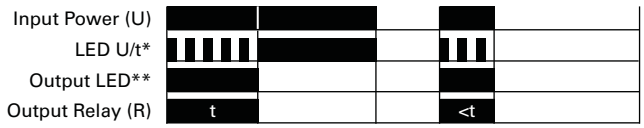
Function #8—Universal TR, TRN, TMR5, TMRP
ON Delay, Power Triggered
Delay ON Make

When the supply voltage U is applied, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position. The relay will remain in that position until supply voltage U is interrupted.



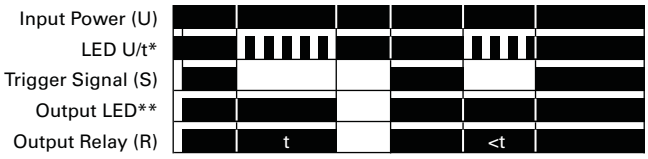
Function #9—Universal TR, TRN, TMR5, TMRP
Single Shot Leading Edge Voltage Controlled
Interval ON/Interval (Power Start)

When the supply voltage U is applied, the output relay R switches to the ON position and set interval t begins. After the interval t has expired, the output relay R switches to the OFF position. The relay will remain in that position until supply voltage U is interrupted. If the supply voltage is interrupted prior to interval t timing out, the relay will immediately switch to the OFF position.



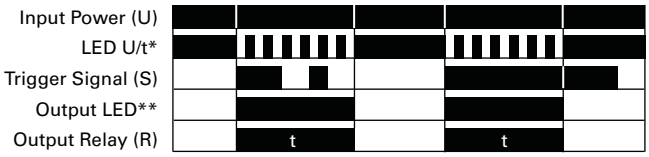
Function #10—Universal TR, TRF, TMR5, TMRP, E5-248
OFF Delay/Signal OFF Delay
Delay ON Release

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the output relay R switches to the ON position. When the control contact is opened, interval t begins. After the interval t has expired, the output relay R switches to the OFF position. If the control contact S is closed before interval t expires, the output relay will remain in the ON position until the control switch opens, at which time the interval t will begin again.



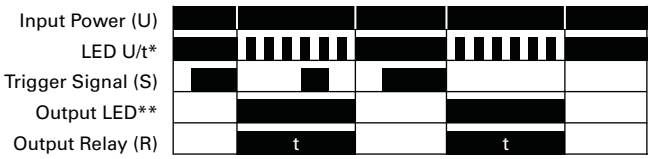
Function #11—Universal TR, TRF, TMR5, TMRP, E5-248
Single Shot Leading Edge with Control Input
Single Shot/One Shot (Signal Start)/Momentary Interval

The supply voltage U must be constantly applied to the device. When the control contact S is closed, the output relay R switches to the ON position and the set interval t begins. After the interval t has expired, the output relay R switches to the OFF position. The control contact is ignored during the interval t, and a new cycle cannot be started until the set interval t has timed out.



Function #12—Universal TR
Single Shot Trailing Edge with Control Input

The supply voltage U must be constantly applied to the device. When the control contact S is closed and reopened, the output relay R switches to the ON position and the set interval t begins. After the interval t has expired, the output relay R switches to the OFF position. The control contact is ignored during the interval t, and a new cycle must be started after the set interval t has timed out.

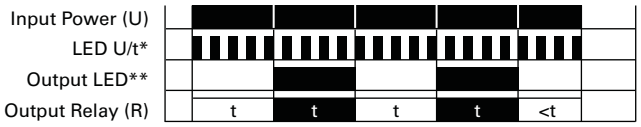


Function #13—Universal TR
ON Delay Control Signal Start, Trailing Edge OFF

The supply voltage U must be constantly applied to the device. When the control switch S is applied, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position. The relay will remain in that position until the control switch opens. If the control switch is opened prior to interval t timing out, the relay will remain in the OFF position and any elapsed time will be erased.

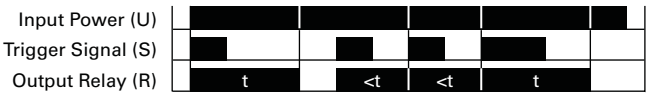
Function #14—Universal TR, TRN, TMR5, TMRP
Flasher, Pause First
Cycle 1 (Power Start, OFF First)

When the supply voltage U is applied, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position and set interval t will begin again. After interval t has expired, the relay will switch to the OFF position for the set interval t. This cycle will repeat at a 1:1 ratio until supply voltage U is interrupted.



Function #15—TMR5, TMRP, E5-248
Watchdog
Retriggerable Single Shot

The supply voltage U must be constantly applied to the device. When the control switch S is applied, the relay switches to the ON position and the set interval t begins. After the interval t has expired, the output relay R switches to the OFF position. Closing the control switch during interval t will reset the time. Continuous cycling of the trigger signal at a rate faster than the preset time will cause the relay to remain in the ON position.

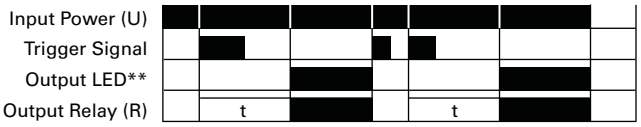


Function #16—TRN, TMRP
Flasher, ON First
Cycle 3 (Power Start, ON First)

When the supply voltage U is applied, the relay switches to the ON position and set interval t begins. After the interval t has expired, the output relay R switches to the OFF position and set interval t will begin again. After interval t has expired, the relay will again switch to the ON position for the set interval t. This cycle will repeat at a 1:1 ratio until supply voltage U is interrupted.

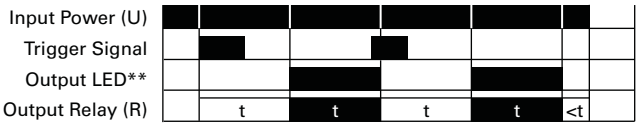
Function #17—TRF, E5-248
ON Delay Control Signal Start, Leading Edge OFF

The supply voltage U must be constantly applied to the device. When the control switch S is applied, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position. The relay will remain in that position until the control switch has opened and closed. If the control switch is opened and closed prior to interval t timing out, the relay will remain in the OFF position and any elapsed time will be erased.



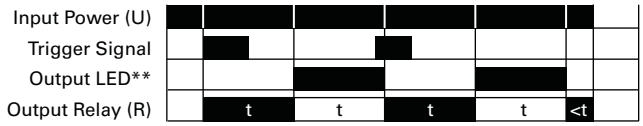
Function #18—TRF, E5-248
Flasher—Control Signal Start, Pause First

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position and set interval t will begin again. After interval t has expired, the relay will switch to the OFF position for the set interval t. This cycle will repeat at a 1:1 ratio until supply voltage U is interrupted. The control switch is ignored during the cycle.



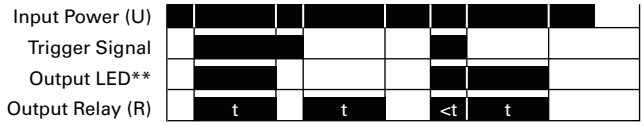
Function #19—TRF, E5-248
Flasher—Control Signal Start, ON First

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the relay switches to the ON position and set interval t begins. After the interval t has expired, the output relay R switches to the OFF position and set interval t will begin again. After interval t has expired, the relay will again switch to the ON position for the set interval t. This cycle will repeat at a 1:1 ratio until supply voltage U is interrupted. The control switch is ignored during the cycle.



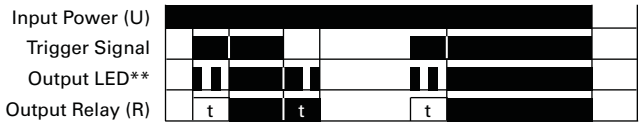
Function #20—TRF
Signal ON/OFF Delay

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the relay switches to the ON position and set interval t begins. After the interval t has expired with the control switch still closed, the output relay R switches to the OFF position. When the control switch is opened, the relay will switch to the ON position again and the interval t will begin. If the control switch is closed and opened within the interval t, the relay will remain in the ON position until interval t has timed out after the control switch is opened.



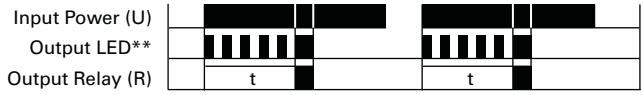
Function #21—TMRP
ON/OFF Delay
Make/Break with Control Switch Trigger

The supply voltage U must be constantly applied to the device. When the control switch S is closed, the set interval t begins. After the interval t has expired, the output relay R switches to the ON position. When the control switch is opened, interval t will begin again. After interval t has timed out, the relay will switch to the OFF position. If supply voltage U is removed at any time, the relay will return to the OFF position.



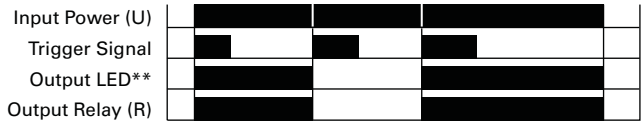
Function #22—TMRP, E5-248
Single Pulse Generator, Voltage Controlled

When the supply voltage U is applied, the set interval t begins. After the interval t has expired, the relay will switch to the ON position for 0.5 seconds before returning to the OFF position. Supply voltage U must be removed and reapplied to repeat the pulse.



Function #23—N/A
Memory Latch
Control Switch Make

The supply voltage U must be constantly applied to the device. Output changes state with every closure of the control switch S (leading edge).



Function #24—TMR6
True OFF Delay

When the supply voltage U is applied, the relay switches to the ON position. When supply power is removed, set time interval t begins. After interval t has expired, the relay switches to the OFF position and will remain there until supply power U is applied again.

TRP07

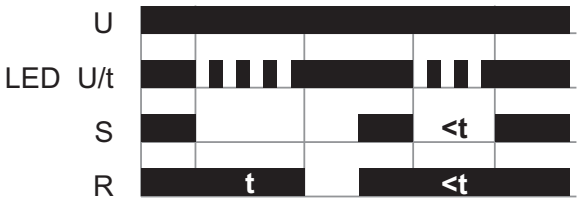
ON delay (E)

When the supply voltage U is applied, the set interval t begins (green LED U/t flashes). After the interval t has expired (green LED U/t illuminated), the output relay R switches into on-position (yellow LED illuminated). This status remains until the supply voltage is interrupted.

If the supply voltage is interrupted before the expiry of the interval t, the interval already expired is erased and is restarted when the supply voltage is next applied.

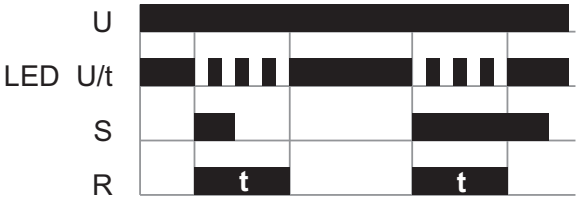
OFF delay (R)

The supply voltage U must be constantly applied to the device (green LED U/t illuminated). When the control contact S is closed, the output relay R switches into on-position (yellow LED illuminated). If the control contact S is opened, the set interval t begins (green LED flashes). After the interval t has expired (green LED U/t illuminated), the output relay R switches into off-position (yellow LED not illuminated). If the control contact S is closed again before the interval t has expired, the interval already expired is erased and is restarted.



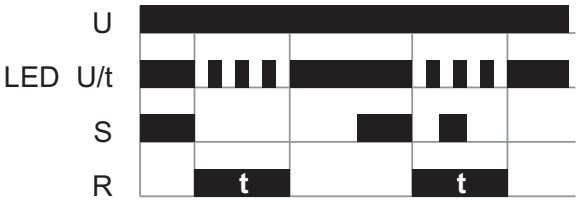
Single shot leading edge with control input (Ws)

The supply voltage U must be constantly applied to the device (green LED U/t illuminated). When the control contact S is closed, the output relay R switches into on-position (green LED U/t illuminated), and the set interval t begins (green LED U/t flashes). After the interval t has expired (green LED U/t illuminated), the output relay R switches into off-position (yellow LED not illuminated). During the interval, the control contact can be operated any number of times. A further cycle can only be started when the cycle run has been completed.



Single shot trailing edge with control input (Wa)

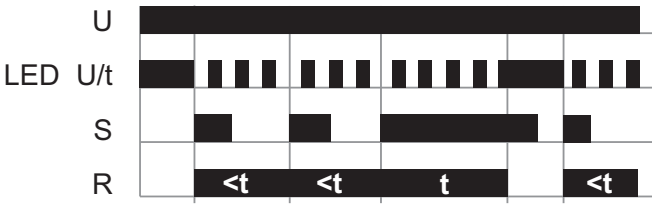
The supply voltage U must be constantly applied to the device (green LED U/t illuminated). Closing the control contact S has no influence on the condition of the output R. When the control contact S is opened, the output relay R switches into on-position (yellow LED illuminated), and the set interval t begins (green LED U/t flashes). After the interval t has expired (green LED U/t illuminated), the output relay R switches into off-position (yellow LED not illuminated). During the interval, the control contact S can be operated any number of times. A further cycle can only be started when the cycle run has been completed.



TRP07, continued

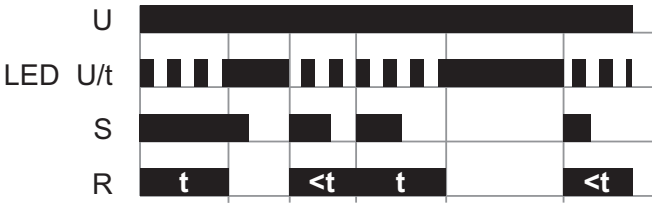
Pulse sequence monitoring edge triggered (Wtf)

When the supply voltage U is applied, the green LED U/t illuminated. When the control contact S is closed (rising edge), the output relay R switches into on-position (yellow LED illuminated), and the set interval t begins (green LED U/t flashes). So that the output relay R remains in on-position, the control contact S must be opened and closed again within the set interval t. If this does not happen, the output relay R switches into off-position. If a new positive edge on the control input is detected, the interval t begins (green LED U/t flashes), and the output relay R switches into on-position (yellow LED illuminated).



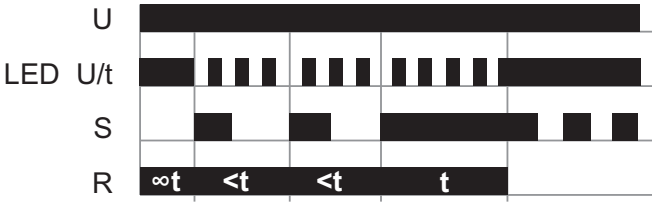
Pulse sequence monitoring edge triggered with on state (Wto)

When the supply voltage U is applied the green LED U/t illuminated and if the control input S is on at the same time, the set interval t begins (green LED U/t flashes), and the output relay R switches into on-position (yellow LED illuminated). If there is no rising edge detected on the control input S, then the Relay R switches into off state. When the control contact S is closed (rising edge), again, the output relay R switches into on-position (yellow LED illuminated), and the set interval t begins (green LED U/t flashes). So that the output relay R remains in on-position, the control contact S must be opened and closed again within the set interval t. If this does not happen, the output relay R switches into off-position. If a new positive edge on the control input is detected, the interval t begins (green LED U/t flashes), and the output relay R switches into on-position (yellow LED illuminated).



Pulse sequence monitoring (Wt)

When the supply voltage U is applied (green LED U/t illuminated), the output relay R switches into on-position (yellow LED illuminated). When the control contact S is closed, the set interval t begins (green LED U/t flashes). So that the output relay R remains in on-position, the control contact S must be opened and closed again within the set interval t. If this does not happen, the output relay R switches into off-position and all further pulses at the control contact are ignored. To restart the function, the supply voltage must be interrupted and re-applied.



TRF25

ON delay (E)

When the supply voltage U is applied, the set interval t begins (green LED U/t flashes). After the interval t has expired (green LED U/t illuminated), the output relay R switches into on-position (yellow LED illuminated). This status remains until the supply voltage is interrupted.

If the supply voltage is interrupted before the expiry of the interval t, the interval already expired is erased and is restarted when the supply voltage is next applied.

OFF-Delay without auxiliary voltage (A)

When the supply voltage U is supplied, the output relay R switches into on-position (green LED U illuminated). If the supply voltage is interrupted (green LED U not illuminated), the set interval t begins. After the set interval t has expired, the output relay R switches into off-position.

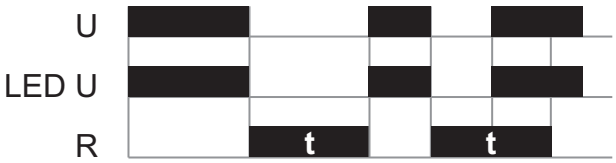
If the supply voltage is reconnected before the interval t has expired, the interval already is erased and is restarted with the next cycle.

Maintained single shot trailing edge (nWa)

When the supply voltage U is supplied, the output relay R remains into off-position (green LED U illuminated). As soon as the supply voltage is interrupted, the output relay switches into on-position and the set interval t begins (green LED not illuminated).

After the set interval t has expired, the output relay switches into off-position.

When the supply voltage is reconnected before the interval t has expired, the unit continues to perform the actual single shot.



Maintained single shot leading edge (nWu)

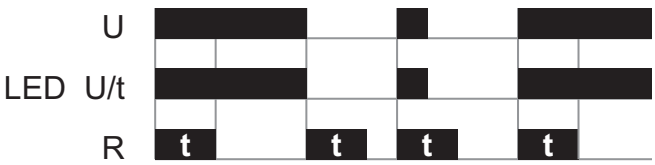
When the supply voltage U is applied (green LED U illuminated), the output relay R switches into on-position and the set interval t begins (green LED U/t flashes). After the interval t has expired, the output relay switches into off-position. This status remains until the supply voltage is interrupted. If the supply voltage is reconnected before the interval t has expired, the unit continues to perform the actual single shot.

Maintained single shot leading and trailing edge (nWuWa)

When the supply voltage U is applied, the output relay R switches into on-position and the set interval t begins (green LED U illuminated). After the interval t has expired, the output relay switches into off-position.

As soon as the supply voltage is interrupted, the output relay switches into on-position again and the set interval t begins (green LED not illuminated). After the set interval t has expired, the output relay switches into off-position.

If the supply voltage is interrupted (nWu), or reconnected (nWa), before the interval t has expired, the unit continues to perform the actual single shot.



Universal TR Series

Contents

Universal TR Series

Product Description

Eaton's Universal TR Series timers are our most flexible and cost-effective timing relays available. Products are available with up to seven user-selectable functions and seven user-selectable time ranges. Each unit is DIN rail mountable with a direct connection, eliminating the need for additional sockets. The Universal TR Series timers are available in SPDT and DPDT contact configurations, and have a compact IEC-style footprint and a universal input voltage range for AC and DC applications.

Application Description

A timing relay is a simple form of time-based control, allowing the user to open or close the contacts based on a specified timing function. The Universal TR Series timers are equipped with a set of selector switches, which can easily be set to a specific function and time, thereby reducing the number of product variations required. The universal input voltage (either 12–240 Vac/Vdc or 24–240 Vac/Vdc, depending on the model) further reduces the number of product variations.

The Universal TR Series timers are ideal for high-variability operations, such as systems integrators, distributors, and small equipment manufacturers. The compact design saves panel space, and the low cost and high flexibility of the units reduce inventory requirements.

Features

- Multiple user-selectable timing functions and timing ranges in a single unit reduce product variations and stock keeping units (SKUs)
- Universal input voltages from 12 or 24 to 240 Vac or Vdc eliminate the need to order and stock separate coil voltages
- Compact, DIN rail mountable case reduces panel size
- Advanced LED indication makes troubleshooting easy
- Staggered terminal locations allow access to lower-level terminals after wiring
- SPDT or DPDT contacts with 8 A ratings

Standards and Certifications

- cULus listed (File E37317)
- CE marked
- RoHS compliant
- IEC/EN 61812

c UL us Listed CE RoHS COMPLIANT

Product Selection

Single-Pole Model

Universal TR Timing Relays

Supply Voltage	Description	Catalog Number
4-Function		
24–240 Vac/Vdc	Compact DIN rail mount, SPDT	**TRL04**
5-Function		
24–240 Vac/Vdc	22.5 mm, DIN rail mount, DPDT	**TRF25**
7-Function		
24–240 Vac/Vdc	Compact DIN rail mount, SPDT	**TRL07**
	Compact DIN rail mount, SPDT	**TRP07**
12–240 Vac/Vdc	Compact DIN rail mount, DPDT	**TRL27**
	Asymmetrical pulse generator, DPDT	**TRW27**

Technical Data and Specifications

Universal TR Timing Relays

Description	TRL04	TRL07	TRP07	TRL27	TRW27
Functions ①	E, R, Wu, Bp	E, R, Wu, Bp, Ws, Wa, Es	E, R, Ws, Wa, Wt, Wtf, Wto	E, R, Wu, Bp, Ws, Wa, Es	Ii, Ip, ER, Ewu, Ews, WsWa, Wt
Time range	0.05 sec to 100 hours	0.05 sec to 100 hours	0.05 sec to 100 hours	0.05 sec to 100 hours	0.05 sec to 100 hours
Input					
Supply voltage	24–240 Vac/Vdc	24–240 Vac/Vdc	24–240 Vac/Vdc	12–240 Vac/Vdc	12–240 Vac/Vdc
Rated supply frequency	+10% /–15%	+10% /–15%	+10% /–15%	±10%	±10%
Rated consumption	4 VA (1.5 W)	4 VA (1.5 W)	4 VA (1.5 W)	6 VA (2 W)	6 VA (2 W)
Duty cycle	100%	100%	100%	100%	100%
Reset time	100 ms	100 ms	100 ms	100 ms	100 ms
Residual ripple for DC	10%	10%	10%	10%	10%
Dropout voltage	>30% of rated supply voltage	>30% of rated supply voltage	>30% of rated supply voltage	>30% of rated supply voltage	>30% of rated supply voltage
Overvoltage category	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)
Rated surge voltage	4 kV	4 kV	4 kV	4 kV	4 kV
Output					
Contact configuration	SPDT (one changeover contact)	SPDT (one changeover contact)	SPDT (one changeover contact)	SPDT (one changeover contact)	SPDT (one changeover contact)
Rated voltage	250 Vac	250 Vac	250 Vac	250 Vac	250 Vac
Switching capacity	2000 VA (8 A/250 V)	2000 VA (8 A/250 V)	2000 VA (8 A/250 V)	2000 VA (8 A/250 V)	2000 VA (8 A/250 V)
Fusing	8 A fast acting	8 A fast acting	8 A fast acting	8 A fast acting	8 A fast acting
Mechanical life	20 x 10^6 operations	20 x 10^6 operations	20 x 10^6 operations	20 x 10^6 operations	20 x 10^6 operations
Electrical life	2 x 10^5 operations at 1000 VA load, resistive	2 x 10^5 operations at 1000 VA load, resistive	2 x 10^5 operations at 1000 VA load, resistive	2 x 10^5 operations at 1000 VA load, resistive	2 x 10^5 operations at 1000 VA load, resistive
Switching frequency	Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1)	Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1)	Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1)	Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1)	Max. 6/min. at 1000 VA resistive load (in accordance with IEC 60947-5-1)
Overvoltage category	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)
Rated surge voltage	4 kV	4 kV	4 kV	4 kV	4 kV

Note

① Refer to Function Code Cross-Reference Guide on **Page V7-T3-143** for function details.

Universal TR Timing Relays, continued

Description	TRL04	TRL07	TRP07	TRL27	TRW27
Control Signal					
Loadable	Yes	Yes	Yes	Yes	Yes
Maximum cable length	10 m	10 m	10 m	10 m	10 m
Trigger level (sensitivity)	Automatic adaption to supply voltage	Automatic adaption to supply voltage	Automatic adaption to supply voltage	Automatic adaption to supply voltage	Automatic adaption to supply voltage
Minimum control pulse length	DC 50 ms/AC 100 ms	DC 50 ms/AC 100 ms	DC 50 ms/AC 100 ms	DC 50 ms/AC 100 ms	DC 50 ms/AC 100 ms
Accuracy					
Base accuracy	±1% of maximum scale value	±1% of maximum scale value	±1% of maximum scale value	±1% of maximum scale value	±1% of maximum scale value
Adjustment accuracy	<5% of maximum scale value	<5% of maximum scale value	<5% of maximum scale value	<5% of maximum scale value	<5% of maximum scale value
Repetition accuracy	<0.5% or ±5 ms	<0.5% or ±5 ms	<0.5% or ±5 ms	<0.5% or ±5 ms	<0.5% or ±5 ms
Temperature influence	≤0.01% / °C	≤0.01% / °C	≤0.01% / °C	≤0.01% / °C	≤0.01% / °C
Physical					
Ambient temperature	–25 to 55 °C	–25 to 55 °C	–25 to 55 °C	–25 to 55 °C	–25 to 55 °C
Storage temperature	–25 to 70 °C	–25 to 70 °C	–25 to 70 °C	–25 to 70 °C	–25 to 70 °C
Relative humidity	15% to 85% (in accordance with IEC 60721-3-3 Class 3K3)	15% to 85% (in accordance with IEC 60721-3-3 Class 3K3)	15% to 85% (in accordance with IEC 60721-3-3 Class 3K3)	15% to 85% (in accordance with IEC 60721-3-3 Class 3K3)	15% to 85% (in accordance with IEC 60721-3-3 Class 3K3)
Pollution degree	2, if built in 3 (in accordance with IEC 60664-1)	2, if built in 3 (in accordance with IEC 60664-1)	2, if built in 3 (in accordance with IEC 60664-1)	2, if built in 3 (in accordance with IEC 60664-1)	2, if built in 3 (in accordance with IEC 60664-1)
Housing material	Self-extinguishing plastic housing, IP40 rating	Self-extinguishing plastic housing, IP40 rating	Self-extinguishing plastic housing, IP40 rating	Self-extinguishing plastic housing, IP40 rating	Self-extinguishing plastic housing, IP40 rating
Mounting	Mounted on DIN rail TS 35 according to EN 60715, any position	Mounted on DIN rail TS 35 according to EN 60715, any position	Mounted on DIN rail TS 35 according to EN 60715, any position	Mounted on DIN rail TS 35 according to EN 60715, any position	Mounted on DIN rail TS 35 according to EN 60715, any position
Terminal rating	Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating	Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating	Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating	Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating	Shockproof terminal connection according to VBG 4 (PZ1 required), IP20 rating
Tightening torque	Max. 1 Nm	Max. 1 Nm	Max. 1 Nm	Max. 1 Nm	Max. 1 Nm

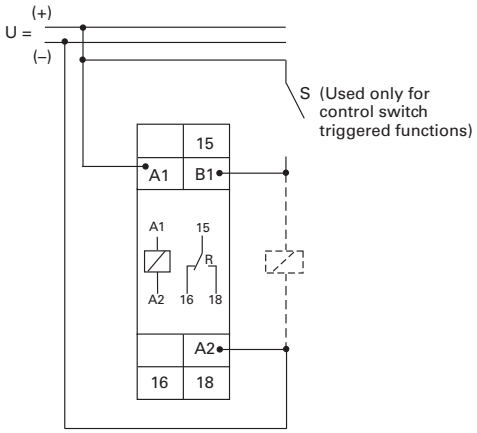
Terminal Capacity

Description
1 x 0.5 to 2.5 mm^2 with/without multicore cable end
1 x 4 mm^2 without multicore cable end
2 x 0.5 to 1.5 mm^2 with/without multicore cable end
2 x 2.5 mm^2 flexible without multicore cable end

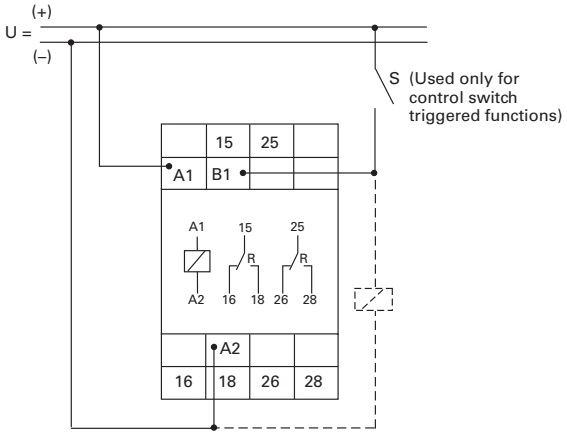
3

Wiring Diagrams

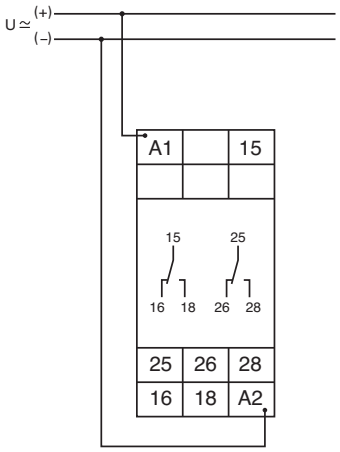
Single-Pole, Double-Throw Units (SPDT) TRL04, TRL07, TRP07



Double-Pole, Double-Throw Units (DPDT)—TRL27 and TRW27



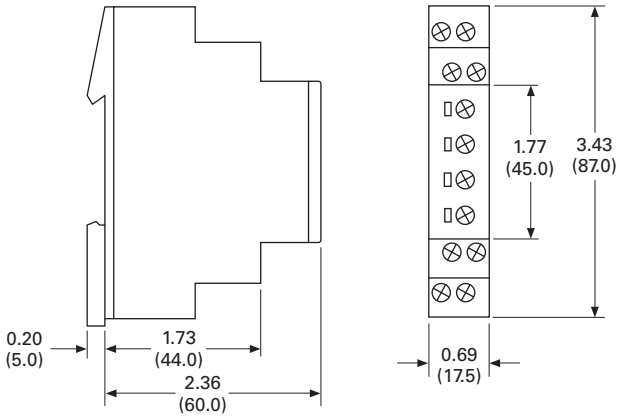
Double-Pole, Double-Throw Units (DPDT) TRF25



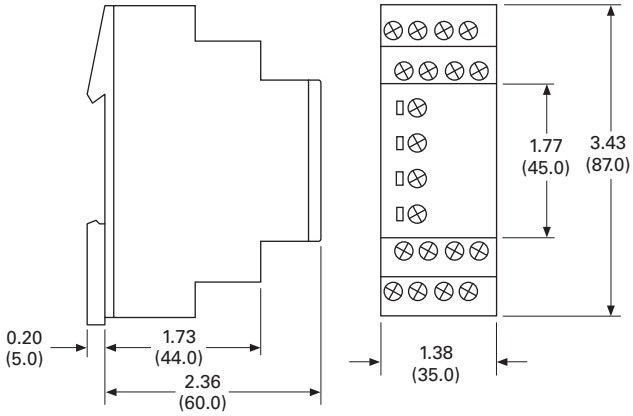
Dimensions

Approximate Dimensions in Inches (mm)

17.5 mm (TRL04, TRL07, TRP07)



35 mm (TRL27 and TRW27)



TR Series

Contents

3

TR Series

Product Description

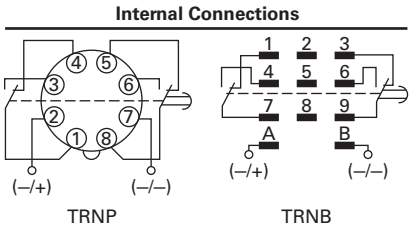
The upgraded TR Series Timing Relays are designed to meet most timing requirements by offering more flexibility in range of input voltage, timing range and functionality. Use a rotary switch to choose from 20 selectable time ranges from 0.1 second to 600 hours. We offer both a power triggered and signal triggered model—each with expanded operation modes. There is a green LED to indicate when power is ON and an orange LED when output is ON.

Features

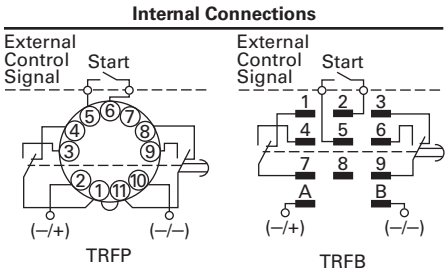
- 20 time ranges and 10 timing functions
- Time delays from 0.1 sec to 600 hrs
- Space-saving, compact package
- High repeat accuracy of ± 0.2%
- LED indication
- Standard 8- or 11-pin and 11-blade termination
- 2 Form C DPDT delayed output contacts
- 10 A contact rating

Operation

TRNP and TRNB



TRFP and TRFB



Standards and Certifications

- cULus listed (File E1491)
- CSA
- CE marked
- TUV

3

Catalog Number Selection

TR N P 240 AC

Family Type
TR

Operational Mode

N = Power Triggered A = ON delay B = Interval C = Flasher (pause first) D = Flasher (ON first)	**F = Signal Triggered** A = ON delay, control signal start (leading edge OFF) B = Flasher, control signal start (pause first) C = Flasher, control signal Start (ON first) D = Signal ON/OFF delay E = OFF delay F = Single shot leading edge with control input

Model Type
P = Pin/octal
B = Blade style

Input Voltage
24AD = 24 Vac (50/60 Hz)/24 Vdc
240AC = 100–240 Vac (50/60 Hz)

Product Selection

TR Plug-In Timing Relays—Power Triggered

Coil Voltage	Octal Catalog Number	Blade Catalog Number
24 Vac/Vdc	**TRNP24AD**	**TRNB24AD**
100–240 Vac	**TRNP240AC**	**TRNB240AC**

TR Plug-In Timing Relays—Signal Triggered

Coil Voltage	Octal Catalog Number	Blade Catalog Number
24 Vac/Vdc	**TRFP24AD**	**TRFB24AD**
100–240 Vac	**TRFP240AC**	**TRFB240AC**

Accessories

Sockets for Use with TR Timers—Standard Pack of 10

Timing Relay	Terminal Style	Catalog Number
TRNP	8-pin octal	**D3PA2**
TRFP	11-pin octal	**D3PA3**
TRNB, TRFB	0.187 in solder/QC terminals (blade style)	**D5PA2**

Technical Data and Specifications

General

Description	Specification
Operation system	Solid-state CMOS circuit
Time range	0.1 sec to 600 hours
Pollution degree	2 (IE60664-1)
Overvoltage category	III (IE60664-1)
Rated operational voltage	
240 AC	100–240 Vac (50/60 Hz)
24 AC	24 Vac (50/60 Hz)/24 Vdc
12 DC	12 Vdc
Voltage tolerance	
240 AC	85–264 Vac (50/60 Hz)
24 AC	20.4–26.4 Vac (50/60 Hz)/21.6–26.4 Vdc
12 DC	10.8–13.2 Vdc
Input OFF voltage	Rated voltage x 10% minimum
Ambient operating temperature	–4 to 149 °F (–20 to 65 °C)
Reset time	100 ms maximum
Repeat error	± 0.2%, ± 20 ms ①
Voltage error	± 0.2%, ± 20 ms ①
Temperature error	± 0.5%, ± 20 ms ①
Setting error	± 10% maximum
Insulation resistance	100M ohm minimum (500 Vdc)
Dielectric strength	
Between power and output terminals	2000 Vac, 1 minute
Between contacts of different poles	2000 Vac, 1 minute
Between contacts of same pole	1000 Vac, 1 minute
Vibration resistance	10–55 Hz amplitude 0.5 mm; 2 hrs in each of 3 axes
Shock resistance	
Operating extremes	10G
Damage limits —	
TRNP, TRFP	40G (3x in each of 3 axes)
TRNB, TRFB	10G (3x in each of 3 axes)
Power consumption (approx.)	
240 AC	6.5 VA TRNP, TRNB/6.6 VA TRFP, TRFB
240 Vac/60 Hz	11.6 VA TRNP, TRNB/12.1 VA TRFP, TRFB
24 AC (AC/DC)	3.4 VA–1.7 W TRNP, TRNB/3.5 VA–1.7 W TRFP, TRFB
12 DC	1.6 W

TR Series Contact Ratings

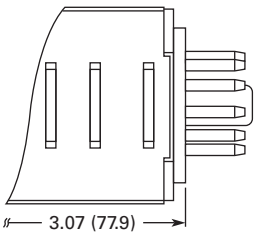
Description	Specification
Contact configuration	2 Form C, DPDT (delayed output)
Allowable voltage/current	240 Vac, 30 Vdc/10 A
Max. permissible operating frequency	1800 cycles per hour
Rated load	
Resistive	10 A, 240 Vac/30 Vdc
Inductive	7 A, 240 Vac/30 Vdc
Horsepower rating	1/6 hp 120 Vac, 1/3 hp 240 Vac
Life	
Electrical	500,000 operations minimum (resistive)
Mechanical	50,000,000 operations minimum

Dimensions

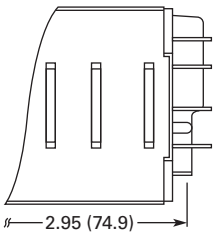
Approximate Dimensions in Inches (mm)

TR Series Dimensions and Weights

Description	Specification
Dimensions	
TRNP, TRFP	1.58H x 1.42W x 3.07D in. (40H x 36W x 77.9D mm)
TRNB, TRFB	1.58H x 1.42W x 2.95D in. (40H x 36W x 74.9D mm)
Weights	
TRNP	87g
TRFP	89g
TRNB, TRFB	85g



Pin (P) Type



Blade (B) Type

Note

① For the value of the error against a preset time, whichever value is larger should apply.

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TMR5 Series

Contents

TMR5 Series

Product Description

The TMR5 Series Time Delay Relays are designed for a broad range of OEM applications. The TMR5 Series offers non-programmable plug-in style timers with a variety of functions available. Each unit offers a single function and single input voltage, and operates over a defined time delay range. Units with fixed time delays are also available. Eaton also offers customization capabilities for these timers—remote adjustments, special pin configurations, and more. Contact us to discuss your specific application and design of a custom timer.

Features

- Single timing range for each unit
- Ranges available from 0.02 sec to 24 hours
- Wide variety of functions available
- Plugs into standard 8- or 11-pin socket
- 10 A DPDT output contacts
- Can be easily customized to meet your needs

Standards and Certifications

- cRUus
- UL listed (with Eaton socket)
- RoHS compliant
- CE marked

c US with Eaton socket RoHS COMPLIANT CE

Catalog Number Selection

All configurations from Catalog Number Selection are available.

TMR5 N 05 120

Family Type
TMR5

Operational Mode	
8-Pin Octal Sockets	**11-Pin Octal Sockets**
N = ON delay **T** = Interval ON **L** = Flasher-pause-first **R** = Repeat cycle ① (OFF time first followed by ON time and repeating) **Y** = Repeat cycle ① (ON time first followed by OFF time and repeating)	**F** = OFF delay, control switch trigger **C** = Single shot, control switch trigger **W** = Watchdog, control switch trigger (retriggerable single shot) **P** = OFF delay, power trigger **G** = Single shot, power trigger **D** = Watchdog, power trigger (retriggerable single shot)

Timing Range ②
04 = 0.05–5 sec **05** = 0.1–10 sec **08** = 0.6–60 sec **12** = 3–300 sec **15** = 0.3–30 min **16** = 0.6–60 min **22** = 6 sec–10 min

Input Voltage
120 = 120 Vac/Vdc **24** = 24 Vac/Vdc **12** = 12 Vac/Vdc **240** = 240 Vac/Vdc

Product Selection

TMR5 Time Delay Relays

Input Voltage	Socket	Timing Range	Catalog Number
ON Delay			
120 Vac/Vdc	8-pin	0.1–10 sec	**TMR5N05120**
		0.6–60 sec	**TMR5N08120**
24 Vac/Vdc		0.1–10 sec	**TMR5N0524**
		0.6–60 sec	**TMR5N0824**
OFF Delay, Control Switch Trigger			
120 Vac/Vdc	11-pin	0.1–10 sec	**TMR5F05120**
		0.6–60 sec	**TMR5F08120**
24 Vac/Vdc		0.1–10 sec	**TMR5F0524**
		0.6–60 sec	**TMR5F0824**
Interval ON			
120 Vac/Vdc	8-pin	0.1–10 sec	**TMR5T05120**
		0.6–60 sec	**TMR5T08120**
24 Vac/Vdc		0.1–10 sec	**TMR5T0524**
		0.6–60 sec	**TMR5T0824**
Single Shot, Control Switch Trigger			
120 Vac/Vdc	11-pin	0.1–10 sec	**TMR5C05120**
		0.6–60 sec	**TMR5C08120**
24 Vac/Vdc		0.1–10 sec	**TMR5C0524**
		0.6–60 sec	**TMR5C0824**
Repeat Cycle (OFF Time First Followed by ON Time and Repeating)			
120 Vac/Vdc	8-pin	0.1–10 sec	**TMR5R05120**
		0.6–60 sec	**TMR5R08120**
24 Vac/Vdc		0.1–10 sec	**TMR5R0524**
		0.6–60 sec	**TMR5R0824**
Repeat Cycle (ON Time First Followed by OFF Time and Repeating)			
120 Vac/Vdc	8-pin	0.1–10 sec	**TMR5Y05120**
		0.6–60 sec	**TMR5Y08120**
24 Vac/Vdc		0.1–10 sec	**TMR5Y0524**
		0.6–60 sec	**TMR5Y0824**

Accessories

Accessories for Use with TMR5 Time Delay Relays

Description	Standard Pack	Catalog Number
8-pin socket	10	**D3PA2**
11-pin socket	10	**D3PA3-A2**
Hold-down spring	10	**D65CHDS**

Notes

① Indicates DUAL knob unit. All dual knob units can have independently selectable and adjustable ON and OFF times. If different ON and OFF times are desired, add two codes for time ranges in the part number. The first code listed indicates the first timing range of the unit (OFF time for R, ON time for Y) and the second code indicates the second timing range (ON time for R, OFF Time for Y).

② Fixed time delay settings are available for orders of 50 pieces or more. Contact EatonCare for additional information at 877-ETN-CARE (386-2273).

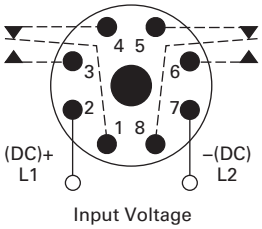
Technical Data and Specifications

TMR5 Time Delay Relays

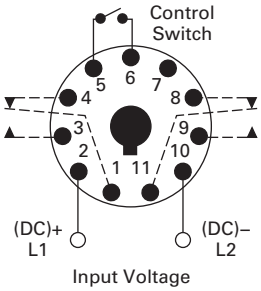
Description	Specification
Voltage tolerance	
AC operation	+10/–15% of nominal at 50/60 Hz
DC operation	+10/–15% of nominal
Load burden	2 VA
Setting accuracy	
Maximum setting (adjustable)	+5%, –0%
Minimum setting (adjustable)	+0%, –50%
Fixed time delay	
< 2 seconds	+1%
0.1–2 seconds	±5%
Repeat accuracy (constant voltage and temperature)	
> 2 seconds delay	±0.1%
0.1–2 seconds delay	±2%
Reset time	
ON Delay/interval/repeat cycle	0.1 second
OFF Delay/single shot/watchdog	0.04 second
Startup time (time from when power is applied until unit is timing)	
120 and 240 V units	0.05 second
12, 24 and 48 V units	0.08 second
Maintain function time (time unit continues to time after power is removed)	0.01 second
Temperature	
12–120 V input voltage	–18 to 150 °F (–28 to 65 °C)
240 V input voltage	–18 to 122 °F (–28 to 50 °C)
Insulation voltage	2000 V
Output contacts	DPDT 10 A @ 240 Vac/30 Vdc, 1/2 hp @ 120/240 Vac (NO contacts) 1/3 hp @ 120/240 Vac (NC contacts) B300 and R300; AC-15 and DC-13
Life	
Mechanical	10,000,000 operations
Full load	100,000 operations

Wiring Diagrams

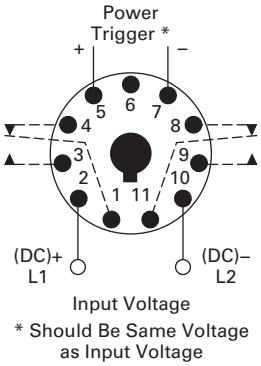
Wiring for 8-Pin Units



Wiring for 11-Pin Control Switch Trigger Units



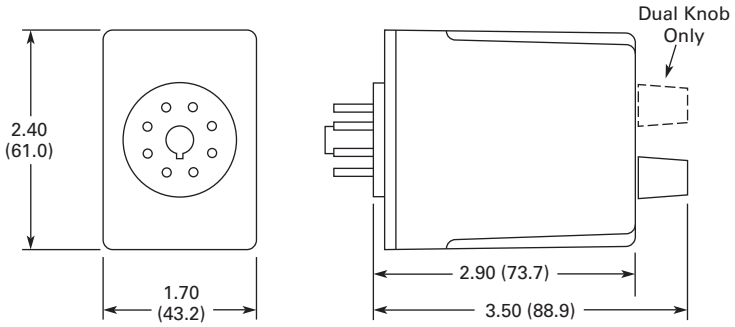
Wiring for 11-Pin Power Trigger Units



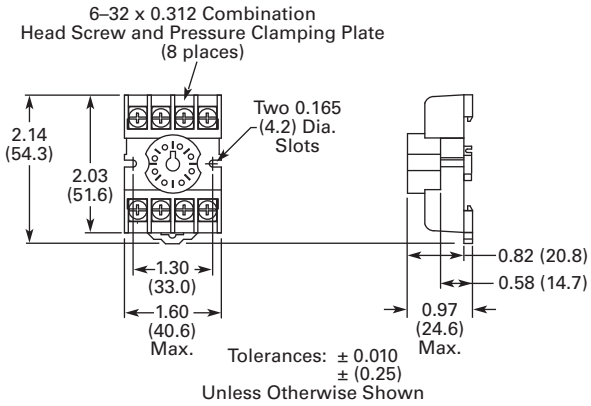
Dimensions

Approximate Dimensions in Inches (mm)

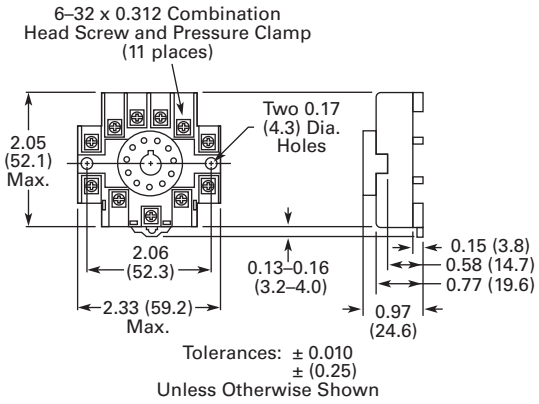
TMR5



D3PA2 Socket



D3PA3 Socket



TMR6 Series

Contents

TMR6 Series

Product Description

Most electronic time delay relays with an OFF delay function require input voltage to be applied continuously in order to operate correctly. However, there are many applications where this is not possible—keeping a relay energized for some amount of time after input voltage has been removed. Eaton's TMR6 true OFF delay product provides this function even when input voltage is removed. It duplicates the operation of the older OFF delay pneumatic time delay relays.

Features

- Provides OFF delay function without requiring input voltage during OFF time delay
- Duplicates operation of pneumatic OFF delay timers
- Each unit has eight timing ranges built in, covering 0.05 seconds to 30 minutes
- Selecting a range is easy using a rotary switch (no math is required or DIP switches to set)
- Uses industry-standard 8-pin octal socket
- 10 A DPDT output contacts

Timing Ranges

Select one of the eight timing ranges using the selector knob, and then adjust the time within that range for an accurate delay setting.

Timing Ranges

Dial Setting	Timing Range
A	0.05–5 sec.
B	0.1–10 sec.
C	0.3–30 sec.
D	0.6–60 sec.
E	1.8–180 sec.
F	3–300 sec.
G	0.1–10 min.
H	0.3–30 min

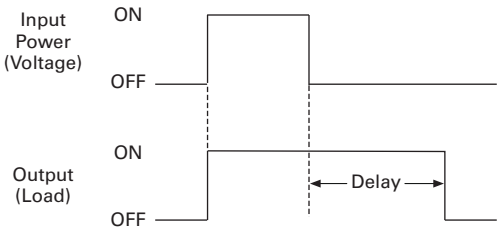
Operation

True OFF Delay

Upon application of input voltage, the relay is energized. When the input voltage is removed, the preset time begins. At the end of the preset time, the relay is de-energized.

Voltage must be applied for a minimum of 0.1 second to assure proper operation. Any application of the input voltage during the preset time will keep the relay energized and reset the time delay. No external trigger switch is required.

True OFF Delay



Standards and Certifications

- cRUus
- UL listed (with Eaton socket)
- RoHS compliant
- CE marked

with Eaton socket

Catalog Number Selection

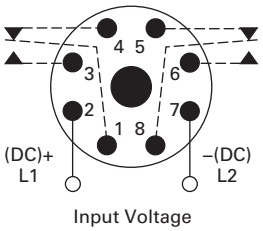
All configurations from Catalog Number Selection are available.

TMR6 X 00 120

Family Type	Operational Mode	Timing Range	Input Voltage
TMR6	**X** = True OFF delay	**00** = Programmable	**120** = 120 Vac/Vdc **24** = 24 Vac/Vdc **240** = 240 Vac/Vdc

Wiring Diagram

Wiring for 8-Pin Units



Product Selection

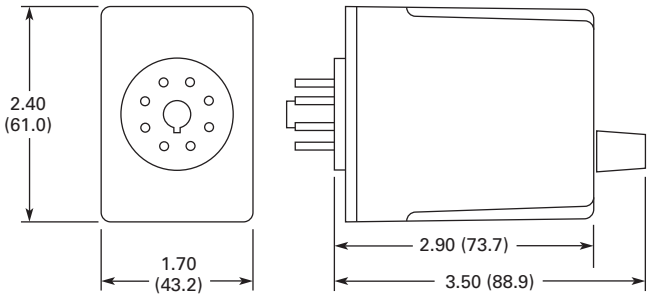
TMR6 True OFF Delay Relays

Input Voltage	Timing Range	Catalog Number
True OFF Delay		
120 Vac/Vdc	0.05 sec–30 min (user selectable, 8 ranges)	**TMR6X00120**
24 Vac/Vdc		**TMR6X0024**
240 Vac/Vdc		**TMR6X00240**

Dimensions

Approximate Dimensions in Inches (mm)

TMR6

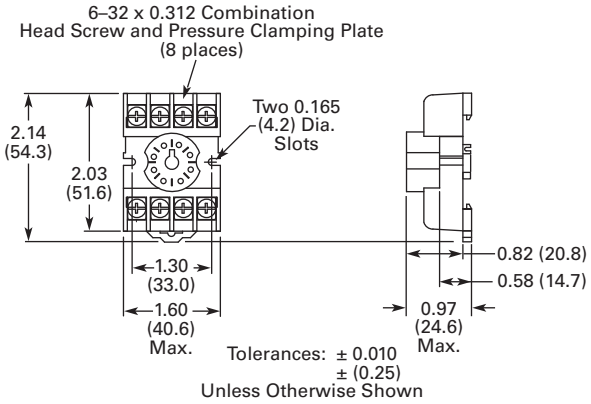


Accessories

Accessories for Use with TMR6 Time Delay Relays

Description	Standard Pack	Catalog Number
8-pin socket	10	**D3PA2**
Hold-down spring	10	**D65CHDS**

D3PA2 Socket



Technical Data and Specifications

TMR6 Time Delay Relays

Description	Specification
Voltage tolerance	
AC operation	+10/–15% of nominal at 50/60 Hz
DC operation	+10/–15% of nominal
Load burden	2 VA
Setting accuracy	
Maximum setting (adjustable)	+5%, –0%
Minimum setting (adjustable)	+0%, –50%
Repeat accuracy (constant voltage and temperature)	±0.1% or 50 ms, whichever is greater
Temperature	–18 to 150 °F (–28 to 65 °C)
Insulation voltage	2,000 V
Output contacts	DPDT 10 A @ 240 Vac/30 Vdc, 1/2 hp @ 120/240 Vac (NO contacts) 1/3 hp @ 120/240 Vac (NC contacts) B300 and R300; AC-15 and DC-13
Life	
Mechanical	2,000,000 operations
Full load	100,000 operations

TMRP Series

Contents

TMRP Series

Product Description

Eaton's TMRP Series timers combine flexibility with ease of use and installation to make the most versatile timer in our offering. The thumb-wheel setting design allows for quick selection and review of up to 10 timing functions and seven timing ranges. The TMRP units can be mounted in a 1/16 DIN cutout or on a DIN rail with our D3 series sockets. Input voltage is 12–240 Vac/Vdc to work with all popular control voltages.

Application Description

A timing relay is a simple form of time-based control, allowing the user to open or close the contacts based on a specified timing function. The TMRP series is equipped with a set of thumb-wheel style selector switches, which can easily be set to a specific function and time, thereby reducing the number of product variations required. The universal input voltage of 12–240 Vac/Vdc further reduces the number of product variations.

The TMRP timers are ideal for high-variability operations, such as systems integrators, distributors, and small equipment manufacturers. The flexible enclosure design allows for back-panel mounting, through-panel mounting, or DIN rail mounting.

Features

- Multiple user-selectable timing functions and timing ranges in a single unit reduce product variations and stock keeping units (SKUs)
- Universal input voltages from 12–240 Vac/Vdc eliminate the need to order and stock separate coil voltages
- Timing ranges up to 9990 hours
- Dual LED indication makes troubleshooting easy
- Flexible design for back-panel, through-panel (45 mm x 45 mm cutout), or DIN rail mounting
- SPDT or DPDT contacts with 12 A ratings
- Plastic dust cover keeps out contaminants and eliminates accidental set point changes
- Use with standard Eaton D3 sockets—see Technical Data and Specifications

LED Indicator

LED Description	Function
Solid green "Input"	Supply voltage present
Solid red "Output"	Relay energized
Slowly flashing red "Output"	Timing cycle activated, relay not energized
Rapidly flashing red "Output"	Timing cycle activated, relay energized

Standards and Certifications

- UL recognized
- CE marked
- RoHS compliant

Product Selection

TMRP5100

TMRP Timing Relays

Supply Voltage	Description	Catalog Number
10-Function		
12–240 Vac/Vdc	Control switch trigger, DPDT	**TMRP5100**
	Control switch trigger, SPDT	**TMRP5101**
	Power trigger, DPDT	**TMRP5102**

Technical Data and Specifications

TMRP Timing Relays

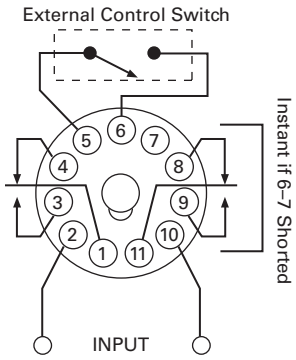
Description	TMRP5100	TMRP5101	TMRP5102
Functions ①	A, B, C, D, E, F, G, H, I, J	A, B, C, D, E, F, G, H, I, J	A, B, C
Time range	0.1 sec to 9,990 hours	0.1 sec to 9,990 hours	0.1 sec to 9,990 hours
Input			
Supply voltage	12–240 Vac/Vdc	12–240 Vac/Vdc	12–240 Vac/Vdc
Supply voltage tolerance	±15%	±15%	±15%
Rated consumption	2.5 VA (2 W) maximum	2.5 VA (2 W) maximum	2.5 VA (2 W) maximum
Reset time	150 ms	150 ms	150 ms
Reverse polarity protection	Yes	Yes	Yes
Operate time	25 ms maximum	25 ms maximum	25 ms maximum
Release time	25 ms maximum	25 ms maximum	25 ms maximum
Rated surge voltage	4 kV	4 kV	4 kV
Output			
Contact configuration	DPDT	SPDT	DPDT
Contact rating (AC)	12 A resistive at 120, 240 UL 508	12 A resistive at 120, 240 UL 508	12 A resistive at 120, 240 UL 508
Contact rating (DC)	12 A resistive at 30 UL 508	12 A resistive at 30 UL 508	12 A resistive at 30 UL 508
Contact rating horsepower	1/2 at 120 Vac, 1 at 240 Vac	1/2 at 120 Vac, 1 at 240 Vac	1/2 at 120 Vac, 1 at 240 Vac
Contact rating pilot duty	A300, 720 VA at 240 Vac	A300, 720 VA at 240 Vac	A300, 720 VA at 240 Vac
Minimum load	12 V/100 mA	12 V/100 mA	12 V/100 mA
Contact material	Silver-nickel 90/10	Silver-nickel 90/10	Silver-nickel 90/10
Contact resistance	100 milliohms max. at 1 A 12 Vdc	100 milliohms max. at 1 A 12 Vdc	100 milliohms max. at 1 A 12 Vdc
Mechanical life—full load	10 million operations	10 million operations	10 million operations
Electrical life—full load	100,000 operations	100,000 operations	100,000 operations
Control Signal			
Minimum control pulse length	50 ms minimum	50 ms minimum	50 ms minimum
Accuracy			
Repetition accuracy	0.10% at constant voltage and temperature	0.10% at constant voltage and temperature	0.10% at constant voltage and temperature
Physical			
Ambient temperature	–10 to 55 °C	–10 to 55 °C	–10 to 55 °C
Storage temperature	–40 to 85 °C	–40 to 85 °C	–40 to 85 °C
Mounting	Use with D3PA3 socket	Use with D3PA2 socket	Use with D3PA2 socket

Note

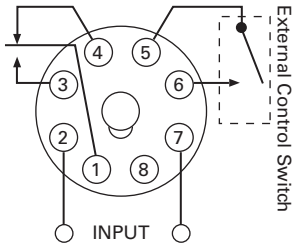
① Refer to Function Code Cross-Reference Guide on **Page V7-T3-143** for function details.

Wiring Diagrams

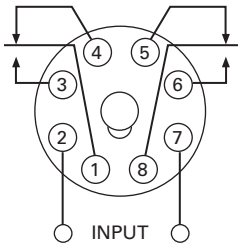
TMRP5100



TMRP5101



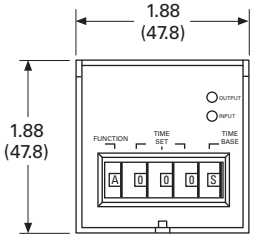
TMRP5102

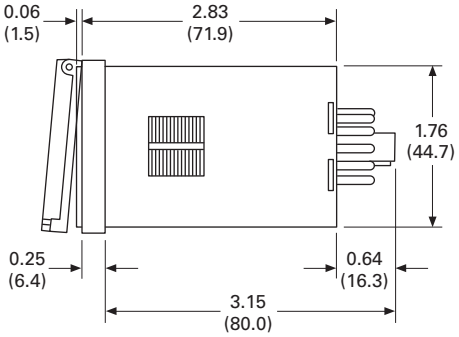


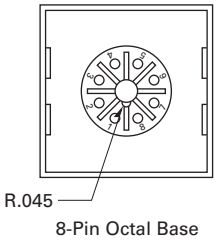
Dimensions

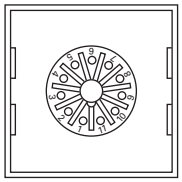
Approximate Dimensions in Inches (mm)

TMRP Series









D85 Series—Alternating Relays

Contents

3

Product Description

Alternating relays are used in applications where the optimization of load usage is required by equalizing the run time of two loads. They are also used where additional capacity is required 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 LED indicators show the status of the output relay.

The D851 and D852 Series Relays are used with one control switch and are available in either SPDT or DPDT output configurations with or without a selector switch to lock in one sequence. The D852X Series Relays are available in DPDT cross-wired output configurations for use with one or two control switches (LEAD and LAG).

The D853 Series is designed for use with three-switch applications (LEAD, LAG and STOP). The D853 Series combines a standard DPDT Cross-Wired alternating relay, contactor auxiliary contacts, and a control relay into one compact and economical product. This saves space and labor, while reducing the number of components needed. The D853 Series uses Sequence On–Simultaneous Off (S.O.S.O.) operation, where the two loads are energized sequentially, but remain on together until the STOP switch is opened. This device also protects against failure of the STOP and LEAD switches. If both switches fail, the two pump motors will be energized simultaneously when the LAG switch is closed.

Each of the D85 Series alternating relays is available with an optional three-position selector switch, which allows the unit to alternate the two loads as normal, or lock the relay to one load or the other. By locking the alternating relay to one load, the other load can be removed for service without rewiring the first load for continuous operation. The selector switch has a low profile to prevent any accidental actuation.

Features

- For duplex loads
- Works with one-, two-, or three-switch applications
- Compact plug-in design using industry standard sockets
- 10 A SPDT or DPDT output configurations
- Optional low profile selector switch to lock in one sequence
- Two LEDs indicate relay status
- D853 Series replaces separate components in duplex panel—saving space and reducing labor

Standards and Certifications

- CE
- cRUus
- UL listed ①
- RoHS compliant

Listed

Note

① When used with appropriate Eaton socket.

Product Selection

D85 Series—Alternating Relays ①

Output Contacts	Control Voltage	Socket	Catalog Number
SPDT	12 Vac	8-pin	**D851NR**
SPDT	24 Vac	8-pin	**D851NT**
SPDT	120 Vac	8-pin	**D851NA**
SPDT	240 Vac	8-pin	**D851NB**
SPDT w/selector switch	12 Vac	8-pin	**D851LR**
SPDT w/selector switch	24 Vac	8-pin	**D851LT**
SPDT w/selector switch	120 Vac	8-pin	**D851LA**
SPDT w/selector switch	240 Vac	8-pin	**D851LB**
DPDT	12 Vac	11-pin	**D852NR**
DPDT	24 Vac	11-pin	**D852NT**
DPDT	120 Vac	11-pin	**D852NA**
DPDT	240 Vac	11-pin	**D852NB**
DPDT w/selector switch	12 Vac	11-pin	**D852LR**
DPDT w/selector switch	24 Vac	11-pin	**D852LT**
DPDT w/selector switch	120 Vac	11-pin	**D852LA**
DPDT w/selector switch	240 Vac	11-pin	**D852LB**
DPDT cross-wired	12 Vac	8-pin	**D852XNR**
DPDT cross-wired	24 Vac	8-pin	**D852XNT**
DPDT cross-wired	120 Vac	8-pin	**D852XNA**
DPDT cross-wired	240 Vac	8-pin	**D852XNB**
DPDT cross-wired w/selector switch	12 Vac	8-pin	**D852XLR**
DPDT cross-wired w/selector switch	24 Vac	8-pin	**D852XLT**
DPDT cross-wired w/selector switch	120 Vac	8-pin	**D852XLA**
DPDT cross-wired w/selector switch	240 Vac	8-pin	**D852XLB**

Accessories

D85 Series—Alternating Relays

Description	Standard Pack	Catalog Number
8-pin socket	10	**D3PA2**
11-pin socket	10	**D3PA3-A2**
Hold-down spring	10	**D65CHDS**

Note

① Contact Eaton for relays for 3-switch applications (Lead-Lag-Stop).

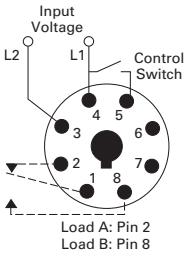
Technical Data and Specifications

D85 Series—Alternating Relays

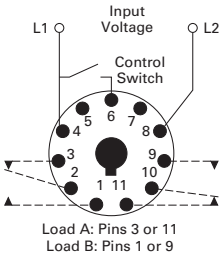
Description	Specification
Voltage tolerance	+10%/-15% of control voltage at 50/60 Hz
Load (burden)	Less than 3 VA
Output contacts	10 A resistive at 240 Vac / 30 Vdc, 1/2 hp at 120/240 Vac (NO), 1/3 hp at 120/240 Vac (NC)
Mechanical life	10,000,000 operations
Electrical life	100,000 operations
Temperature	–20 °F to +150 °F (–28 ° to 65 °C)
Transient protection	10,000 volts for 20 microseconds
Indicator LEDs	2 LEDs marked LOAD A and LOAD B
Optional selector switch settings	ALTERNATE, LOCK LOAD A, LOCK LOAD B

Wiring Diagrams

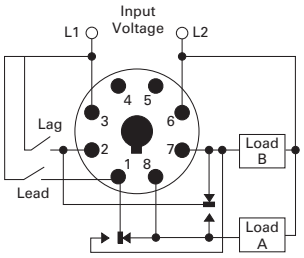
D851 Series Relays, SPDT



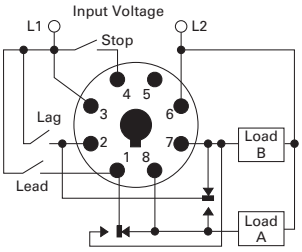
D852 Series Relays, DPDT



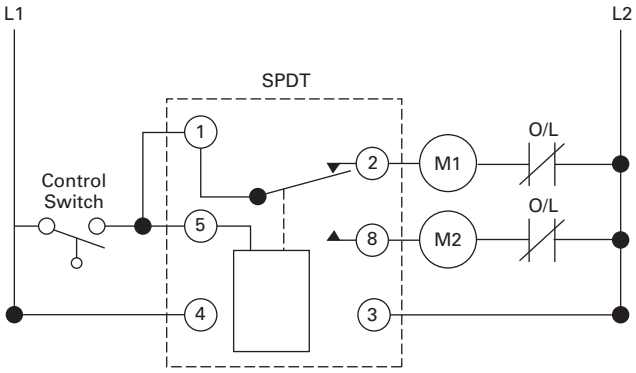
D852X Series Relays, DPDT Cross-Wired



D853 Series Relays, Three-Switch Applications



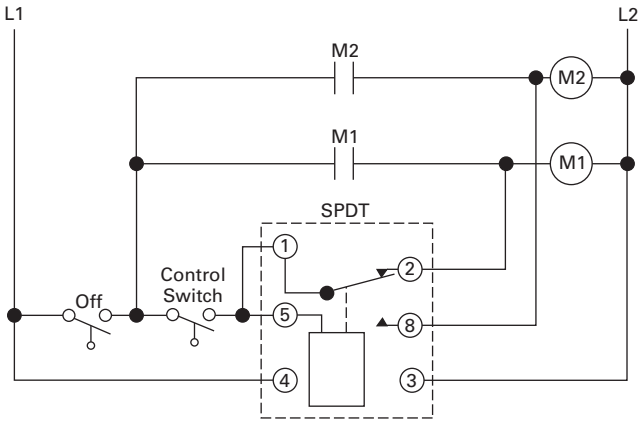
Typical Installations for SPDT and DPDT Alternating Relays, Standard Installation



In the OFF state (standard installation), the control switch is open, the alternating relay is in the LOAD A position, and both loads (M1 and M2) are off. When the control switch closes, it energizes the first load (M1). The red LED marked "LOAD A" glows. As long as the control switch remains closed, M1 remains energized.

When the control switch opens, the first load (M1) is turned off and the alternating relay toggles to the LOAD B position. When the control switch closes again, it energizes the second load (M2). The red LED marked "LOAD B" glows.

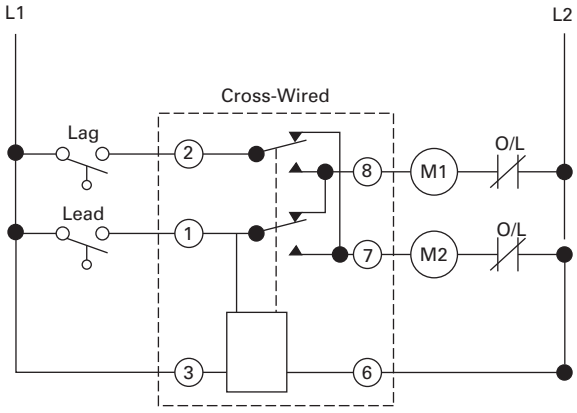
Typical Installations for SPDT and DPDT Alternating Relays, Anti-Bounce Installation



When the control switch opens, the second load (M2) is turned off, the alternating relay toggles back to the LOAD A position, and the process can be repeated again. On relays with DPDT contacts, two pilot lights can be used for remote indication of LOAD A or LOAD B status.

To eliminate any bounce condition of the control switch, the addition of a second switch (OFF) along with two auxiliary contacts is recommended as shown in the Anti-Bounce Installation.

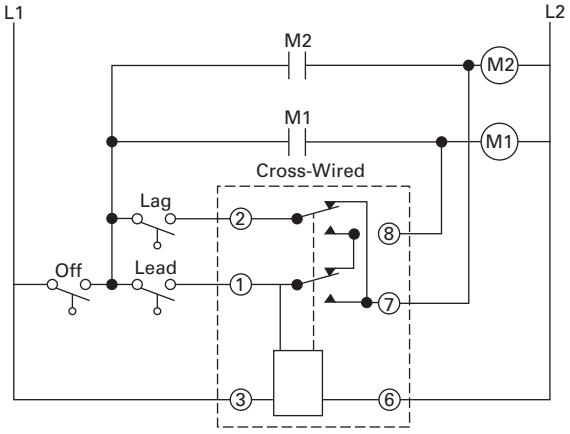
Typical Installations for DPDT Cross-Wired Alternating Relays, Standard Installation



In the OFF state, both the LEAD control switch and the LAG control switch are open, the alternating relay is in the LOAD A position, and both loads are off. When the LEAD control switch closes, it energizes the first load (M1). The red LED marked "LOAD A" glows. As long as the LEAD control switch remains closed, M1 remains energized. If the LAG control switch closes, it energizes the second load (M2).

When the LAG control switch opens, the second load (M2) is turned off. When the LEAD control switch opens, the first load (M1) is turned off and the alternating relay toggles to the LOAD B position.

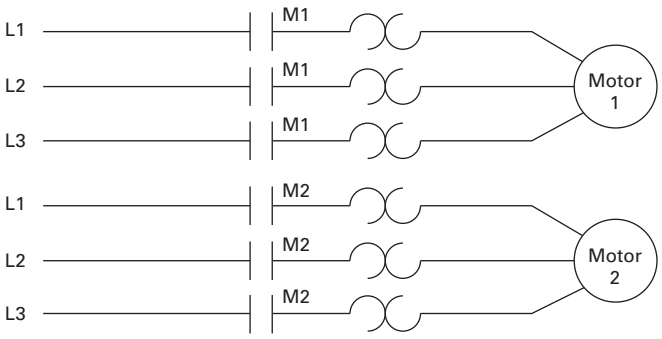
Typical Installations for DPDT Cross-Wired Alternating Relays, Anti-Bounce Installation



When the LEAD control switch closes, it turns on the second load (M2). The red LED marked "LOAD B" glows. If the LAG control switch closes, it will energize the first load (M1). When the LAG control switch opens, the first load (M1) is turned off. When the LEAD control switch opens, the second load (M2) is turned off, the alternating relay toggles back to the LOAD A position, and the process can be repeated again.

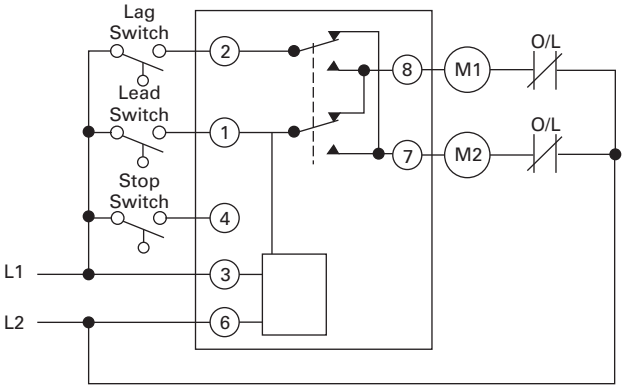
To eliminate any bounce condition of the control switch, the addition of a second switch (OFF) along with two auxiliary contacts is recommended as shown in the Anti-Bounce Installation.

Typical Installations for DPDT Cross-Wired Relays for Three-Switch Applications



In the OFF state, all three switches are open, the alternating relay is in the LOAD A position, and both loads are off. No action happens with the alternating relay or either load when the STOP switch closes. When the LEAD switch closes, Load #1 (M1) turns on. When the LAG switch closes, Load #2 (M2) turns on. Both loads remain on as long as all three switches are closed.

When the LAG switch opens, Load #2 (M2) remains on because the STOP switch is still closed. When the LEAD switch opens, Load #1 (M1) remains on because the STOP switch is still closed. When the STOP switch opens, both Load #1 (M1) and Load #2 (M2) are turned off simultaneously.



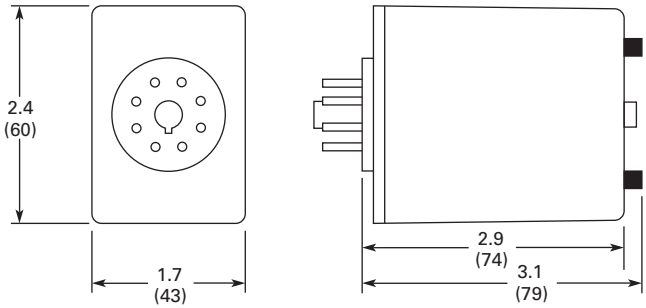
The alternating relay toggles to the LOAD B position. The entire cycle is then repeated, but with Load #2 (M2) energized first followed by Load #1 (M1). This type of operation is known as "Sequence On–Simultaneously Off (S.O.S.O.)"—the two loads are energized sequentially, but remain on together until the STOP switch is opened.

If both the STOP switch and LEAD switch fail to close and turn on the first load, both loads will be turned on simultaneously when the LAG switch is closed.

Dimensions

Approximate Dimensions in Inches (mm)

D85 Series—Alternating Relays



3

Safety Relays

Contents

Product Description

Safety relays are intended to reliably monitor the signals from safety devices at all times and switch off quickly and reliably in an emergency. Single-channel and dual channel versions are available for the construction of safety applications. The internal logic of the safety relays monitors the safety circuits (emergency stop, guard door, and so on) and activates the enable paths in a fault-free condition. Upon actuation of the safety device or in the even of a fault, the enable paths are switched off. Any faults that occur in the control circuit, such as ground fault, cross connection fault or wire breakage are also detected.

Application Description

Eaton's ESR5 safety relays provide optimal safety and a high degree of reliability on plant machinery. Applications that meet the highest safety requirements in accordance with EN 954-1, EN ISO 13849-1 up to PL e and accordance with IEC 62061 up to SILCL 3 can be realized with the ESR5 safety relay.

Compatible with a wide variety of safety devices:

- Emergency stops
- Rope pulls
- Two-hand control stations
- Light curtain (OSSD)
- Gate enable device
- Safety switches

Features

- Use for the highest safety requirements in accordance with EN 954-1 EN ISO 13849-1, IEC 62061 and EC 61508
- Suitable for the world market with UL, cUL certifications and TÜV Rhineland functional safety certifications
- Applicable for EN 60204 stop categories 0 or 1
- Plug-in screw terminals for fast and fault-free replacement
- Multi-voltage versions (24–230 Vac/Vdc) for a flexible range of application
- Delayed and non-delayed contact expansions accommodate a wide variety of applications

Standards and Certifications

- UL 508; CSA C22.2 No 14-95; CE Marked
- UL/cUL file number: E29184
- Degree of protection: IP20
- TÜV Rhineland certified
- UL/cULus listed

Product Selection

Safety Relays

Technical Overview

Single Channel	Dual Channel	Safety Output (NO)	Safety Output (NO) (Delayed)	Output Delay	Signal Output (NC)	Feedback Output	Control Voltage	Removable Terminal Blocks	Type of Unit	Catalog Number
n	—	4	—	—	1	—	24 Vac/Vdc	n	Main	**ESR5-NO-41-24VAC-DC**
n	n	2	—	—	1	—	24 Vac/Vdc	n	Main	**ESR5-NO-21-24VAC-DC**
n	n	3	—	—	1	—	24 Vac/Vdc	n	Main	**ESR5-NO-31-24VAC-DC**
n	n	3	—	—	1	—	230 Vac	n	Main	**ESR5-NO-31-230VAC**
n	n	3	—	—	1	—	24–230 Vac/Vdc	n	Main	**ESR5-NO-31-AC-DC**
n	n	2	2	0.1–30s	—	—	24 Vdc	n	Main	**ESR5-NV3-30**
—	n	2	—	—	1	—	24 Vac/Vdc	n	Main	**ESR5-NZ-21-24VAC-DC**
n	—	5	—	—	1	1	24 Vac/Vdc	n	Expansion	**ESR5-NE-51-24VAC-DC**
n	—	—	4	0.3–3s	1	1	24 Vdc	n	Expansion	**ESR5-VE3-42**

Application Overview

Emergency Stop	Safety Switches	Light Curtain/ OSSD ①	Two-Hand Control (EN 574 Type III C)	Contact Expansion	Off-Delayed	Cross Circuit Recognition	Monitored Manual Reset ②	Catalog Number
n	n	—	—	—	—	—	—	**ESR5-NO-41-24VAC-DC**
n	n	—	—	—	—	n	—	**ESR5-NO-21-24VAC-DC**
n	n	—	—	—	—	n	—	**ESR5-NO-31-24VAC-DC**
n	n	—	—	—	—	n	n	**ESR5-NO-31-230VAC**
n	n	—	—	—	—	n	n	**ESR5-NO-31-AC-DC**
n	n	n	—	—	n	n	n	**ESR5-NV3-30**
—	n	—	n	—	—	n	—	**ESR5-NZ-21-24VAC-DC**
—	—	—	—	n	—	—	—	**ESR5-NE-51-24VAC-DC**
—	—	—	—	n	n	—	—	**ESR5-VE3-42**

Application Overview, continued

Single Channel	Dual Channel	Stop Category EN 60204	Control Category to EN 954-1	Achievable PL per ISO 13849-1	Achievable SIL per EN IEC 62061	Catalog Number
n	—	0	2	PL d	SIL 3	**ESR5-NO-41-24VAC-DC**
n	n	0	4	PL e	SIL 3	**ESR5-NO-21-24VAC-DC**
n	n	0	4	PL e	SIL 3	**ESR5-NO-31-24VAC-DC**
n	n	0	4	PL e	SIL 3	**ESR5-NO-31-230VAC**
n	n	0	4	PL e	SIL 3	**ESR5-NO-31-AC-DC**
n	n	0/1	4	PL e	SIL 3	**ESR5-NV3-30**
—	n	0	4	PL e	SIL 3	**ESR5-NZ-21-24VAC-DC**
n	—	0	4	PL e	SIL 3	**ESR5-NE-51-24VAC-DC**
n	—	1	3	PL d	SIL 2	**ESR5-VE3-42**

Notes

① Laser scanners or light curtains with OSSD outputs.

② All main units can also be reset automatically or manually.

Technical Data and Specifications

Safety Relay

Description	Unit	ESR5-NO-21_	ESR5-NO-41_	ESR5-NO-31-24VAC-DC	ESR5-NZ-21_
General					
Standards		EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed	EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed	EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed	EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed
Type-dependent standards		—	—	—	EN 574 Part no. IIIC
Lifespan, mechanical—c (contacts)	x 10^6	10	10	10	10
Maximum operating frequency	Ops/h	3600	3600	3600	3600
Climatic proofing		Cold according to EN 60068-2-1, dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3	Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3	Cold according to EN 60068-2-1, dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3	Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3
Ambient temperature	°F (°C)	–4 ° to 131 ° (–20 ° to 55 °)	–4 ° to 131 ° (–20 ° to 55 °)	–4 ° to 131 ° (–20 ° to 55 °)	–4 ° to 131 ° (–20 ° to 55 °)
Ambient temperature storage	°F (°C)	–13 ° to 167 ° (–25 ° to 75 °)	–13 ° to 167 ° (–25 ° to 75 °)	–13 ° to 167 ° (–25 ° to 75 °)	–13 ° to 167 ° (–25 ° to 75 °)
Mounting position		Any	Any	Any	Any
Vibration resistance (IEC/EN 60068-2-6)		2g, frequency: 10–150 Hz, amplitude: 0.15 mm	2g, frequency: 10–150 Hz, amplitude: 0.15 mm	2g, frequency: 10–150 Hz, amplitude: 0.15 mm	2 g, frequency: 10–150 Hz, amplitude: 0.15 mm
Shock resistance (IEC 60068-2-27)		—	—	—	—
Protection type					
Housing		IP20	IP20	IP20	IP20
Terminals		IP20	IP20	IP20	IP20
Protection against direct contact when actuated from front (IEC 0106 Part 100)		Finger- and back-of-hand proof	Finger- and back-of-hand proof	Finger- and back-of-hand proof	Finger- and back-of-hand proof
Weight	kg	0.17	0.22	0.17	0.22
Terminal capacity					
Solid or flexible	mm^2	1 x (0.2–2.5) 2 x (0.2–1)	1 x (0.2–2.5) 2 x (0.2–1)	1 x (0.2–2.5) 2 x (0.2–1)	1 x (0.2–2.5) 2 x (0.2–1)
Flexible with ferrule	mm^2	1 x (0.25–2.5) 2 x (0.25–1)	1 x (0.25–2.5) 2 x (0.25–1)	1 x (0.25–2.5) 2 x (0.25–1)	1 x (0.25–2.5) 2 x (0.25–1)
Solid or stranded	AWG	24–12	24–12	24–12	24–12
Terminal screw					
Pozidriv screwdriver	Size	2	2	2	2
Flat-blade screwdriver	mm	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5
Max. tightening torque	Nm	0.6	0.6	0.6	0.6
Main Contacts					
Rated impulse withstand voltage—U_{imp}	Vac	6000	4000	4000	6000
Overvoltage category/pollution degree					
Outside		III/2	III/2	III/2	III/2
Inside		—	—	—	—
Rated insulation voltage—U_i	Vac	250	250	250	250
Rated operating voltage—U_e	Vac	230	230	230	230
Rated operation current					
AC-15					
230 V (360 ops./h)—I_e	A	5	4	5	4
230 V (3600 ops./h)—I_e	A	3	3	3	3
DC-13					
24 V (360 ops./h)—I_e	A	6	4	6	4
24 V (3600 ops./h)—I_e	A	3	2.5	3	2.5
Max. summation current of all poles					
24 Vac/Vdc devices	A	72	72	72	72
230 Vac devices	A	—	—	—	—
Square of the total current (and total current) of all current paths		72 A^2 (6 + 6)	72 A^2 (4.2 + 4.2 + 4.2 + 4.2)	72 A^2 (4.9 + 4.9 + 4.9)	72 A^2 (6 + 6)
Short-circuit protection					
Max. fuse	A gG/gL	10	6	10	6

Safety Relay, continued

Description	Unit	ESR5-NO-21_	ESR5-NO-41_	ESR5-NO-31-24VAC-DC	ESR5-NZ-21_
Power Supply Circuit					
Actuating voltage 50/60 Hz	Vac	24	24	24	24
Actuating voltage—U_s	Vdc	24	24	24	24
Voltage tolerance pick-up voltage	x_e	0.85–1.1	0.85–1.1	0.85–1.1	0.85–1.1
Power consumption					
AC operated 50/60 Hz	VA	—	—	—	—
AC operated 50/60 Hz	W	3.4	3.4	3.4	3
DC operated	W	1.6	1.6	1.6	1.5
Fuse for control circuit supply					
24 V		Short-circuit proof	Short-circuit proof	Short-circuit proof	Short-circuit proof
115/230 V		—	—	—	—
Control Circuit					
Rated output voltage	Vdc	24	24	24	24
Rated operational current	mA	S12, S22: 30, S34: 45	S12: 65, S34: 40	S12, S22: 30, S34: 45	S11, S21: 60, Y2: 45
Resistance—R		50	22	50	22
Short-circuit current	A	2.3	2.3	2.3	2.3
Response time	ms	100	65	100	50
Recovery time	ms	—	—	—	—
Response time with reset monitoring—t_{A1}	ms	—	—	—	—
Response time without reset monitoring—t_{A2}	ms	100	65	100	50
Reset time—t_R/t_{R1}	ms	Single-channel 45; dual-channel 10	45	Single-channel 45; dual-channel 10	20
Minimum on duration—t_M	ms	—	—	—	—
Recovery time—t_W	ms	Approx. 1000	Approx. 1000	Approx. 1000	Approx. 1000
Synchronous monitoring time—t_S	ms	—	—	—	500
Electromagnetic Compatibility (EMC)					
Emitted interference		EN 61000-6-4	EN 61000-6-4	EN 61000-6-4	EN 61000-6-4
Interference immunity		According to EN 61000-6-2, EN 62061	According to EN 61000-6-2	According to EN 61000-6-2, EN 62061	According to EN 61000-6-2

Safety Relay, continued

Description	Unit	ESR5-NO-31-230VAC	ESR5-NO-31-24V-230VAC-DC	ESR5-NV3_	ESR5-VE3_	ESR5-NE-51_
General						
Standards		EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed	EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed	EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed	EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed	EN ISO 13849-1, IEC 62061, IEC 61508, DIN EN 50178, UL/CUL listed
Type-dependent standards		EN 60204 (if applicable)	EN 60204 (if applicable)	EN 60204 (if applicable)	—	—
Lifespan, mechanical—c (contacts)	x 10^6	10	10	10	10	10
Maximum operating frequency	Ops/h	3600	3600	3600	900	3600
Climatic proofing		Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3	Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3	Cold in accordance with: EN 60068-2-1, dry heat in accordance with EN 60068-2-2, humidity storage test in accordance with 60068-2-78	Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3	Dry heat according to EN60068-2-2, damp heat according to EN 60068-2-3
Ambient temperature	°F (°C)	–4 ° to 131 ° (–20 ° to 55 °)	–4 ° to 131 ° (–20 ° to 55 °)	–4 ° to 131 ° (–20 ° to 55 °)	–4 ° to 131 ° (–20 ° to 55 °)	–4 ° to 131 ° (–20 ° to 55 °)
Ambient temperature storage	°F (°C)	–13 ° to 167 ° (–25 ° to 75 °)	–13 ° to 167 ° (–25 ° to 75 °)	–13 ° to 167 ° (–25 ° to 75 °)	–13 ° to 167 ° (–25 ° to 75 °)	–13 ° to 167 ° (–25 ° to 75 °)
Mounting position		Any	Any	Any	Any	Any
Vibration resistance (IEC/EN 60068-2-6)		2g, frequency: 10–150 Hz, amplitude: 0.15 mm	2g, frequency: 10–150 Hz, amplitude: 0.15 mm	2g, frequency: 10–150 Hz, amplitude: 0.15 mm	2g, frequency: 10–150 Hz, amplitude: 0.15 mm	2g, frequency: 10–150 Hz, amplitude: 0.15 mm
Shock resistance (IEC 60068-2-27)		—	—	—	—	—
Protection type						
Housing		IP40	IP40	IP20	IP20	IP20
Terminals		IP20	IP20	IP20	IP20	IP20
Protection against direct contact when actuated from front (IEC 0106 Part 100)		Finger- and back-of-hand proof	Finger- and back-of-hand proof	Finger- and back-of-hand proof	Finger- and back-of-hand proof	Finger- and back-of-hand proof
Weight	kg	0.3	0.3	0.17	0.17	0.22
Terminal capacity						
Solid or flexible	mm^2	1 x (0.2–2.5) 2 x (0.2–1)	1 x (0.2–2.5) 2 x (0.2–1)	1 x (0.2–2.5) 2 x (0.2–1)	1 x (0.2–2.5) 2 x (0.2–1)	1 x (0.2–2.5) 2 x (0.2–1)
Flexible with ferrule	mm^2	1 x (0.25–2.5) 2 x (0.25–1)	1 x (0.25–2.5) 2 x (0.25–1)	1 x (0.25–2.5) 2 x (0.25–1)	1 x (0.25–2.5) 2 x (0.25–1)	1 x (0.25–2.5) 2 x (0.25–1)
Solid or stranded	AWG	24–12	24–12	24–12	24–12	24–12
Terminal screw						
Pozidriv screwdriver	Size	2	2	2	2	2
Flat-blade screwdriver	mm	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5	0.6 x 3.5
Max. tightening torque	Nm	0.6	0.6	0.6	0.6	0.6
Main Contacts						
Rated impulse withstand voltage—U_{imp}	Vac	6000	6000	4000	4000	4000
Overvoltage category/pollution degree						
Outside		III/2	III/2	III/2	III/2	III/2
Inside		—	—	—	—	—
Rated insulation voltage—U_i	Vac	250	250	250	250	250
Rated operating voltage—U_e	Vac	230	230	230	230	230
Rated operation current						
AC-15						
230 V (360 ops./h)—I_e	A	4	4	—	5	4
230 V (3600 ops./h)—I_e	A	3	3	3	3	3
DC-13						
24 V (360 ops./h)—I_e	A	4	4	—	6	4
24 V (3600 ops./h)—I_e	A	2.5	2.5	3	3	2.5
Max. summation current of all poles						
24 Vac/Vdc devices	A	50	50	49	50	50
230 Vac devices	A	50	50	—	—	—
Square of the total current (and total current) of all current paths		50 A^2 (4 + 4 + 4)	50 A^2 (4 + 4 + 4)	50 A^2 (4 + 4 + 4)	49 A^2 (3.5 + 3.5 + 3.5 + 3.5)	50 A^2 (3.7 + 3.7 + 3.7 + 3.7 + 3.7)
Short-circuit protection						
Max. fuse	A gG/gL	6	6	10	10	6

Safety Relay, continued

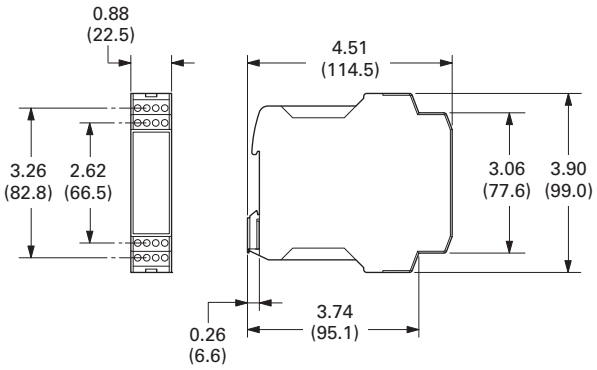
Description	Unit	ESR5-NO-31-230VAC	ESR5-NO-31-24V-230 VAC-DC	ESR5-NV3_	ESR5-VE3_	ESR5-NE-51_
Power Supply Circuit						
Actuating voltage 50/60 Hz	Vac	230	24–230	—	—	24
Actuating voltage—U_s	Vdc	—	230	24	24	24
Voltage tolerance pick-up voltage	x_e	0.85–1.1	0.85–1.1	0.85–1.1	0.85–1.1	0.8–1.1
Power consumption						
AC operated 50/60 Hz	VA	—	—	—	—	—
AC operated 50/60 Hz	W	5.8	5.8	—	—	2.2
DC operated	W	2.9	2.9	1.8	2	2.2
Fuse for control circuit supply						
24 V		—	Short-circuit proof	—	—	—
115/230 V		Short-circuit proof	Short-circuit proof	—	—	—
Control Circuit						
Rated output voltage	Vdc	24	24	24	24	24
Rated operational current	mA	S10, S12, S22: 35, S34, S35: 45	S10, S12, S22: 35, S34, S35: 45	S12, S22: 3.5, S34, S35: 7	A1, A2: 84, K1/K2: 5	A1, A2: 92
Resistance—R		11	11	500	—	—
Short-circuit current	A	0.7	0.7	0.1	—	—
Response time	ms	250	250	150	20	20
Recovery time	ms	—	—	—	—	—
Response time with reset monitoring—t_{A1}	ms	60	60	150	20	20
Response time without reset monitoring—t_{A2}	ms	250	250	150	20	20
Reset time—t_R/t_{R1}	ms	20	20	20 (non-delayed enable paths); 100 (min. delayed enable paths)	0.3–3 s (+50%) adjustable	20
Minimum on duration—t_M	ms	—	—	—	—	—
Recovery time—t_W	ms	Approx. 1000	Approx. 1000	Approx. 330	Approx. 1000	—
Synchronous monitoring time—t_S	ms	—	—	—	—	—
Electromagnetic Compatibility (EMC)						
Emitted interference		EN 61000-6-4	EN 61000-6-4	EN 61000-6-4	EN 61000-6-4	EN 61000-6-4
Interference immunity		According to EN 61000-6-2	According to EN 61000-6-2	According to EN 61000-6-2, EN 62061	According to EN 61000-6-2	According to EN 61000-6-2

Dimensions

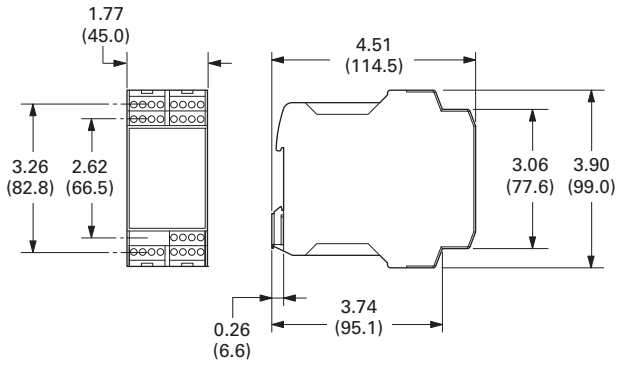
Approximate Dimensions in Inches (mm)

Safety Relays, Contact Expansion Modules

ESR5_ 24 Vac/Vdc



ESR5_ 230 Vac



3

MRV Voltage Monitoring Relays

Contents

Product Description

The MRV Series monitoring relays provide protection against phase loss, phase reversal, phase failure, along with under/overvoltage conditions in a compact DIN rail mounted IP40 housing. Both single-phase and three-phase loads can be monitored up to 690 Vac with a variety of applicable load conditions the relay will detect. Options for SPDT or DPDT are available in two different IEC-style footprints of 17.5 mm or 22.5 mm.

Application Description

The MR Series monitoring relays are used in a variety of applications in which voltage or current is impacted by outside agents that cause harmful transients, spikes or drops to power and interrupt equipment and processes. Building HVAC, centrifugal pumps, compressors, emergency power, heat pumps, industrial plants, water/wastewater facilities, and other machinery can be monitored for insight into the health and status of your equipment. Phase monitoring will provide protection from improper wiring of motors, imbalances and failures while voltage monitoring protects against under/overvoltage conditions with selectable delays to prevent nuisance trips.

Features

- Multiple user-selectable thresholds, tripping delay in single- and three-phase circuits
- Monitoring of phase sequence, failure and asymmetry
- Under/overvoltage monitoring, latching features
- User-selectable window monitoring for under/overvoltage conditions with adjustable delay
- Compact, DIN rail mounted IEC style footprints reduce required space in panels
- SPDT and DPDT contacts

Standards and Certifications

- cULus listed (File E37317)
- CE market
- RoHS compliant

c UL us Listed CE RoHS COMPLIANT

Product Selection Guide

Summary of Capabilities

Function	Description	MRV480A31L	MRV480A31U	MRV115A32S	MRV690A32S	MRV300C12T	MRV500C11T
		See **Page V7-T3-180**	See **Page V7-T3-181**	See **Page V7-T3-182**	See **Page V7-T3-184**	See **Page V7-T3-186**	See **Page V7-T3-187**
1	Phase Sequence	■	■	■	■	—	—
2	Phase Failure	■	■	■	■	—	—
3	Phase Asymmetry	■	—	■	■	—	—
4	Undervoltage	—	■	■	■	—	—
5	Undervoltage + Phase Sequence	—	■	■	■	—	—
6	Voltage Window	—	■	■	■	■	■
7	Voltage Window + Phase Sequence	—	■	■	■	■	■
8	Overvoltage	—	—	—	—	■	■
9	Overvoltage + Latch	—	—	—	—	■	■
10	Undervoltage	—	—	—	—	■	■
11	Undervoltage + Latch	—	—	—	—	■	■
—	Voltage Monitored	208/120 V to 480/277 V	480/277 V	115/66 V	208 to 690 V	3 to 300 V	15 to 500 V
—	Phases Monitored	Three-phase, three-wire	Three-phase, three-wire	Three-phase, four-wire	Three-phase, three-wire	Single-phase or DC	Single-phase or DC or three-phase, three-wire
—	Control Power	Self-powered	Self-powered	24–240 Vac/Vdc	Self-powered	24–240 Vac/Vdc	230 Vac
—	Relay Contacts	SPDT	SPDT	DPDT	DPDT	DPDT	SPDT
—	Relay Switching Capacity	5 A at 250 Vac	5 A at 250 Vac	5 A ① at 250 Vac	5 A ① at 250 Vac	5 A ① at 250 Vac	5 A ① at 250 Vac
		5 A at 30 Vdc	5 A at 30 Vdc	5 A at 30 Vdc	5 A at 30 Vdc	5 A at 30 Vdc	5 A at 30 Vdc

Note

① Switching current derating may be required depending on ambient temperature or the proximity of adjacent devices. See full technical specifications on **Page V7-T3-189**.

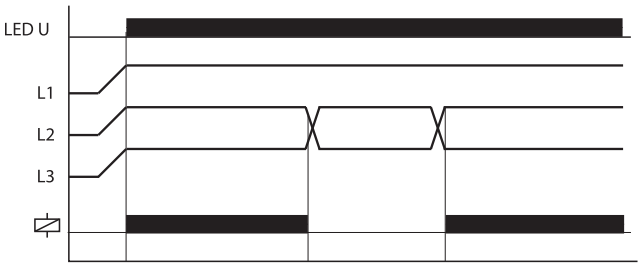
MRV48031L

Function #1

Phase sequence monitoring

When all the phases are connected in the correct sequence and the measured asymmetry is less than the set value, the output relay switches into on-position (yellow LED illuminated).

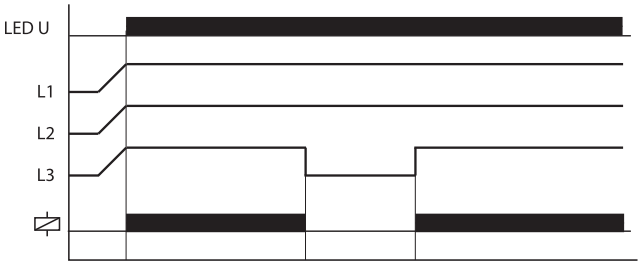
When the phase sequence changes, the output relay switches into off-position (yellow LED not illuminated).



Function #2

Phase failure monitoring

As soon as one of the three phases fails, the output relay R switches into off-position (yellow LED not illuminated).

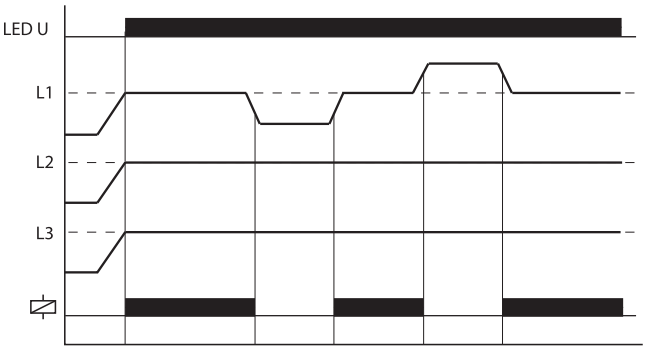


Function #3

Asymmetry monitoring

As soon as the asymmetry exceeds the value at the ASYM-regulator, the output relay R switches into off-position (yellow LED not illuminated).

Reverse voltages of a consumer (e.g., a motor that continues to run on two phases only) do not effect the disconnection.



Loss of neutral wire by means of evaluation of asymmetry

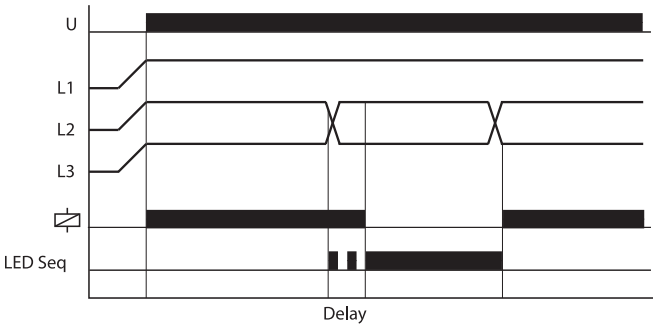
A break of the neutral wire between power line and machinery is detected as soon as asymmetry between phase-to-phase voltage and neutral wire occurs. If the asymmetry exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (DELAY) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relays switch into off-position (yellow LED not illuminated). A break of the neutral wire between our device and the machinery can not be detected.

MRV480A31U

Function #1

Phase sequence monitoring (SEQ)

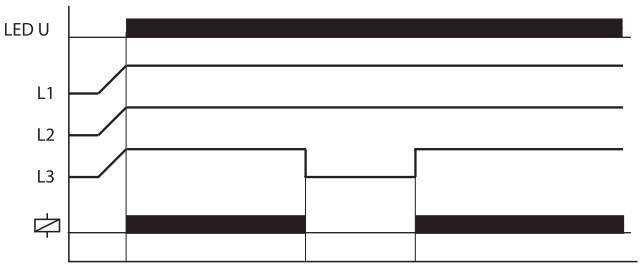
Phase sequence monitoring is selectable for all functions. If a change in phase sequence is detected (red LED SEQ illuminated), the output relay R switches into off-position after the set interval of tripping delay (Delay) has expired (yellow LED not illuminated).



Function #2

Phase failure monitoring

As soon as one of the three phases fails, the output relay R switches into off-position (yellow LED not illuminated).



Functions #4, #5

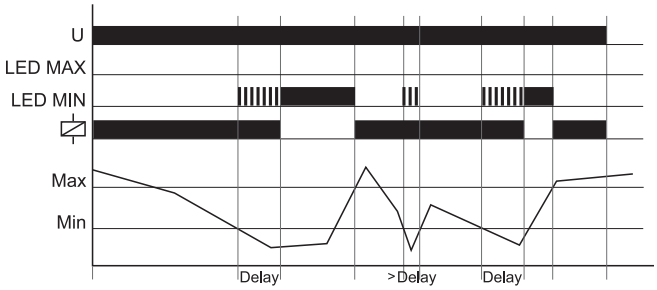
Undervoltage monitoring (UNDER, UNDER+SEQ)

The output relay R switches into on-position, if the measured voltage of all three phase voltages is beyond the Min-value.

As soon as the measured voltage falls below the Min-value, the output relay R switches into off-position after the interval of the tripping delay (Delay) has expired.

UNDER

The output relay R switches into on-position again after the measured voltage exceeds the Max-value.



Functions #6, #7

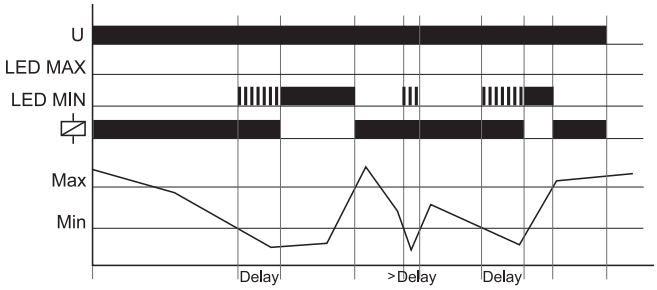
Window function (WIN, WIN+SEQ)

The output relay R switches into on-position, if the measured voltage of all three phase voltages is within the adjusted window.

As soon as the measured voltage leaves the acceptance region between Min and Max, the output relay R switches into off-position after the interval of the tripping delay (Delay) has expired.

WIN

The output relay R switches into on-position again after the measured voltage reenters the acceptance region.



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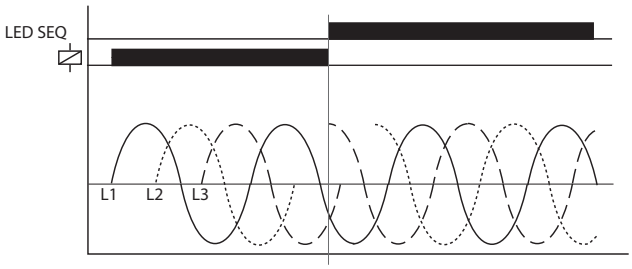
MRV115A32S

Function #1

Phase sequence monitoring (SEQ)

Phase sequence monitoring is selectable for all functions. If a change in phase sequence is detected (red LED SEQ illuminated), the output relays switch into off-position immediately (yellow LED not illuminated).

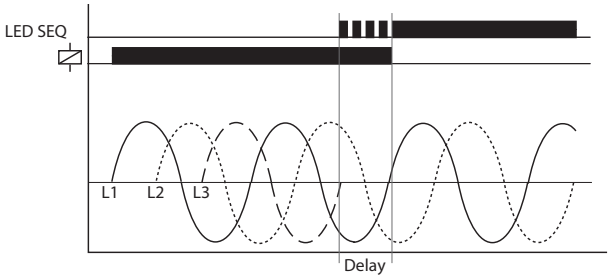


Function #2

Phase failure monitoring (SEQ)

If one of the phase voltages fails, the set interval of the tripping delay (DELAY) begins (red LED SEQ flashes). After the interval has expired (red LED SEQ illuminated), the output relays switch into off-position (yellow LED not illuminated).

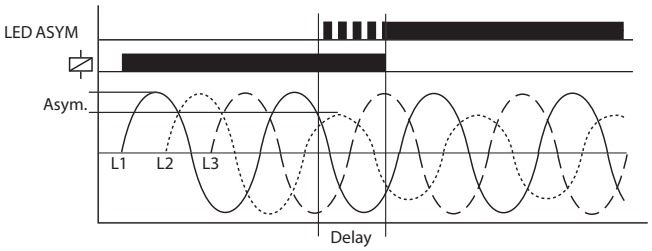
Reverse voltages of a consumer (e.g., a motor that continues to run on two phases only) do not effect the disconnection but can be monitored by using a proper value for the asymmetry.



Function #3

Asymmetry monitoring

If the asymmetry of the phase-to-phase voltages exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (DELAY) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relays switch into off-position (yellow LED not illuminated). If the neutral wire is connected to the device, the asymmetry of the phase voltages referred to the neutral wire (Y-voltage) is monitored also. In that case both values of the asymmetry are evaluated and if one of the values exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (DELAY) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relays switch into off-position (yellow LED not illuminated).



Loss of neutral wire by means of evaluation of asymmetry

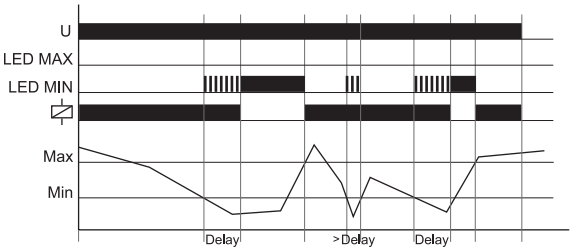
A break of the neutral wire between power line and machinery is detected as soon as asymmetry between phase-to-phase voltage and neutral wire occurs. If the asymmetry exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (DELAY) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relays switch into off-position (yellow LED not illuminated). A break of the neutral wire between our device and the machinery can not be detected.

MRV115A32S, continued

Functions #4, #5

Undervoltage monitoring (UNDER, UNDER+SEQ)

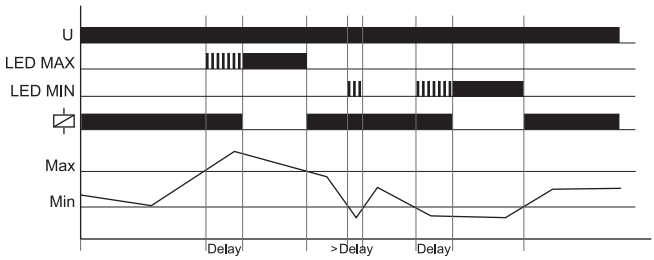
When the measured voltage (mean value of phase-to-phase voltages) falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated), when the measured voltage exceeds the value adjusted at the MAX-regulator.



Functions #6, #7

Window function (WIN, WIN+SEQ)

The output relays switch into on-position (yellow LED illuminated) when the measured voltage (mean value of phase-to-phase voltages) exceeds the value adjusted at the MIN-regulator. When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated).

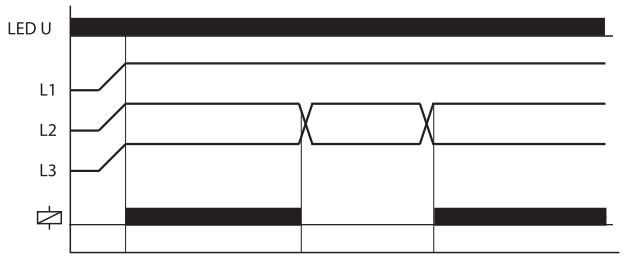


MRV690A32S

Function #1

Phase sequence monitoring (SEQ)

Phase sequence monitoring is selectable for all functions. If a change in phase sequence is detected (red LED SEQ illuminated), the output relays switch into off-position immediately (yellow LED not illuminated).

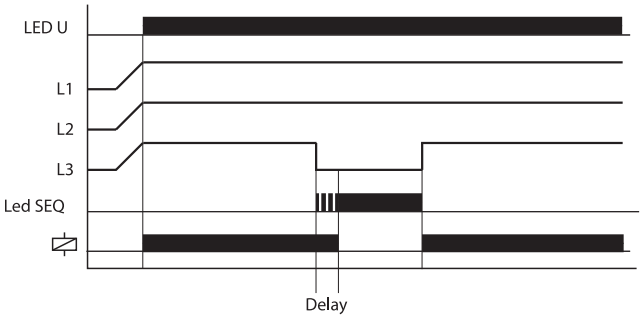


Function #2

Phase failure monitoring (SEQ)

If one of the phase voltages fails, the set interval of the tripping delay (DELAY) begins (red LED SEQ flashes). After the interval has expired (red LED SEQ illuminated), the output relays switch into off-position (yellow LED not illuminated).

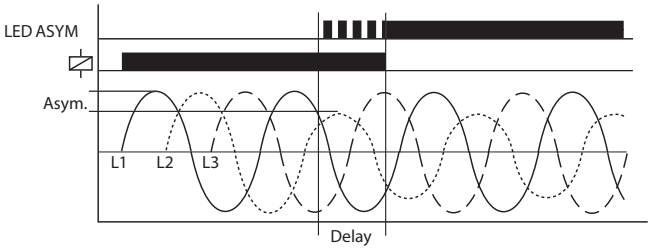
Reverse voltages of a consumer (e.g., a motor that continues to run on two phases only) do not effect the disconnection but can be monitored by using a proper value for the asymmetry.



Function #3

Asymmetry monitoring

If the asymmetry of the phase-to-phase voltages exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (DELAY) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relays switch into off-position (yellow LED not illuminated).

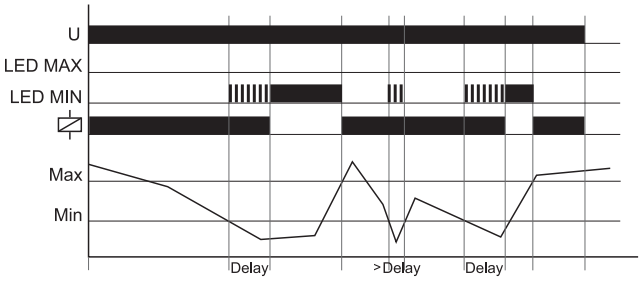


MRV690A32S, continued

Functions #4, #5

Undervoltage monitoring (UNDER, UNDER+SEQ)

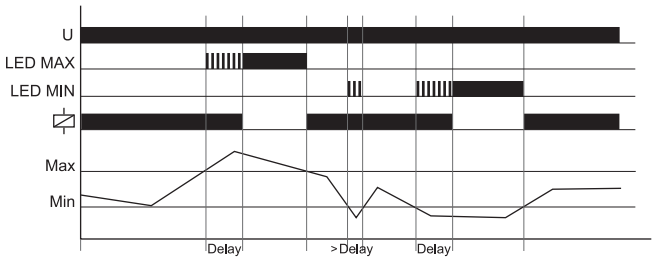
When the measured voltage (mean value of phase-to-phase voltages) falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated), when the measured voltage exceeds the value adjusted at the MAX-regulator.



Functions #6, #7

Window function (WIN, WIN+SEQ)

The output relays switch into on-position (yellow LED illuminated) when the measured voltage (mean value of phase-to-phase voltages) exceeds the value adjusted at the MIN-regulator. When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated).



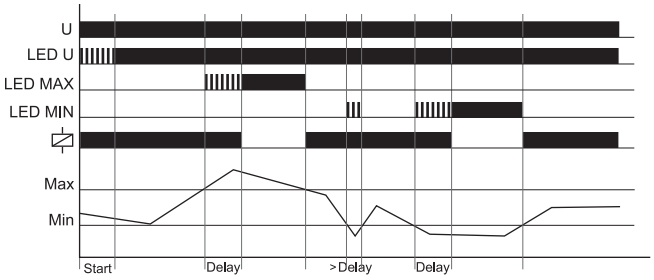
MRV300C12T

Functions #6, #7

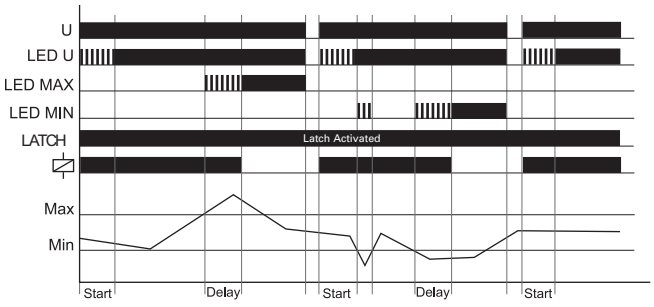
Window function (WIN, WIN+LATCH)

The output relays switch into on-position (yellow LED illuminated) when the measured voltage exceeds the value adjusted at the MIN-regulator. When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated).

The output relays again switch into on-position (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated).



If the fault latch is activated (WIN+LATCH) and the measured voltage remains below the MIN-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage exceeds the value adjusted at the MIN-regulator. If the measured voltage remains above the MAX-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage falls below the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).

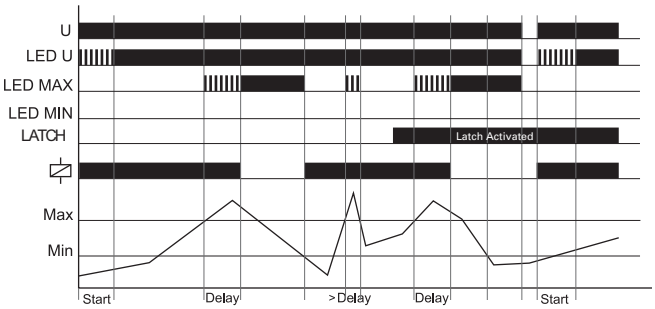


Functions #8, #9

Overvoltage monitoring (OVER, OVER+LATCH)

When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated), when the measured voltage falls below the value adjusted at the MIN-regulator (red LED MAX not illuminated).

If the fault latch is activated (OVER+LATCH) and the measured voltage remains above the MAX-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage falls below the value adjusted at the MIN-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).



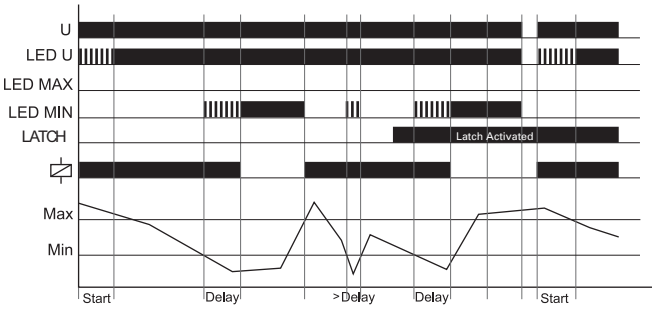
MRV300C12T, continued

Functions #10, #11

Undervoltage monitoring (UNDER, UNDER+LATCH)

When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated), when the measured voltage exceeds the value adjusted at the MAX-regulator.

If the fault latch is activated (UNDER+LATCH) and the measured voltage remains below the MIN-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage exceeds the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).



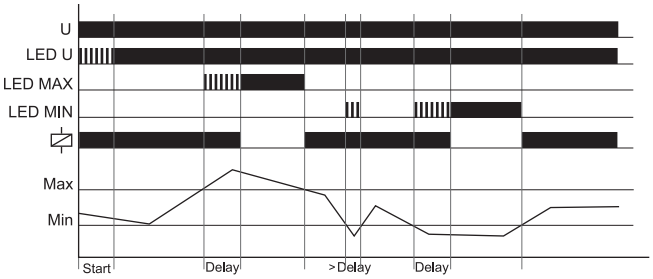
MRV500C11T

Functions #6, #7

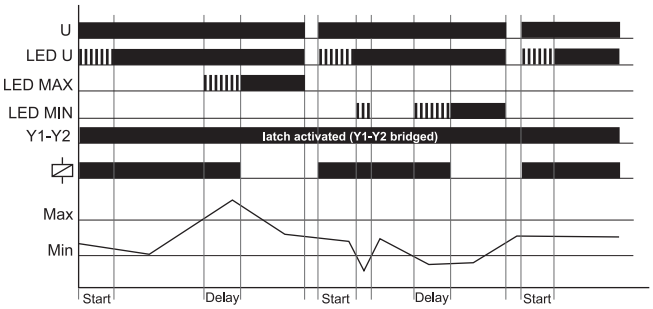
Window function (WIN, WIN+LATCH)

The output relays switch into on-position (yellow LED illuminated) when the measured voltage exceeds the value adjusted at the MIN-regulator. When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated).

The output relays again switch into on-position (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated).



If the fault latch is activated (WIN+LATCH) and the measured voltage remains below the MIN-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage exceeds the value adjusted at the MIN-regulator. If the measured voltage remains above the MAX-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage falls below the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).



MRV500C11T, continued

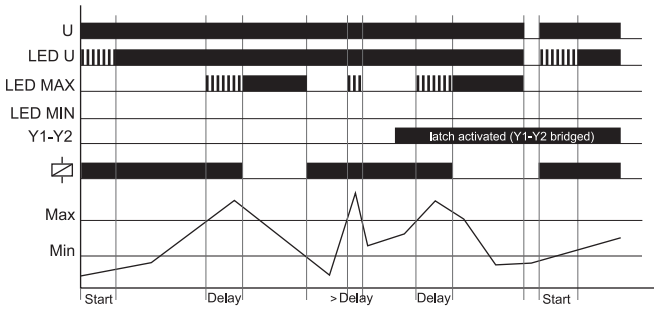
3

Functions #8, #9

Overvoltage monitoring (OVER, OVER+LATCH)

When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated), when the measured voltage falls below the value adjusted at the MIN-regulator (red LED MAX not illuminated).

If the fault latch is activated (OVER+LATCH) and the measured voltage remains above the MAX-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage falls below the value adjusted at the MIN-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).

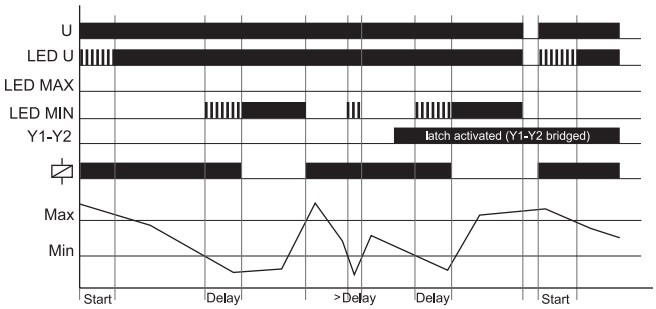


Functions #10, #11

Undervoltage monitoring (UNDER, UNDER+LATCH)

When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated), when the measured voltage exceeds the value adjusted at the MAX-regulator.

If the fault latch is activated (UNDER+LATCH) and the measured voltage remains below the MIN-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage exceeds the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).



Technical Data and Specifications

MV Series—Voltage Monitoring Relays

Description	MRV480A31L	MRV480A31U	MRV115A32S	MRV690A32S	MRV500C11T	MRV500C12T
Functions	1, 2, 3	1, 2, 4, 5, 6, 7	1, 2, 3, 4, 5, 6, 7	6, 7, 8, 9, 10, 11	6, 7, 8, 9, 10, 11	—
Start-up suppression time	—	—	—	—	0 to 10 sec	0 to 10 sec
Tripping delay	Fixed, app. 100 ms	100 ms to 10 sec	100 ms to 10 sec	100 ms to 10 sec	100 ms to 10 sec	100 ms to 10 sec
Input						
Supply voltage	= measured voltage	= measured voltage	24 to 240 Vac/ Vdc	= measured voltage	230 Vac	24 to 234 Vac/Vdc
Terminals	L1-L2-L3	L1-L2-L3	A1-A2	L1-L2-L3	A1-A2	A1-A2
Rated voltage U_N	3~ 208 V/120 V to 480 V/277 V	3~480/277 V	—	—	—	—
Tolerance	10% to –10% of UN	10% to –35% of UN	24 to 240 Vdc 20% to +25% 24 to 240 Vac 15% to +10%	10% to –35% of UN	–15% to +15%	24 to 240 Vdc –20% to +25% 24 to 240 Vac –15% to +10%
Rated consumption	10 VA (1 W) at 400 V / 50 Hz 16 VA (1.5 W) at 480 V / 60 Hz	10 VA (1 W) at 400 V / 50 Hz 16 VA (1.5 W) at 480 V / 60 Hz	4.5 VA (1 W)	10 VA (1 W) at 400 V / 50 Hz 16 VA (1.5 W) at 480 V / 60 Hz	2 VA (1.5 W)	4.5 VA (1 W)
Rated frequency	AC 48 to 63 Hz	AC 48 to 63 Hz	24 to 240 Vac 48 to 400 Hz 48 to 240 Vac 16 to 48 Hz	AC 48 to 63 Hz	50 / 60 Hz	24 to 240 Vac 48 to 400 Hz 48 to 240 Vac 16 to 48 Hz
Duty cycle	100%	100%	100%	100%	100%	100%
Reset time	500 ms	500 ms	500 ms	500 ms	500 ms	500 ms
Drop-out voltage	>20% of the supply voltage	>20% of the supply voltage	>15% of the supply voltage	>20% of the supply voltage	>30% of the supply voltage	>15% of the supply voltage
Overvoltage category	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)
Rated surge voltage	4 kV	4 kV	4 kV	4 kV	4 kV	4 kV
Output						
Contacts	SPDT (one changeover contact)	SPDT (one changeover contact)	DPDT (two changeover contacts)	DPDT (two changeover contacts)	SPDT (one changeover contact)	DPDT (two changeover contacts)
Rated voltage	250 Vac or 30 Vdc	250 Vac or 30 Vdc	250 Vac or 30 Vdc	250 Vac or 30 Vdc	250 Vac or 30 Vdc	250 Vac or 30 Vdc
Max switching voltage	—	—	—	400 Vac	—	—
Switching capacity	1250 VA (5 A / 250 Vac) (5 A / 24 Vdc)	1250 VA (5 A / 250 Vac) (5 A / 24 Vdc)	750 VA (3 A / 250 Vac) If the distance between the devices is less than 5 mm. 1250 VA (5 A / 250 Vac) If the distance between the devices is greater than 5 mm. (5 A / 30 Vdc)	1250 VA (5 A / 250 Vac) at +55 °C 150 VA (5 A / 30 Vdc) at +55 °C 75 VA (2.5 A / 30 Vdc) at +70 °C B300 at +55 °C C300 at +70 °C	750 VA (3 A / 250 Vac) If the distance between the devices is less than 5 mm. 1250 VA (5 A / 250 Vac) If the distance between the devices is greater than 5 mm. (5 A / 30 Vdc)	750 VA (3 A / 250 Vac) If the distance between the devices is less than 5 mm. 1250 VA (5 A / 250 Vac) If the distance between the devices is greater than 5 mm. (5 A / 30 Vdc)
Fusing	5 A fast acting	5 A fast acting	5 A fast acting	5 A fast acting	5 A fast acting	5 A fast acting
Mechanical life	20 x 10^6 operations	20 x 10^6 operations	20 x 10^6 operations	20 x 10^6 operations	20 x 10^6 operations	20 x 10^6 operations
Electrical life	2 x 10^5 operations at 1000 VA resistive load	2 x 10^5 operations at 1000 VA resistive load	2 x 10^5 operations at 1000 VA resistive load	2 x 10^5 operations at 1000 VA resistive load	2 x 10^5 operations at 1000 VA resistive load	2 x 10^5 operations at 1000 VA resistive load
Switching frequency	Max. 6/min at 1000 VA resistive load (in accordance with IEC 60947-5-1)	Max. 6/min at 1000 VA resistive load (in accordance with IEC 60947-5-1)	Max. 60/min at 100 VA resistive load Max. 6/min at 1000 VA resistive load (in accordance with IEC 60947-5-1)	Max. 60/min at 100 VA resistive load Max. 6/min at 1000 VA resistive load (in accordance with IEC 60947-5-1)	Max. 60/min at 100 VA resistive load Max. 6/min at 1000 VA resistive load (in accordance with IEC 60947-5-1)	Max. 60/min at 100 VA resistive load Max. 6/min at 1000 VA resistive load (in accordance with IEC 60947-5-1)
Overvoltage category	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)
Rated surge voltage	4 kV	4 kV	4 kV	4 kV	4 kV	4 kV

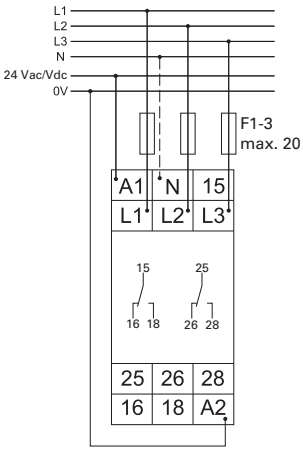
MV Series—Voltage Monitoring Relays

Description	MRV480A31L	MRV480A31U	MRV115A32S	MRV690A32S	MRV500C11T	MRV500C12T
Measuring circuit						
Fusing	—	—	Max. 20 A (in accordance with UL 508)	—	Max. 20 A (in accordance with UL 508)	Max. 20 A (in accordance with UL 508)
Measuring variable	3~, sinus, 48 to 63 Hz	3~, sinus, 48 to 63 Hz	3~, sinus, 48 to 63 Hz	3~, sinus, 20 to 70 Hz	—	—
Measuring input	=supply voltage	=supply voltage	3(N)~ 115/66 V	208–690 V	150 Vac/Vdc 300 Vac/Vdc 500 Vac/Vdc	30 Vac/Vdc 60 Vac/Vdc 300 Vac/Vdc
Terminals	L1-L2-L3	L1-L2-L3	(N)-L1-L2-L3	L1-L2-L3	E-F1(+) E-F2(+) E-F3(+)	E-F1(+) E-F2(+) E-F3(+)
Overload capacity	Determined by tolerance specified for supply voltage	Determined by tolerance specified for supply voltage	3(N)~173/100 V	3~ 794 V	300 V_{eff} 440 V_{eff} 600 V_{eff}	100 V_{eff} 150 V_{eff} 440 V_{eff}
Input resistance	—	—	220 kΩ	—	270 kΩ 470 kΩ 1 MΩ	47 kΩ 100 kΩ 470 MΩ
Switching threshold	—	Max: 75% to 110% of U_N Min: 65% to 100% of U_N	Max: –20% to +30% of U_N Min: –30% to +20% of U_N	Min: –50% to +10% of U_N Max: –45% to +15% of U_N	Max: 10% to 100% of U_N Min: 5% to 95% of U_N	Max: 10% to 100% of U_N Min: 5% to 95% of U_N
Asymmetry	5% to 25%	5% to 25%	5% to 25%	5% to 25%	—	—
Overvoltage category	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)	III (in accordance with IEC 60664-1)
Rated surge voltage	4 kV	4 kV	4 kV	6 kV	4 kV	4 kV
Accuracy						
Base accuracy	≤5%	≤5%	≤3% (of maximum scale value)	≤3% (of maximum scale value)	≤3% (of maximum scale value)	≤5% (of maximum scale value)
Adjustment accuracy	≤5%	≤5%	≤5% (of maximum scale value)	≤5% (of maximum scale value)	≤5% (of maximum scale value)	≤5% (of maximum scale value)
Repetition accuracy	±2%	±2%	≤2%	≤2%	≤2%	≤2%
Voltage influence	—	—	—	—	—	—
Frequency responses	—	—	—	—	–10% to +5% (at 16.6 to 400 Hz)	–10% to +5% (at 16.6 to 400 Hz)
Temperature influence	≤0.05% / °C	≤0.05% / °C	≤0.05% / °C	≤0.05% / °C	≤0.05% / °C	≤0.05% / °C
Physical						
Ambient temperature	–25 to +55 °C at operating frequencies >50 Hz and ambient temperatures above 40 °C a side distance to other units of 5 mm must be observed.	–25 to +55 °C at operating frequencies >50 Hz and ambient temperatures above 40 °C a side distance to other units of 5 mm must be observed.	–25 to +55 °C (in accordance with IEC 60068-1) –25 to +40 °C (in accordance with UL 508)	–25 to +70 °C at C300 –25 to +55 °C at B300 (in accordance with IEC 60068-1)	–25 to +55 °C (according to IEC 68-1) –25 to +40 °C (according to UL 508)	–25 to +55 °C (according to IEC 68-1) –25 to +40 °C (according to UL 508)
Storage temperature	–25 to +70 °C	–25 to +70 °C	–25 to +70 °C	–25 to +70 °C	–25 to +70 °C	–25 to +70 °C
Relative humidity	15% to 85%	15% to 85%	15% to 85%	15% to 85%	15% to 85% (according to IEC 721-3-3 class 3K3)	15% to 85% (according to IEC 721-3-3 class 3K3)
Pollution degree	2 (in accordance with IEC 60664-1)	2 (in accordance with IEC 60664-1)	3 (in accordance with IEC 60664-1)	3 (in accordance with IEC 60664-1)	3 (in accordance with IEC 60664-1)	3 (in accordance with IEC 60664-1)
Vibration resistance	—	—	10 to 55 Hz 0.35 mm (in accordance with IEC 60068-2-6)	10 to 55 Hz 0.35 mm (in accordance with IEC 60068-2-6)	10 to 55 Hz 0.35 mm (according to IEC 68-2-6)	10 to 55 Hz 0.35 mm (according to IEC 68-2-6)
Shock resistance	—	—	15 g 11 ms (in accordance with IEC 60068-2-27)	15 g 11 ms (in accordance with IEC 60068-2-27)	15 g 11 ms (according to IEC 68-2-27)	15 g 11 ms (according to IEC 68-2-27)
Housing	Self-extinguishing plastic housing, IP rating IP40	Self-extinguishing plastic housing, IP rating IP40	Self-extinguishing plastic housing, IP rating IP40	Self-extinguishing plastic housing, IP rating IP40	Self-extinguishing plastic housing, IP rating IP40	Self-extinguishing plastic housing, IP rating IP40
Terminal rating	Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20	Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20	Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20	Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20	Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20	Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20
Tightening torque	Max. 1 Nm	Max. 1 Nm	Max. 1 Nm	Max. 1 Nm	Max. 1 Nm	Max. 1 Nm
Weight	72 g	72 g	—	—	—	—
Height	60 mm	60 mm	103 mm	103 mm	103 mm	103 mm
Length	87 mm	87 mm	90 mm	90 mm	90 mm	90 mm
Width	17.5 mm	17.5 mm	22.5 mm	22.5 mm	22.5 mm	22.5 mm

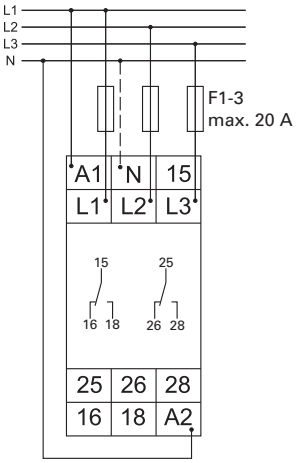
Wiring Diagrams

MRV115A32

Supply Voltage 24 Vac/Vdc

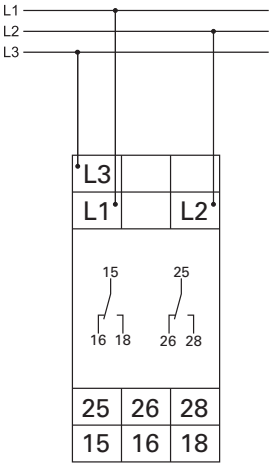


Supply Voltage 230 Vac



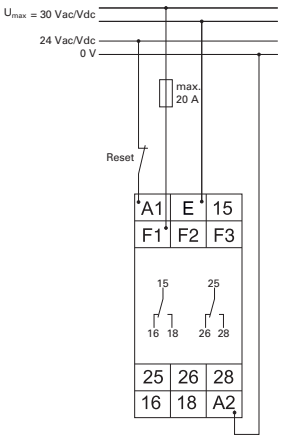
MRV690A32

MRV690A32

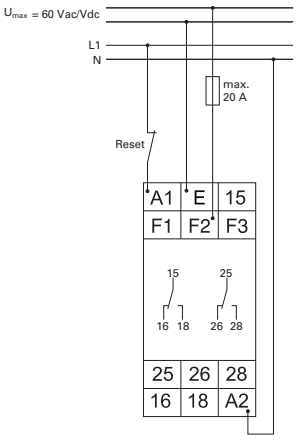


MRV300C12T

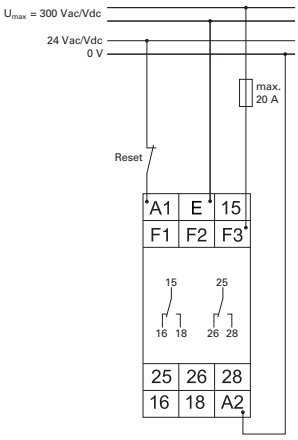
Measuring range 30 V, supply voltage 24 Vac/Vdc and fault latch



Measuring range 60 V, supply voltage 230 Vac and fault latch

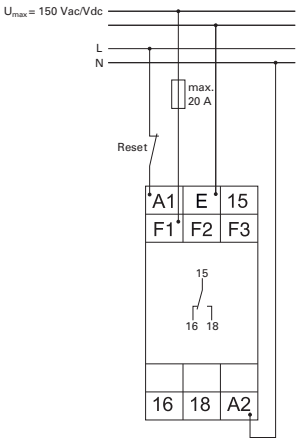


Measuring range 300 V, supply voltage 24 Vac/Vdc and fault latch

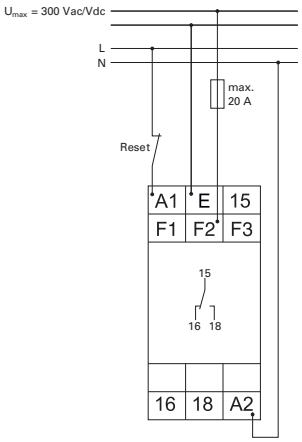


MRV500C11T

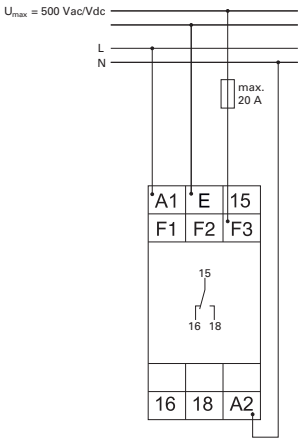
Measuring range 150 V, supply voltage 230 Vac and fault latch



Measuring range 300 V, supply voltage 230 Vac and fault latch

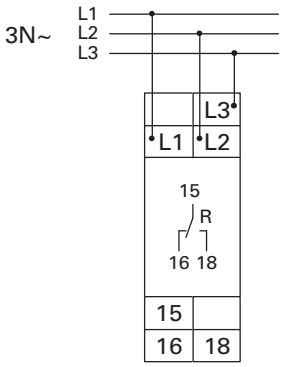


Measuring range 500 V, supply voltage 230 Vac without fault latch



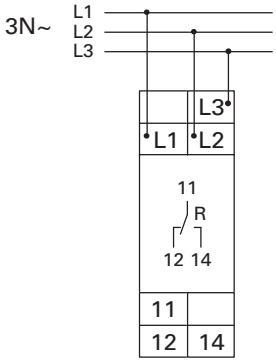
MRV480A31U

MRV480A31U



MRV480A31L

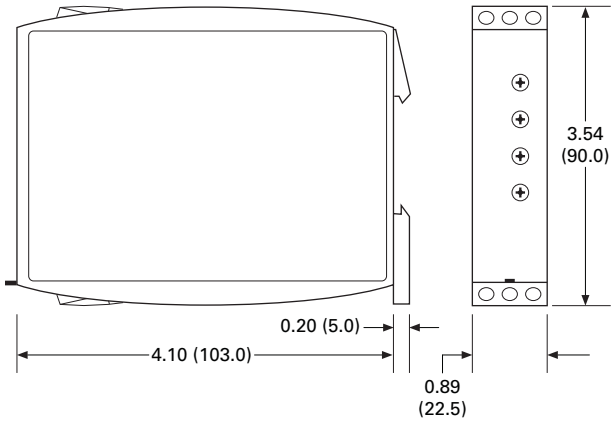
MRV480A31L



Dimensions

Approximate Dimensions in Inches (mm)

MRV115A32, MRV115A32S, MRV690A32S, MRV300C12T, MRV500C11T



MMRV480A31U, MRV480A31L