

**easyRelay Programmable Relays**



**D1 Series General Purpose Relay**



**D96 Series Solid-State Relay**



**Universal TR Series Timing Relay**



**Safety Relay**



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## Volume 7—Logic Control, Operator Interface and Connectivity Solutions, CA08100008E

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Revision date	Section	Change page(s)	Description
05/15/2017	3.4	V7-T3-54	Content edits
05/15/2017	3.4	V7-T3-113	Content edits
05/15/2017	3.4	V7-T3-114	Content edits



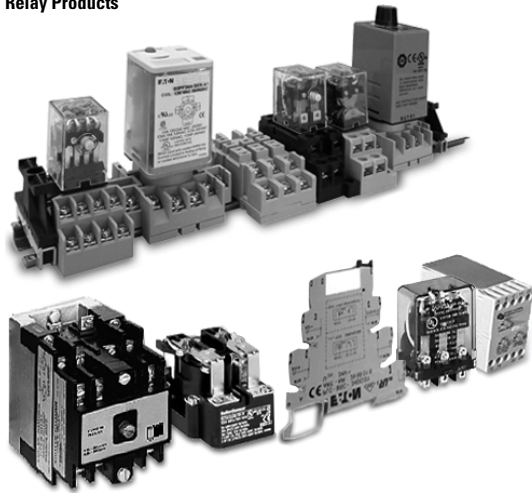
*Powering Business Worldwide*

# 3.1

## Control Relays and Timers

### Relay Product Overview

#### Relay Products



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### Control Relays and Timers Comparison

#### Selection Guide by Catalog Number Prefix

Relays	Type	Mounting	Contacts	Maximum Amperage (AC)	RU	UL	CSA	CE	Page Number
9575H3	General purpose	Panel mount	Fixed	40 A	—	■	■	■	<b>V7-T3-119</b>
AR/ARD	Machine tool	Panel mount	Convertible	10 A	—	■	■	—	<b>V7-T3-154</b>
BF/BFD	Machine tool	Panel mount	Fixed	10 A	■	—	■	—	<b>V7-T3-148</b>
D2RF	Full featured plug-in	DIN rail / panel mount	Fixed	10 A	■	—	■	■	<b>V7-T3-59</b>
D2RR	Standard plug-in	DIN rail / panel mount / flange	Fixed	10 A	■	—	■	■	<b>V7-T3-59</b>
D3RF	Full featured plug-in	DIN rail / panel mount	Fixed	16 A	■	—	■	■	<b>V7-T3-69</b>
D3RR	Standard plug-in	DIN rail / panel mount	Fixed	16 A	■	—	■	■	<b>V7-T3-69</b>
D4PR	Standard plug-in	DIN rail / panel mount	Fixed	10 A	■	—	■	■	<b>V7-T3-77</b>
D5RF	Full featured plug-in	DIN rail / panel mount	Fixed	16 A	■	—	■	■	<b>V7-T3-82</b>
D5RR	Standard plug-in	DIN rail / panel mount / PC board	Fixed	16 A	■	—	■	■	<b>V7-T3-82</b>
D7PF	Full featured plug-in	DIN rail / panel mount	Fixed	20 A	■	—	■	■	<b>V7-T3-91</b>
D7PR	Standard plug-in	DIN rail / panel mount / flange	Fixed	20 A	■	—	■	■	<b>V7-T3-91</b>
D8PR	Standard plug-in	DIN rail / panel mount / flange	Fixed	30 A	■	—	■	■	<b>V7-T3-104</b>
D9PR	Standard plug-in	Panel mounting	Fixed	25 A	■	—	■	—	<b>V7-T3-109</b>
D15	Machine tool	DIN rail / panel mount	Fixed	10 A	—	■	■	■	<b>V7-T3-143</b>
D26	Machine tool	Panel or channel mount	Convertible	10 A	—	■	■	—	<b>V7-T3-159</b>
D85	Alternating relays	DIN rail / panel mount	Fixed	10 A	■	■	—	■	<b>V7-T3-189</b>
D1RF	Full featured plug-in	DIN rail / panel mount	Fixed	20 A	■	—	■	■	<b>V7-T3-54</b>
D1RR	Standard plug-in	DIN rail / panel mount	Fixed	20 A	■	—	■	■	<b>V7-T3-54</b>
easyRelay	Programmable relay	DIN rail	Fixed	8 A	—	■	■	■	<b>V7-T3-23</b>
TMR5	Timing relay (non-programmable)	DIN rail / panel mount	Fixed	10 A	■	■	—	■	<b>V7-T3-180</b>
TMR6	Timing relay (non-programmable)	DIN rail / panel mount	Fixed	10 A	■	■	—	■	<b>V7-T3-184</b>
TR	Timing relay (programmable)	DIN rail / panel mount	Fixed	10 A	—	■	■	—	<b>V7-T3-177</b>
Universal TR	Timing relay (programmable)	DIN rail	Fixed	8 A	—	■	■	■	<b>V7-T3-173</b>
XR	Terminal block relay	DIN rail	Fixed	6 A, 10 A	■	—	—	■	<b>V7-T3-5</b>

### Terminal Block Relays



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#### Description

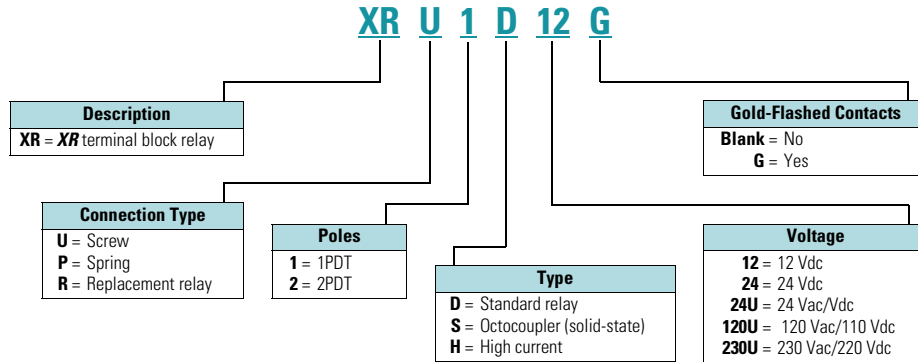
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## Catalog Number Selection

### XR Series—Overview



Standard Terminal Block Relay



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### 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
- Choice of screw connections or spring-cage connection
- 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



## Product Selection

## XRU1D 24U



## Standard Terminal Block Relays

Gold-Plated Contacts	Rated Current	Supply Voltage	Standard Pack	Catalog Number
<b>1PDT Screw Connection</b>				
No	6 A	12 Vdc	10	<b>XRU1D12</b>
No	6 A	120 Vac/110 Vdc	10	<b>XRU1D120U</b>
Yes	6 A	120 Vac/110 Vdc	10	<b>XRU1D120UG</b>
No	6 A	24 Vdc	10	<b>XRU1D24</b>
No	6 A	24 Vac/Vdc	10	<b>XRU1D24U</b>
Yes	6 A	24 Vac/Vdc	10	<b>XRU1D24UG</b>
No	6 A	230 Vac/220 Vdc	10	<b>XRU1D230U</b>
<b>1PDT Spring Cage Connection</b>				
No	6 A	12 Vdc	10	<b>XRP1D12</b>
No	6 A	120 Vac/110 Vdc	10	<b>XRP1D120U</b>
No	6 A	24 Vdc	10	<b>XRP1D24</b>
No	6 A	24 Vac/Vdc	10	<b>XRP1D24U</b>
No	6 A	230 Vac/220 Vdc	10	<b>XRP1D230U</b>
<b>DPDT Screw Connection</b>				
No	6 A	12 Vdc	10	<b>XRU2D12</b>
No	6 A	120 Vac/110 Vdc	10	<b>XRU2D120U</b>
No	6 A	24 Vdc	10	<b>XRU2D24</b>
No	6 A	24 Vac/Vdc	10	<b>XRU2D24U</b>
No	6 A	230 Vac/220 Vdc	10	<b>XRU2D230U</b>

## Standard Replacement Relays

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

**Note**

<sup>①</sup> 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	XRU1D12	XRU1D24	XRU1D24U	XRU1D120U
Replacement Relay	XRR1D12	XRR1D24	XRR1D24	XRR1D120U
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
<b>Connection Data</b>				
Rigid solid AWG (mm <sup>2</sup> )	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 <sup>2</sup> )	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
<b>Input Data for 1PDT Screw Connection Versions</b>				
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
Permissible range	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>
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
<b>Output Data</b>				
Contact type	1PDT	1PDT	1PDT	1PDT
Contact material	AgSnO	AgSnO	AgSnO	AgSnO
Max. switching voltage	250 Vac/Vdc <sup>①</sup>	250 Vac/Vdc <sup>①</sup>	250 Vac/Vdc <sup>①</sup>	250 Vac/Vdc <sup>①</sup>
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
<b>Miscellaneous Data</b>				
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 <sup>7</sup> cycles	2 x 10 <sup>7</sup> cycles	2 x 10 <sup>7</sup> cycles	2 x 10 <sup>7</sup> cycles

#### Note

<sup>①</sup> 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	XRU1D24UG	XRU1D120UG
Replacement Relay	XRR1D24G	XRR1D120UG
Input voltage	24 Vac/Vdc	120 Vac/110 Vdc
<b>Connection Data</b>		
Rigid solid AWG (mm <sup>2</sup> )	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Flexible stranded AWG (mm <sup>2</sup> )	26–14 (0.14–2.5)	26–14 (0.14–2.5)
<b>Input Data for 1PDT Screw Connection Versions with Gold Contacts</b>		
Input voltage	24 Vac/Vdc	120 Vac/110 Vdc
Permissible range	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>
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
<b>Output Data</b>		
Contact type	1PDT	1PDT
Contact material	AgSnO, gold plated <sup>①</sup>	AgSnO, gold plated <sup>①</sup>
Max. switching voltage	30 Vac/36 Vdc (250 Vac/Vdc) <sup>②</sup>	30 Vac/36 Vdc (250 Vac/Vdc) <sup>②</sup>
Min. switching voltage	100 mV (12 Vac/Vdc) <sup>②</sup>	100 mV (12 Vac/Vdc) <sup>②</sup>
Limiting continuous current	50 mA (6 A) <sup>②</sup>	50 mA (6 A) <sup>②</sup>
Min. switching current	1 mA (10 mA) <sup>②</sup>	1 mA (10 mA) <sup>②</sup>
Min. switching power	100 mW (120 mW) <sup>②</sup>	100 mW (120 mW) <sup>②</sup>
<b>Miscellaneous Data</b>		
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 x 10 <sup>7</sup> cycles	2 x 10 <sup>7</sup> cycles

**Notes**

- <sup>①</sup> 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.
- <sup>②</sup> If the maximum values are exceeded, the gold layer is destroyed and the values in parentheses apply.



## Standard 1PDT Spring Cage Terminal Block Relays

Catalog Number	XRP1D12	XRP1D24	XRP1D24U	XRP1D120U
Replacement Relay	XRR1D12	XRR1D24	XRR1D24	XRR1D120U
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
<b>Connection Data</b>				
Rigid solid AWG (mm <sup>2</sup> )	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 <sup>2</sup> )	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
<b>Input Data for 1PDT Spring Cage Versions</b>				
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
Permissible range	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>
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
<b>Output Data</b>				
Contact type	1PDT	1PDT	1PDT	1PDT
Contact material	AgSnO	AgSnO	AgSnO	AgSnO
Max. switching voltage	250 Vac/Vdc <sup>①</sup>	250 Vac/Vdc <sup>①</sup>	250 Vac/Vdc <sup>①</sup>	250 Vac/Vdc <sup>①</sup>
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
<b>Miscellaneous Data</b>				
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 +131 °F (–20 °C to +55 °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 <sup>7</sup> cycles	2 x 10 <sup>7</sup> cycles	2 x 10 <sup>7</sup> cycles	2 x 10 <sup>7</sup> cycles

**Note**

<sup>①</sup> 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 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
<b>Connection Data</b>				
Rigid solid AWG (mm <sup>2</sup> )	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 <sup>2</sup> )	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
<b>Input Data for 1PDT Spring Cage Versions</b>				
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
Permissible range	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>
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
<b>Output Data</b>				
Contact type	2PDT	Single contact, 2PDT	Single contact, 2PDT	Single contact, 2PDT
Contact material	AgNi	AgNi	AgNi	AgNi
Max. switching voltage	250 Vac/Vdc <sup>①</sup>	250 Vac/Vdc <sup>①</sup>	250 Vac/Vdc <sup>①</sup>	250 Vac/Vdc <sup>①</sup>
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
<b>General Data</b>				
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 <sup>7</sup> cycles	3 x 10 <sup>7</sup> cycles	3 x 10 <sup>7</sup> cycles	3 x 10 <sup>7</sup> cycles

**Note**

<sup>①</sup> 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 XRFBST bridge system.

# 3.2

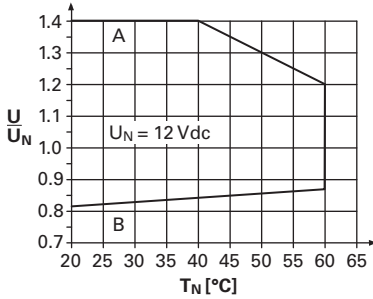
## Control Relays and Timers

### Terminal Block Relays

#### Permissible Range Diagrams

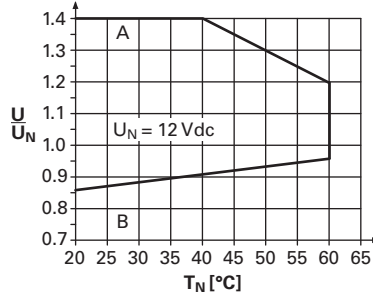
1PDT Relay Modules

#### Operating Range Voltage for 12 Vdc

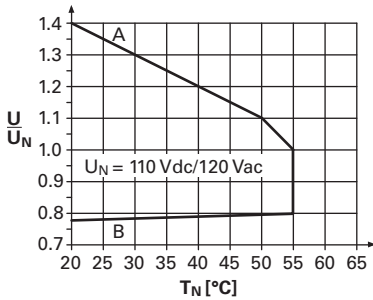


DPDT Relay Modules

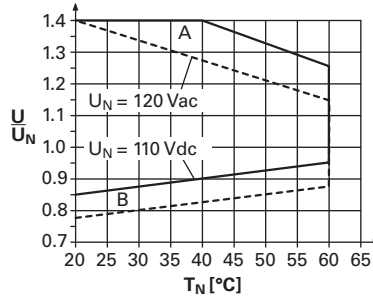
#### Operating Range Voltage for 12 Vdc



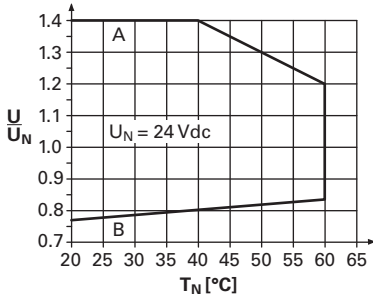
#### Operating Range Voltage for 120 Vac/110 Vdc



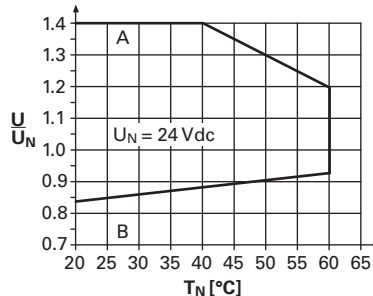
#### Operating Range Voltage for 120 Vac/110 Vdc



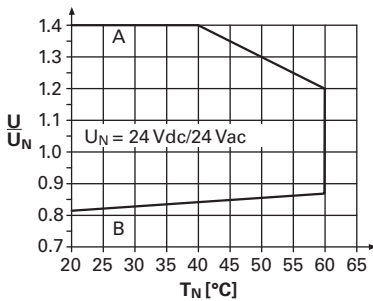
#### Operating Range Voltage for 24 Vdc



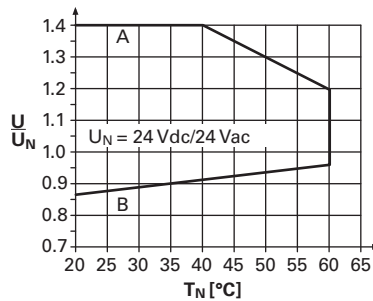
#### Operating Range Voltage for 24 Vdc



#### Operating Range Voltage for 24 Vac/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.

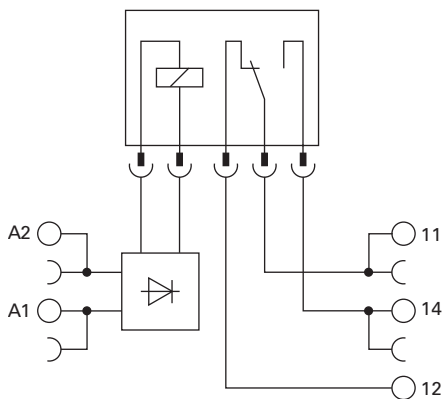
**Curve A** — Maximum permissible continuous operating voltage  $U_{max}$  with limiting continuous current on the contact side (see respective technical data).

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

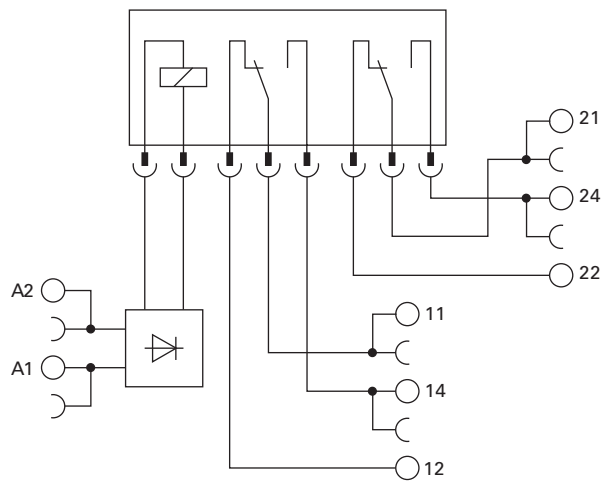
<sup>①</sup> Pre-excitation: Relay has been operated in a thermally steady state at the ambient temperature  $T_U$  with nominal voltage  $U_N$  and limiting continuous current on the contact side (see respective technical data) (warm coil). After being switched off for a short time, the relay must reliably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

### Electrical Schematics

#### 1PDT Terminal Block Relays



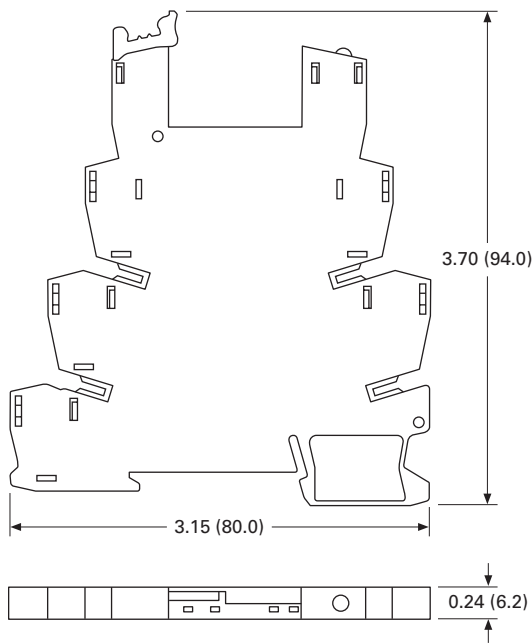
#### DPDT Terminal Block Relays



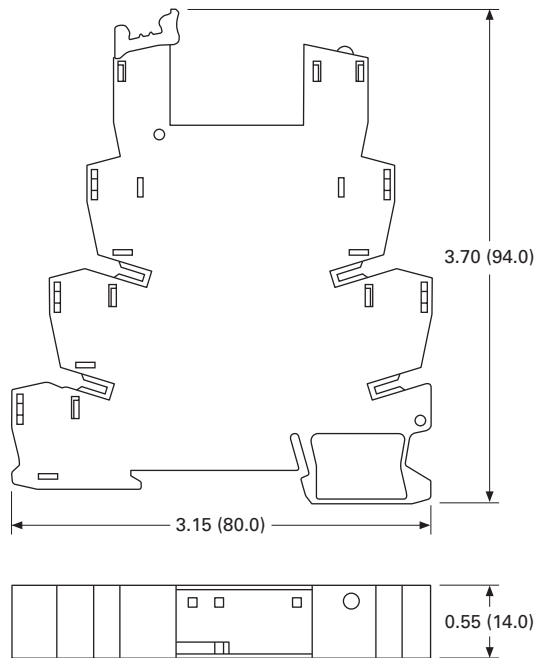
### Dimensions

Approximate Dimensions in Inches (mm)

#### Standard 1PDT Terminal Block Relays



#### Standard DPDT Terminal Block Relays



OptoCoupler Terminal Block Relay



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OptoCoupler Terminal Block Relays	
Product Selection . . . . .	<b>V7-T3-13</b>
Technical Data and Specifications . . . . .	<b>V7-T3-13</b>
Electrical Schematic . . . . .	<b>V7-T3-14</b>
Dimensions . . . . .	<b>V7-T3-14</b>
High Current Terminal Block Relays . . . . .	<b>V7-T3-15</b>
<b>XR</b> Series Accessories . . . . .	<b>V7-T3-18</b>

### 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



## 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 <sup>①</sup>	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
<b>Connection Data</b>		
Rigid solid AWG (mm <sup>2</sup> )	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Flexible stranded AWG (mm <sup>2</sup> )	26–14 (0.14–2.5)	26–14 (0.14–2.5)
<b>Input Data</b>		
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
<b>Output Data</b>		
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
<b>General Data</b>		
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 <sup>7</sup> cycles	2 x 10 <sup>7</sup> cycles

**Note**

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

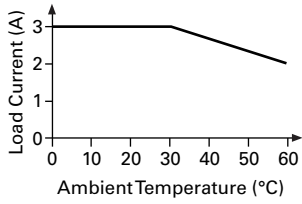
# 3.2

## Control Relays and Timers

### Terminal Block Relays

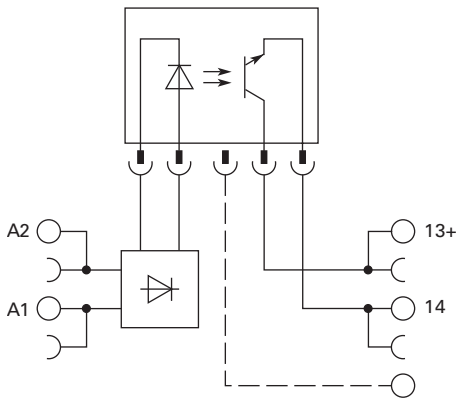
3

#### Derating Curve OptoCoupler



#### Electrical Schematic

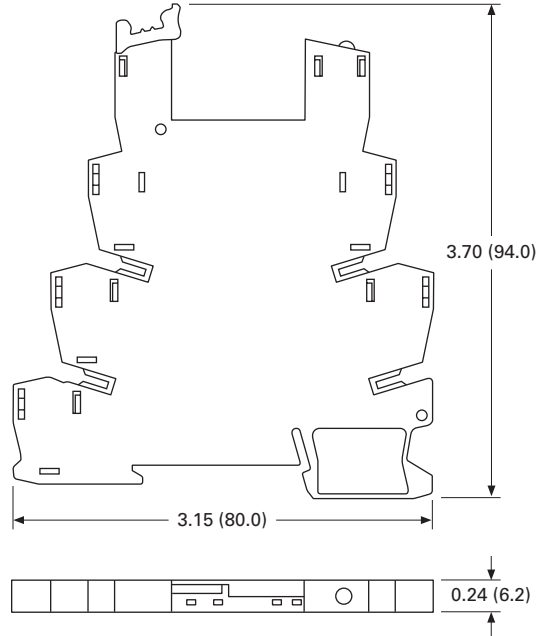
##### Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays



#### Dimensions

Approximate Dimensions in Inches (mm)

##### Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays



## High Current Terminal Block Relay



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## 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





## 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 <sup>①</sup>	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)

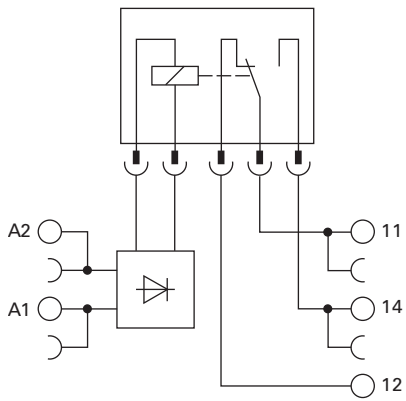
Catalog Number Replacement Relay	XRU1H12 XRR1H12	XRU1H24 XRR1H24	XRU1H24U XRR1H24U	XRU1H120U XRR1H120U
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
<b>Connection Data</b>				
Rigid solid AWG (mm <sup>2</sup> )	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
Flexible stranded AWG (mm <sup>2</sup> )	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)	26–14 (0.14–2.5)
<b>Input Data for 1PDT Spring Cage Versions</b>				
Input voltage	12 Vdc	24 Vdc	24 Vac/Vdc	120 Vac/110 Vdc
Permissible range	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>	See <b>Page V7-T3-10</b>
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
<b>Output Data</b>				
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 <sup>②</sup>	250 Vac/Vdc <sup>②</sup>	250 Vac/Vdc <sup>②</sup>	250 Vac/Vdc <sup>②</sup>
Min. switching voltage	12 Vac/Vdc	12 Vac/Vdc	12 Vac/Vdc	12 Vac/Vdc
Limiting continuous current	10 A <sup>③</sup>	10 A <sup>③</sup>	10 A <sup>③</sup>	10 A <sup>③</sup>
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
<b>Miscellaneous Data</b>				
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 <sup>7</sup> cycles	3 x 10 <sup>7</sup> cycles	3 x 10 <sup>7</sup> cycles	3 x 10 <sup>7</sup> cycles

## Notes

- <sup>①</sup> Voltage is the rating at the base. It may not match the voltage on the specific replacement relay.
- <sup>②</sup> 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.
- <sup>③</sup> 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

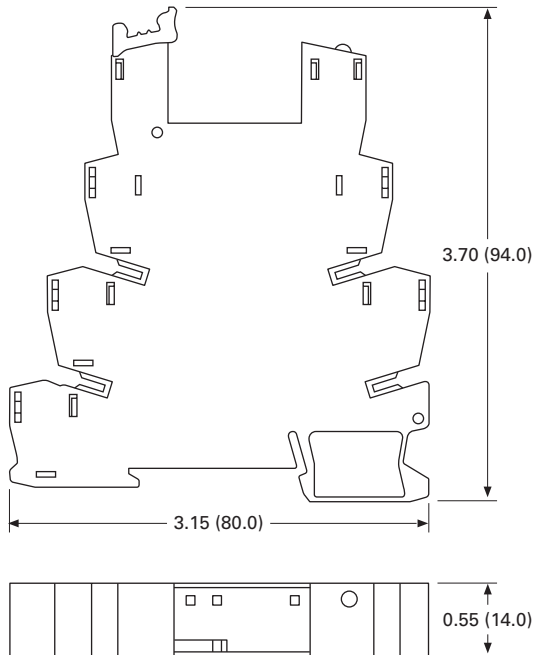
#### High Current Terminal Block Relays



### Dimensions

Approximate Dimensions in Inches (mm)

#### High Current Terminal Block Relays



## XR Series Accessories

### Product Description

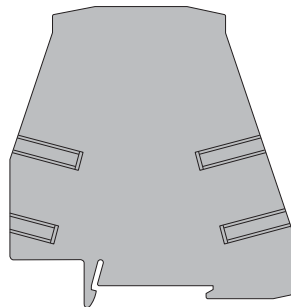
#### Power Terminal Block

#### Bridges

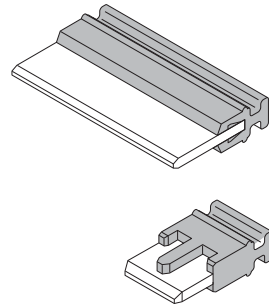


The XRAPLCESK power terminal block has the same shape as the relay modules and is used to feed in the bridging potentials. The nominal current is 32 A. When the total current is less than or equal to 6 A, supply can take place directly at the connecting terminal blocks of one of the connected relays.

#### 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.



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  $\leq 6$  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
<b>2-Position Snap-In Jumper</b>		
Red	10	XRAFBST2RD
Blue	10	XRAFBST2BU
Gray	10	XRAFBST2GY
<b>80-Position Snap-In Jumper</b>		
Red	5	XRAFBST500RD
Blue	5	XRAFBST500BU
Gray	5	XRAFBST500GY
<b>Power Terminal Block</b>		
Gray	5	XRAPLCESK
<b>End Cover</b>		
Black	5	XRAATPBK

### Technical Data and Specifications

#### Power Terminal Block

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

#### Note

- <sup>①</sup> 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.

## Programmable Relays



## Product Overview

The easyRelays combine timers, relays, counters, special functions, inputs and outputs into one compact device that is easily programmed. The easyRelay family of products provides an exceptional level of flexibility together with a substantial savings of commissioning time and effort.

The easyRelays are available in more than 35 styles that support from 12 I/O up to a network of up to 320 I/O points, providing the ideal solution for lighting, energy management, industrial control, irrigation, pump control, HVAC and home automation.

Once easyRelays are installed, changes are easily accomplished through front panel programming, eliminating the need to change wiring and minimizing downtime.

The easy802/806 relays are even more powerful than the easy800 series and include an integrated SmartWire-DT gateway. Conventional hardwiring to pushbuttons, selector switches, pilot devices and contactors can now be eliminated, allowing for a dramatic increase in panel wiring productivity. For more information on SmartWire-DT and how it can increase productivity, go to [www.eaton.com/smartywiredt](http://www.eaton.com/smartywiredt).

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MFD-Titan Multi-Function Displays . . . . .	<b>V7-T3-33</b>
easyRelay Communication Modules . . . . .	<b>V7-T3-40</b>
easyRelay Power Supplies, Accessories and Software . . . . .	<b>V7-T3-43</b>

## Application Description

The easyRelays excel in traditional applications where multiple relays, timers and pushbuttons are used. Applications span residential, commercial and industrial installations.

Typical control applications are:

- Lighting controls
- Duplex pump controls
- Water fountain controls
- Parking garage access controls
- Refrigeration control system
- Greenhouse temperature and ventilation controls
- Booster pump controls

See publication no. **AP05013001E** for the easyRelay application guide. Download from [www.eaton.com/easyrelays](http://www.eaton.com/easyrelays).

#### easy500/700/800 Programmable Relays



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#### easy500/700/800 Programmable Relays

##### Product Description

Three families make up the easyRelay programmable relay product line. All models are available with and without displays. DIN rail mounted.

**easy500**—for controlling small applications with up to 12 input/output signals. Connectable to Ethernet.

**easy700**—for controlling medium-sized applications with 20 I/O points (expandable to 40 I/O points). Connectable to Ethernet and bus systems.

**easy800**—for controlling large-scale applications with 20 points, expandable to 40 points locally, and expandable using the easyNet network up to 320 I/O points. Connectable to Ethernet and bus systems.

The easyNet integrated network provides easy and inexpensive linking of up to eight easy800 devices over a distance of up to 1000 meters. Each easy800 device can run its own program, or be used as a distributed input/output module. Connect up to eight controllers with up to 40 I/O to obtain 320 I/O.

##### Standards

- CSA C22.2 No. 142-M1987
- CSA C22.2 No. 213-M1987
- EN 55011
- EN 50178
- EN 61131-2
- IEC EN 61000-4
- IEC 60068-2-6
- IEC 60068-2-27
- UL 508

##### Certifications

- UL
- CSA
- CE
- CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C
- C-Tick
- GOST-R
- Ukrain-GOST



##### Shipping Approvals

- Bureau Veritas
- Det Norske Veritas
- Germanischer Lloyd
- Lloyd's Register of Shipping

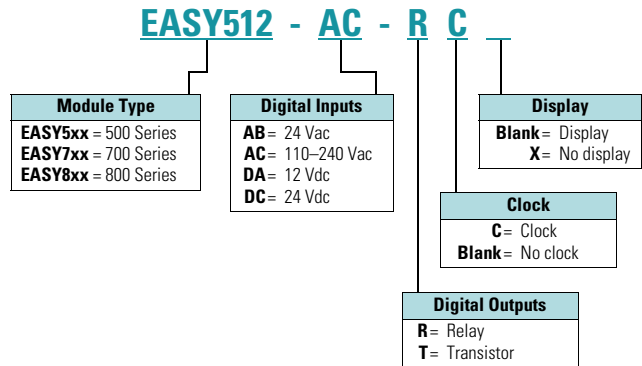
#### Contents

##### Description

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Technical Data and Specifications . . . . .	<b>V7-T3-24</b>
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easy802/806 Programmable Relays with SmartWire-DT . . . . .	<b>V7-T3-26</b>
easyRelay and MFD Expansion Modules . . . . .	<b>V7-T3-30</b>
MFD-Titan Multi-Function Displays . . . . .	<b>V7-T3-33</b>
easyRelay Communication Modules . . . . .	<b>V7-T3-40</b>
easyRelay Power Supplies, Accessories and Software . . . . .	<b>V7-T3-43</b>

#### Catalog Number Selection

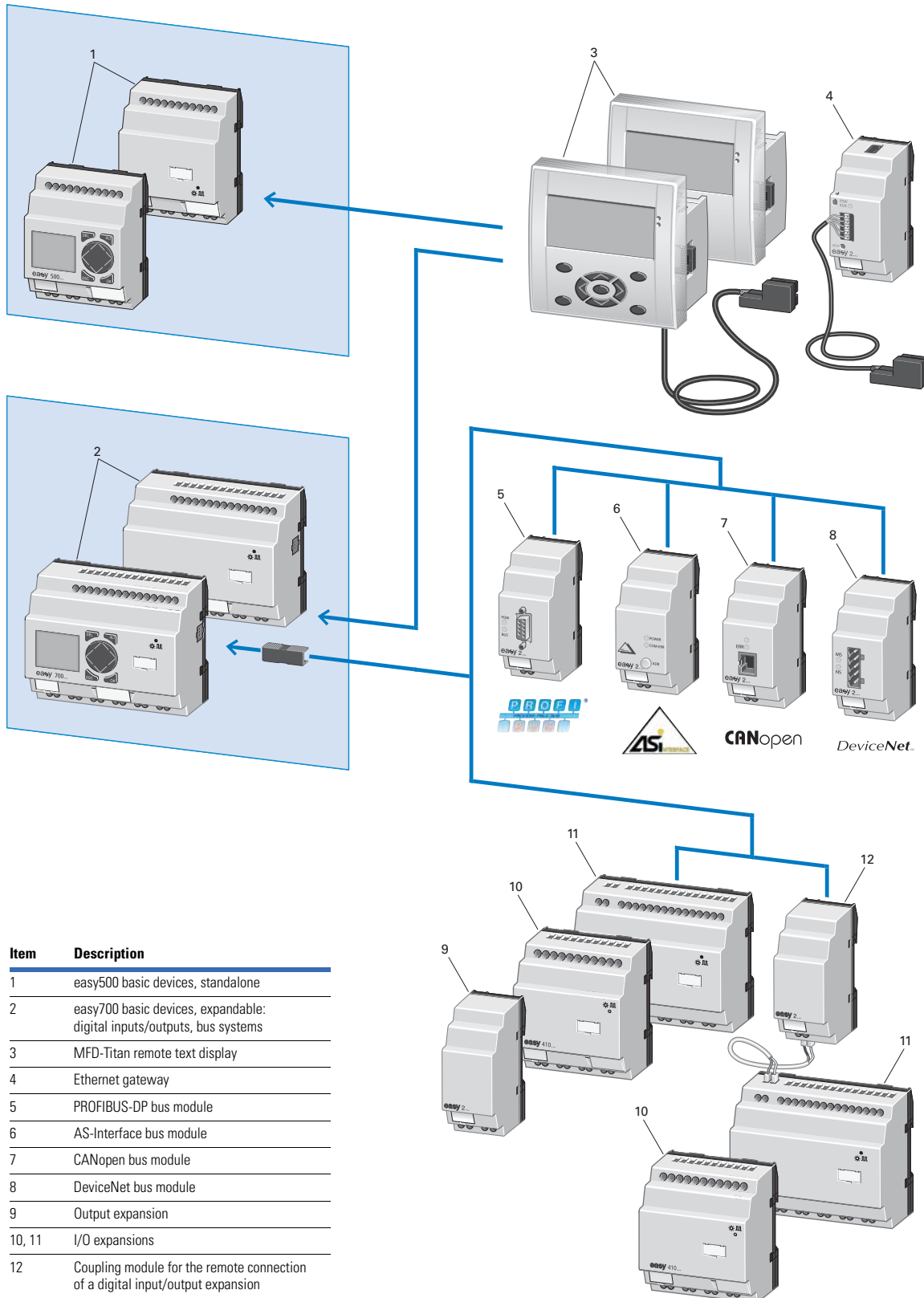
##### easy500/700/800



**Note:** Not all combinations are possible. See selection tables.

### System Overview

#### easy500/700 Programmable Relays



Item	Description
1	easy500 basic devices, standalone
2	easy700 basic devices, expandable: digital inputs/outputs, bus systems
3	MFD-Titan remote text display
4	Ethernet gateway
5	PROFIBUS-DP bus module
6	AS-Interface bus module
7	CANopen bus module
8	DeviceNet bus module
9	Output expansion
10, 11	I/O expansions
12	Coupling module for the remote connection of a digital input/output expansion

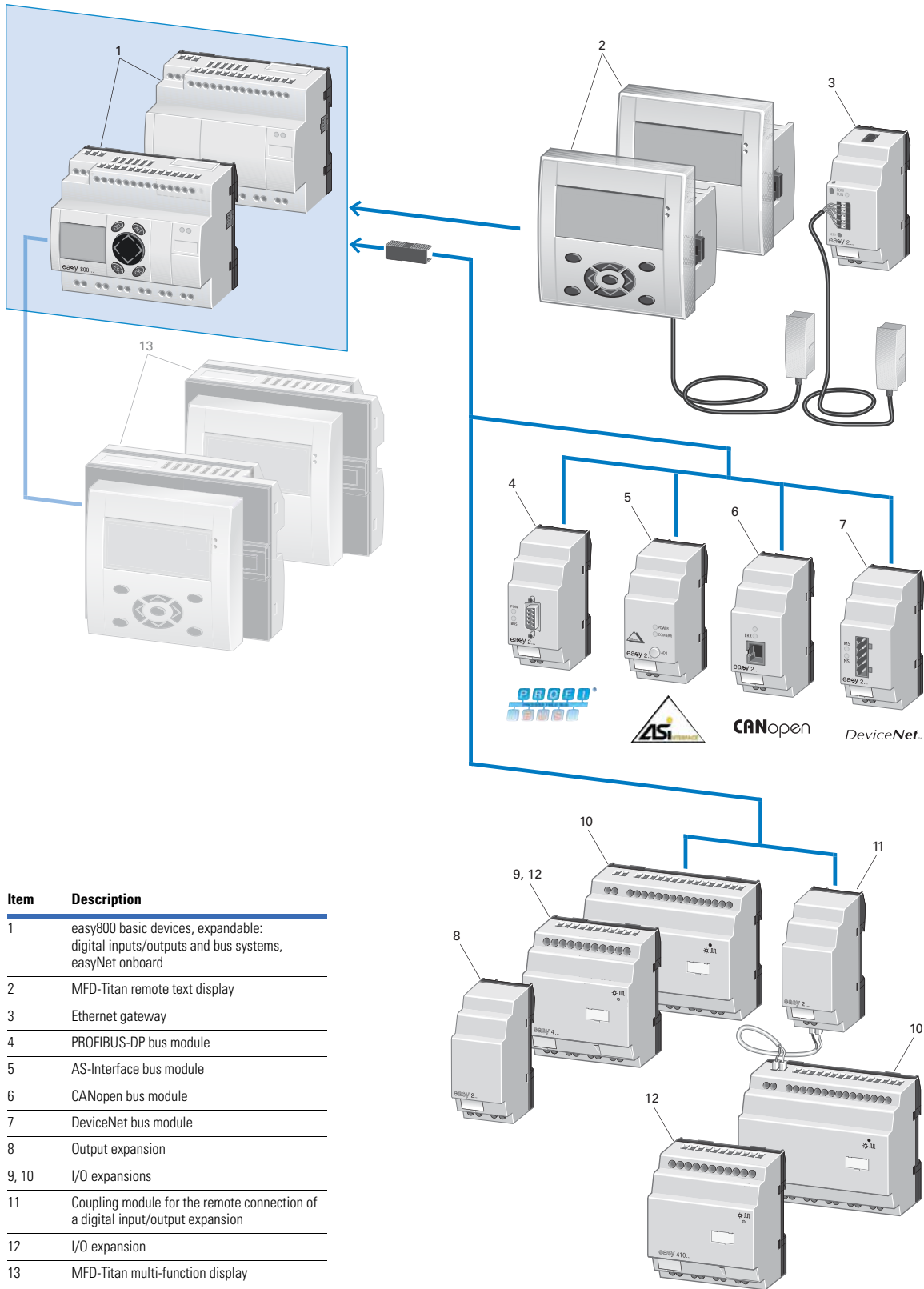
# 3.3

## Control Relays and Timers

### Programmable Relays

#### easy800 Programmable Relay

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### Product Selection

#### easy500—Display



#### easy500 Programmable Relays (Standalone)

Description	Inputs					Outputs		Catalog Number
	24 Vac	110–240 Vac	12 Vdc	24 Vdc	Analog <sup>①</sup>	Relay	Transistor	
<b>Display</b>								
12 I/O, no clock	—	8	—	—	—	4	—	EASY512-AC-R
	—	—	—	8	2	4	—	EASY512-DC-R
12 I/O, clock	8	—	—	—	2	4	—	EASY512-AB-RC
	—	8	—	—	—	4	—	EASY512-AC-RC
	—	—	8	—	2	4	—	EASY512-DA-RC
	—	—	—	8	2	4	—	EASY512-DC-RC
	—	—	—	8	2	—	4	EASY512-DC-TC
<b>No Display</b>								
12 I/O, clock	8	—	—	—	2	4	—	EASY512-AB-RCX
	—	8	—	—	—	4	—	EASY512-AC-RCX
	—	—	8	—	2	4	—	EASY512-DA-RCX
	—	—	—	8	2	4	—	EASY512-DC-RCX
	—	—	—	8	2	—	4	EASY512-DC-TCX

#### easy500—No Display



#### easy700—Display



#### easy700 Programmable Relays (Expandable and Networkable)

Description	Inputs					Outputs		Catalog Number
	24 Vac	110–240 Vac	12 Vdc	24 Vdc	Analog <sup>①</sup>	Relay	Transistor	
<b>Display</b>								
18 I/O, clock	12	—	—	—	4	6	—	EASY719-AB-RC
	—	12	—	—	—	6	—	EASY719-AC-RC
	—	—	12	—	4	6	—	EASY719-DA-RC
	—	—	—	12	4	6	—	EASY719-DC-RC
20 I/O, clock	—	—	—	12	4	—	8	EASY721-DC-TC
<b>No Display</b>								
18 I/O, clock	12	—	—	—	4	6	—	EASY719-AB-RCX
	—	12	—	—	—	6	—	EASY719-AC-RCX
	—	—	12	—	4	6	—	EASY719-DA-RCX
	—	—	—	12	4	6	—	EASY719-DC-RCX
20 I/O, clock	—	—	—	12	4	—	8	EASY721-DC-TCX

#### easy700—No Display



#### easy800—Display



#### easy800 Programmable Relays (Expandable and Networkable)

Description	Inputs			Outputs			Catalog Number
	110–240 Vac	24 Vdc	Analog <sup>①</sup>	Relay	Transistor	Analog	
<b>Display</b>							
18 I/O, clock	12	—	—	6	—	—	EASY819-AC-RC
	—	12	4	6	—	—	EASY819-DC-RC
19 I/O, clock	—	12	4	6	—	1	EASY820-DC-RC
20 I/O, clock	—	12	4	—	8	—	EASY821-DC-TC
21 I/O, clock	—	12	4	—	8	1	EASY822-DC-TC
<b>No Display</b>							
18 I/O, clock	12	—	—	6	—	—	EASY819-AC-RCX
	—	12	4	6	—	—	EASY819-DC-RCX
19 I/O, clock	—	12	4	6	—	1	EASY820-DC-RCX
20 I/O, clock	—	12	4	—	8	—	EASY821-DC-TCX
21 I/O, clock	—	12	4	—	8	1	EASY822-DC-TCX

#### easy800—No Display



**Note**

① Analog inputs optional. Use of analog inputs will result in a decrease in the same number of available digital inputs.



## Technical Data and Specifications

## easy500 Series

Type	EASY512-AB...	EASY512-AC...	EASY512-DA...	EASY512-DC-R...	EASY512-DC-TC.
Supply voltage	24 Vac	100–240 Vac	12 Vdc	24 Vdc	24 Vdc
Heat dissipation	5 VA	5 VA	2 W	2 W	2 W
Continuous current outputs <sup>①</sup>	8 A	8 A	8 A	8 A	0.5 A
Short-circuit proof with power factor 1	Line protection B16, 600 A				—
Short-circuit proof with power factor 0.7...0.7	Line protection B16, 900 A				—
Mounting	On 35 mm DIN rail or screw mounting with ZB4-101-GF1 mounting feet				
Connection cables					
Solid	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)
Flexible	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)
Degree of protection	IP20	IP20	IP20	IP20	IP20
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4				
Ambient operating temperature	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C
Transport and storage temperature	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C
Hazardous location	CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C				

## easy700 Series

Type	EASY719-AB...	EASY719-AC...	EASY719-DA...	EASY719-DC-RC...	EASY721-DC-TC.
Supply voltage	24 Vac	100–240 Vac	12 Vdc	24 Vdc	24 Vdc
Heat dissipation	7 VA	10 VA	3.5 W	3.5 W	3.5 W
Continuous current outputs <sup>①</sup>	8 A	8 A	8 A	8 A	0.5 A
Short-circuit proof with power factor 1	Line protection B16, 600 A	Line protection B16, 600 A	Line protection B16, 600 A	Line protection B16, 600 A	—
Short-circuit proof with power factor 0.7...0.7	Line protection B16, 900 A	Line protection B16, 900 A	Line protection B16, 900 A	Line protection B16, 900 A	—
Mounting	On 35 mm DIN rail or screw mounting with ZB4-101-GF1 mounting feet				
Connection cables					
Solid	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)
Flexible	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)
Degree of protection	IP20	IP20	IP20	IP20	IP20
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4				
Ambient operating temperature	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C
Transport and storage temperature	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C
Hazardous location	CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C				

## easy800 Series

Type	EASY819-AC...	EASY819-DC-RC...	EASY820-DC-RC...	EASY821-DC-TC...	EASY822-DC-TC.
Supply voltage	100–240 Vac	24 Vdc	24 Vdc	24 Vdc	24 Vdc
Heat dissipation	10 VA	3.4 W	3.4 W	3.4 W	3.4 W
Continuous current outputs <sup>①</sup>	8 A	8 A	8 A	8 A	0.5 A
Short-circuit proof with power factor 1	Line protection B16, 600 A	Line protection B16, 600 A	Line protection B16, 600 A	Line protection B16, 600 A	—
Short-circuit proof with power factor 0.7...0.7	Line protection B16, 900 A	Line protection B16, 900 A	Line protection B16, 900 A	Line protection B16, 900 A	—
Mounting	On 35 mm DIN rail or screw mounting with ZB4-101-GF1 mounting feet				
Connection cables					
Solid	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)
Flexible	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)
Degree of protection	IP20	IP20	IP20	IP20	IP20
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4				
Ambient operating temperature	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C
Transport and storage temperature	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C
Hazardous location	CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C				

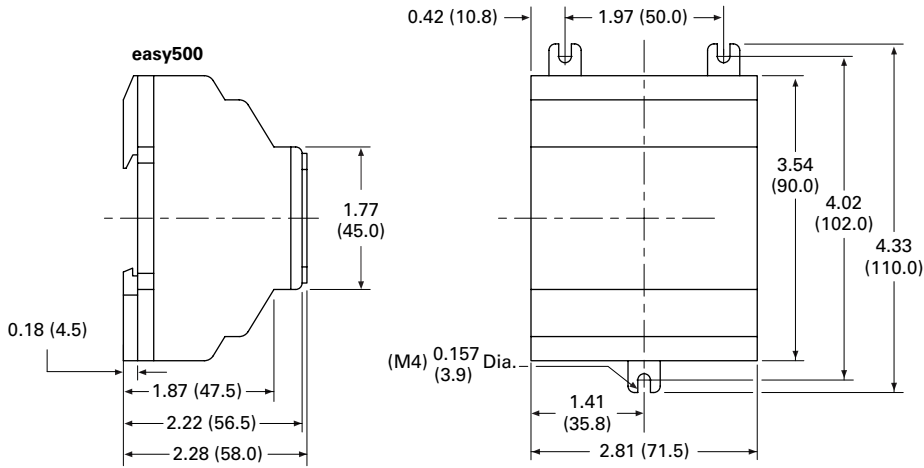
**Note**

<sup>①</sup> Relay = 8 A (10 A to UL) with resistive load, 3 A with inductive load. Transistor outputs = 0.5 A/24 Vdc, maximum four outputs switchable in parallel.

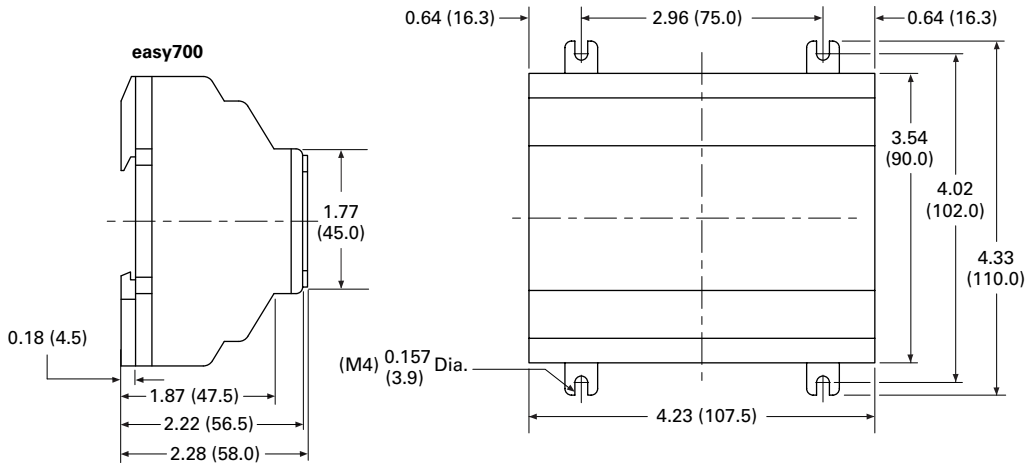
### Dimensions

Approximate Dimensions in Inches (mm)

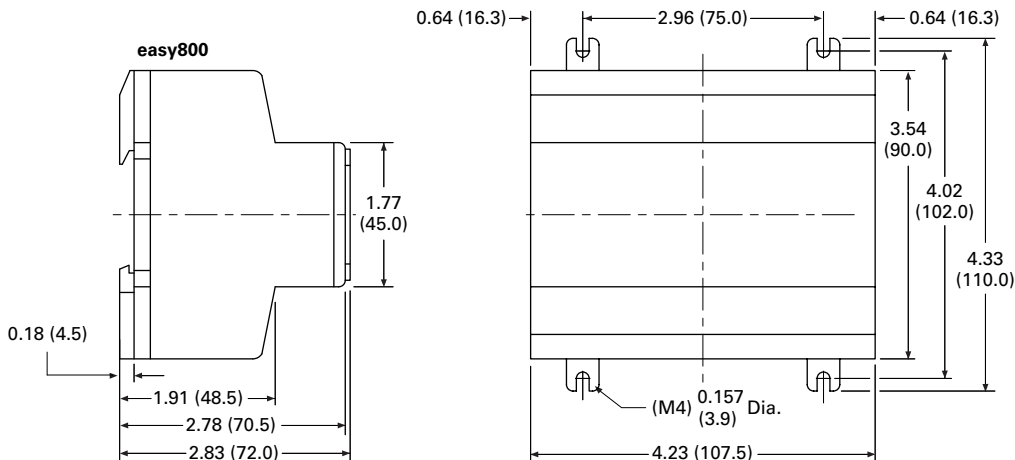
#### easy500 Series, Drawing Number MD05013001E



#### easy700 Series, Drawing Number MD05013002E



#### easy800 Series, Drawing Number MD05013003E



easy802/806 Programmable Relays with SmartWire-DT



### easy802/806 Programmable Relays with SmartWire-DT

#### Product Description

SmartWire-DT is a high-performance system that can be used to quickly and easily connect motor control components such as relays, contactors, pilot devices, manual motor protectors, soft starters <sup>①</sup> and variable frequency drives <sup>②</sup> as well as digital and analog input/output modules. On the new easy800 with integrated SmartWire-DT master, up to 99 SmartWire-DT devices in total with up to 166 inputs/outputs can be connected via the SmartWire-DT line. All required supply voltages, including those for bus devices as well as 24 Vdc for the contactors, are provided directly with the flat eight-pole SmartWire-DT bus line. This reduces wiring effort and troubleshooting and saves time and costs.

The easy802 features a POW power feeder for regulating power to the device as well as the SmartWire-DT devices. A second AUX power feeder provides the connected contactors with 24 Vdc. A separate 24 Vdc power supply is required to provide 24 Vdc power to the easy802 or easy806 controllers. The configuration of the SmartWire-DT devices is undertaken at a touch of the provided Configuration button. LEDs provide feedback on the connecting states on the device and the SmartWire-DT line. The serial interface serves for programming as well as for connection of a remote text display, touch panel or for connection to the Ethernet.

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In addition to the functionality of the easy802, the easy806 also features four fast inputs (5 kHz). Two of the four inputs can also be configured as fast outputs (5 kHz) (transistor 24 Vdc, 0.1 A). In addition to the additional inputs/outputs on easy806, there is a connection option to the easyNet. Up to eight EASY806-DC-SWD controllers can be connected via easyNet, allowing up to 1360 inputs/outputs.

For more information on SmartWire-DT and related components, see **Tab 9** of this volume or go to [www.eaton.com/smawiredt](http://www.eaton.com/smawiredt).

#### Standards

- EN 50178
- IEC/EN 60947
- UL 508

#### Certifications

- cULus
- CE
- C-Tick



#### Note

<sup>①</sup> Soft starters and variable frequency drives will be available with direct SmartWire-DT connectivity in late 2013.

## Product Selection

Control relay for connection of SmartWire-DT and simultaneously for supply of power to the SmartWire-DT devices, such as switchgear and contactors.

### EASY802-DC-SWD



#### easy800 with SmartWire-DT

Supply Voltage	Description	Catalog Number
24 Vdc	Control relay with SmartWire-DT	<b>EASY802-DC-SWD</b>

### EASY806-DC-SWD



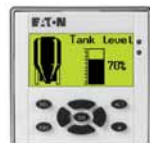
24 Vdc	Control relay with SmartWire-DT, four inputs, two of which can be used as outputs (transistor 24 Vdc, 0.1 A), easyNet onboard	<b>EASY806-DC-SWD</b>
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## Remote Displays

Both the easy802 and easy806 controllers can be connected to a MFD remote display or a XV touch panel display with Galileo.

## Accessories

### MFD-80



#### Accessories—easy800

Description	Catalog Number
MFD display, NEMA 4X indoor rated	<b>MFD-80</b>

### MFD-CP4



24 Vdc power / communication module	<b>MFD-CP4</b>
easy802/806 to MFD-CP4 communication cable, 1.5m	<b>EU4A-RJ45-CAB2</b>
easy802/806 to XV HMI communication cable, 2m	<b>EU4A-RJ45-CAB1</b>

## Technical Data and Specifications

### easy802/806 Programmable Relays with SmartWire-DT

Description	Unit	Specification
<b>Ambient Climatic Conditions</b>		
Cold to IEC 60068-2-1, heat to IEC 60068-2-2, damp heat, constant, to IEC 60068-2-78; cyclical to IEC 60068-2-30; temperature change to IEC 68000-2-14		
Operating ambient temperature	°C (°F)	–25 ° to +55 ° (–13 ° to +131 °)
Condensation		Prevent condensation by means of suitable measures
LCD display (reliable legible)	°C (°F)	0 ° to +55 ° (32 ° to +131 °)
Storage	°C (°F)	–40 ° to +70 ° (–40 ° to +158 °)
Relative humidity, noncondensing (IEC EN 60068-2-30)	%	5 to 95
Air pressure (in operation)	hPa	795 up to 1080
<b>Ambient Mechanical Conditions</b>		
Protection type EN 50178, IEC 60529, VBG4		IP20
Vibrations (IEC EN 60068-2-6)		
Constant amplitude: easy800-SWD; 3.5 mm	Hz	5–8.4
Constant acceleration: easy800-SWD; 1g	Hz	8.4–150
Mechanical shock resistance (IEC EN 60068-2-27) semi-sinusoidal 15g / 11 ms	Shocks	18
Drop (IEC EN 60068-2-31)	Drop height	mm 50
Free fall, packaged (IEC EN 60068-2-32)	m	0.3
<b>Electromagnetic Compatibility (EMC)</b>		
Electrostatic discharge (ESD), to IEC EN 61000-4-2		
Air discharge	kV	8
Contact discharge	kV	6
Electromagnetic fields (RFI), to IEC EN 61000-4-3		
0.8–1.0 GHz	V/m	10
1.4–2.0 GHz	V/m	3
2.0–2.7 GHz	V/m	1
Radio interference suppression		EN 55011 Class B
Burst, to IEC EN 61000-4-4		
Supply cables	kV	2
Signal cables	kV	2
easyNet	kV	2
SWD-line	kV	2
Power pulses (surge), to IEC EN 61000-4-5 (supply cables, symmetrical)	kV	1
Radiated RFI, to IEC EN 61000-4-6	V	10
<b>Insulation Resistance</b>		
Overvoltage category		III
Pollution degree		2
Clearance in air and creepage distances		EN 50178, UL 508, CSA C22.2, No. 142
Insulation resistance		EN 50178
<b>Terminal Capacity</b>		
Solid, minimum to maximum	mm <sup>2</sup>	0.2 to 1.5 (AWG 24–16)
Flexible with ferrule, minimum to maximum	mm <sup>2</sup>	0.2 to 1.5 (AWG 24–16)
<b>DC POW Rated Operational Voltage</b>		
Rated value U <sub>e</sub>	Vdc, (%)	24 DC (–15/+20)
Permissible range ①	Vdc	20.4–28.8
Residual ripple	%	≤ 5
Protection against polarity reversal		Yes
Input current		
At rated operating voltage	mA	easy802: 500 / easy806: 900
Inrush current and duty factor		12.5 A for 6 ms
Voltage dips (IEC EN 61131-2)	ms	10

#### Note

① Use power-feed modules if the cable length of the SWD line causes excessive voltage drop.

## easy802/806 Programmable Relays with SmartWire-DT, continued

Description	Unit	Specification
Heat dissipation		
At 24 Vdc	W	easy802: max. 5 / easy806: max. 6
Fuse	A	≥ 3
Potential isolation (easy800-SWD)		
To auxiliary ①		Yes
To easyNet ①		Yes
To serial interface		Yes
To easyLink ①		No
To inputs ①		No
To outputs ①		No
To SWD ①		No
<b>DC AUX Rated Operational Voltage (easy800-SWD)</b>		
Rated value $U_e$	Vdc, (%)	24 (-15/+20)
Permissible range $U_{AUX}$	Vdc	20.4–28.8
Residual ripple	%	≤ 5
Input current ② (max.)	A	2 (UL) / 3 (CE)
Rated operational voltage of the 24 Vdc stations	V	$U_{AUX} - 0.3$ V
Protection against polarity reversal		Yes
Short-circuit strength		No
Fuse	A	≤ 2 (UL) external fuse with FAZ B2
Heat dissipation		
At 24 Vdc	W	Normally 1
Potential isolation (easy800-SWD)		
To POW power supply, inputs and outputs		Yes
To PC interface (COM), easyNet		Yes
To SWD		Yes

**Notes**

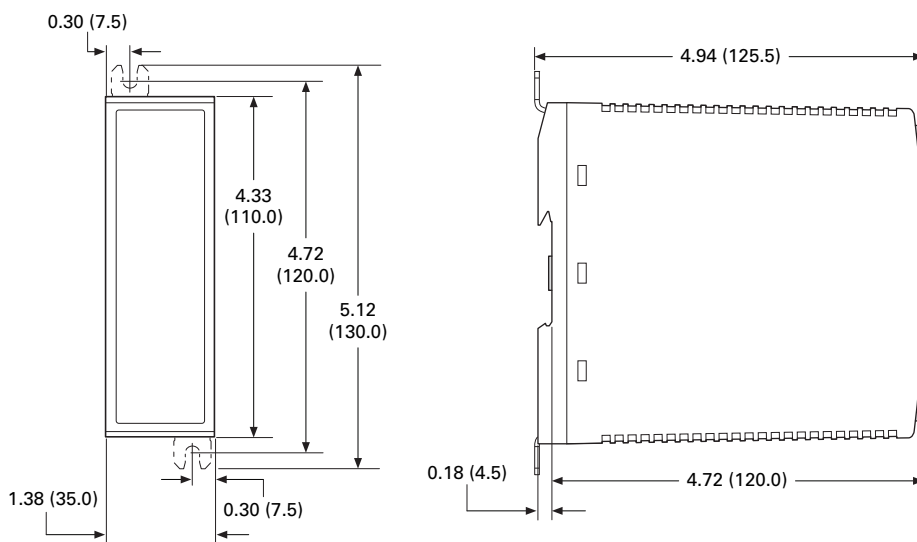
① If present.

② If contactors with a higher total power consumption are connected, an EU5C-SWD-PF1 or EU5C-SWD-PF2 power-feed module must be used.

**Dimensions**

Approximate Dimensions in Inches (mm)

## easy802 and easy806 Controllers



#### easyRelay Expansion Modules



3

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#### easyRelay and MFD Expansion Modules

##### Product Description

Expansion modules are available for increasing the input/output of the easy700/800 and MFD-Titan multi-function displays to 24 inputs and up to 16 outputs. Expansion modules can be mounted directly to the easy700 or easy800 relays or up to 98 ft (30m) away using coupling module EASY200-EASY.

##### Standards

- CSA C22.2 No. 142-M1987
- CSA C22.2 No. 213-M1987
- EN 55011
- EN 50178
- EN 61131-2
- IEC EN 61000-4
- IEC 60068-2-6
- IEC 60068-2-27
- UL 508

##### Certifications

- UL
- CSA
- CE
- CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C
- C-Tick
- GOST-R
- Ukrain-GOST



##### Shipping Approvals

- Bureau Veritas
- Det Norske Veritas
- Germanischer Lloyd
- Lloyd's Register of Shipping

## Product Selection

## EASY618\_



## Digital I/O Expansion Modules

Can be used via easyLink.

Supply Voltage	Digital Inputs	Outputs		Catalog Number
		Relay 10 A (UL)	Transistor	
100–240 Vac	12	6	—	<b>EASY618-AC-RE</b>
24 Vdc	12	6	—	<b>EASY618-DC-RE</b>
24 Vdc	12	—	8	<b>EASY620-DC-TE</b>
24 Vdc	6	4	—	<b>EASY410-DC-RE</b>
24 Vdc	6	—	4	<b>EASY410-DC-TE</b>
24 Vdc	—	2	—	<b>EASY202-RE</b>
For distributed connection of a digital input/output expansion at up to 98 ft (30m) distance				<b>EASY200-EASY</b>

## EASY406\_



## Analog I/O Expansion Modules

Can be used via easyLink.

Supply Voltage	Inputs		Digital Outputs		Analog Outputs	Catalog Number
	Digital/ Analog	Can Be Used for Digital	Relay 10 A (UL)	Transistor		
24 Vdc	1/2	2	—	2	1	<b>EASY406-DC-ME</b>
24 Vdc	1/6	2	—	2	2	<b>EASY411-DC-ME</b>

## Technical Data and Specifications

## easyRelay I/O Expansion Modules

Type	EASY202-RE	EASY618-AC-RE	EASY618-DC-RE	EASY620-DC-TE	EASY200-EASY
Supply voltage	—	100 – 240 Vac	24 Vac	24 Vac	—
Heat dissipation	1 W	10 VA	4 W	4 W	1 W
Continuous current outputs <sup>①</sup>	8 A	8 A	8 A	0.5 A	—
Short-circuit proof with power factor 1	Line protection B16, 600 A	Line protection B16, 600 A	Line protection B16, 600 A	Line protection B16, 600 A	—
Short-circuit proof with power factor 0.7...0.7	Line protection B16, 900 A	Line protection B16, 900 A	Line protection B16, 900 A	Line protection B16, 900 A	—
Connection cables					
Solid	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)
Flexible	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)
Degree of protection	IP20	IP20	IP20	IP20	IP20
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1,2,3,4				
Ambient operating temperature	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C
Transport and storage temperature	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C
Certification, standards	EN 50178, IEC/EN 60947, UL, CSA				
Mounting	On 35 mm DIN rail or screw mounting with ZB4-101-GF1 mounting feet				



# 3.3

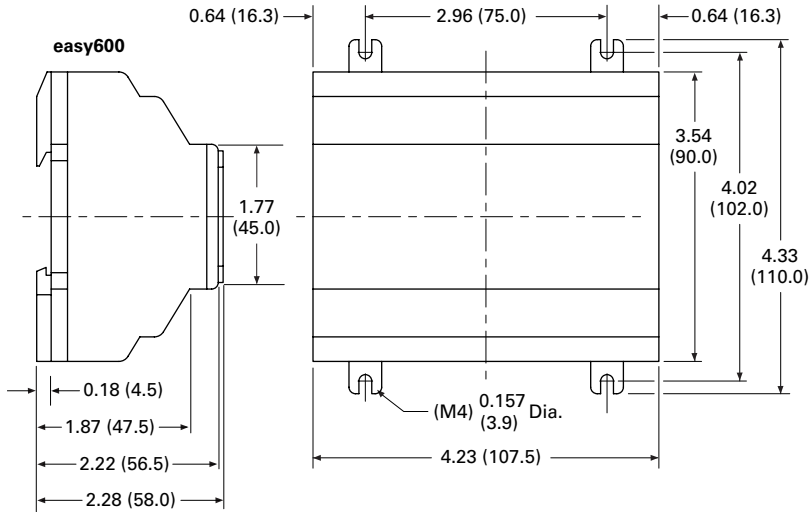
## Control Relays and Timers

### Programmable Relays

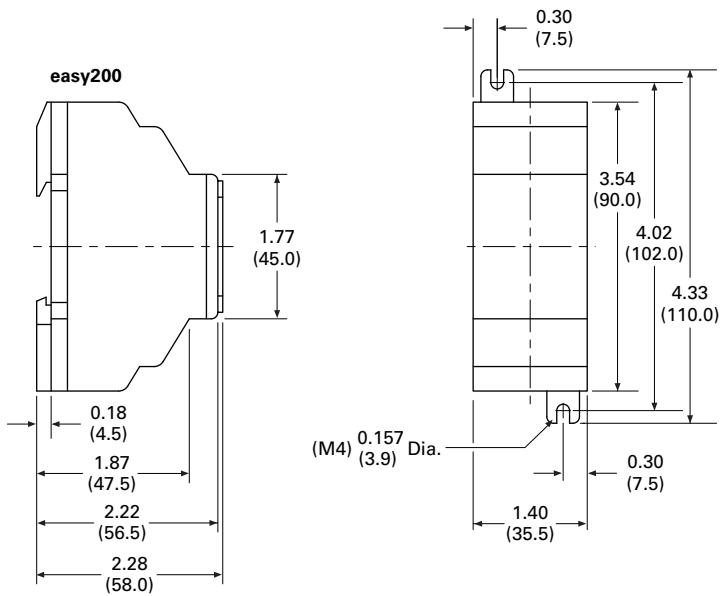
#### Dimensions

Approximate Dimensions in Inches (mm)

#### easy600 Series, Drawing Number MD05013002E



#### EASY202-RE/EASY200-EASY/EASY205-ASI Series, Drawing Number MD05013012E



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**MFD-Titan Multi-Function Displays****Product Description**

The MFD-Titan multi-function displays can be used as remote text displays for easy500, easy700, easy800 and easy802/806 relays or can be configured as standalone or networked multi-function displays. As a multi-function display, the MFD-Titan combines the control functions of an easy800 with a door-mounted graphics display.

MFD-Titan multi-function display is comprised of three parts: display, controller and I/O modules. Match each piece to the needs of your application. If you need to both monitor and modify parameters within your application, choose the MFD-80-B display. The preprogrammed and user programmable buttons give you the capability to make small changes to the way your application is running, start or stop a process, or change your program completely. Select a controller with or without easyNet support, and with AC or DC power. Finally, add the MFD I/O module that best suits your application.

MFD-Titan—for controlling small applications that require graphic visualization and for large-scale applications with 20 points, expandable to 40 points locally, and expandable using the easyNet network up to 320 I/O points.

The MFD-Titan display can be linked to the easy500/700/800 models to provide an enhanced text based operator interface.

The easyNet integrated network provides easy and inexpensive linking of up to eight MFD-Titan devices over a distance of up to 1000 meters. Each MFD-Titan device can run its program, or be used as a distributed input/output module. Connect up to eight controllers with up to 40 I/O to obtain 320 I/O.

**Standards**

- CSA C22.2 No. 142-M1987
- CSA C22.2 No. 213-M1987
- EN 55011
- EN 50178
- EN 61131-2
- IEC EN 61000-4
- IEC 60068-2-6
- IEC 60068-2-27
- UL 508

**Certifications**

- UL
- CSA
- CE
- CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C
- C-Tick
- GOST-R
- Ukrain-GOST

**Shipping Approvals**

- Bureau Veritas
- Det Norske Veritas
- Germanischer Lloyd
- Lloyd's Register of Shipping

# 3.3

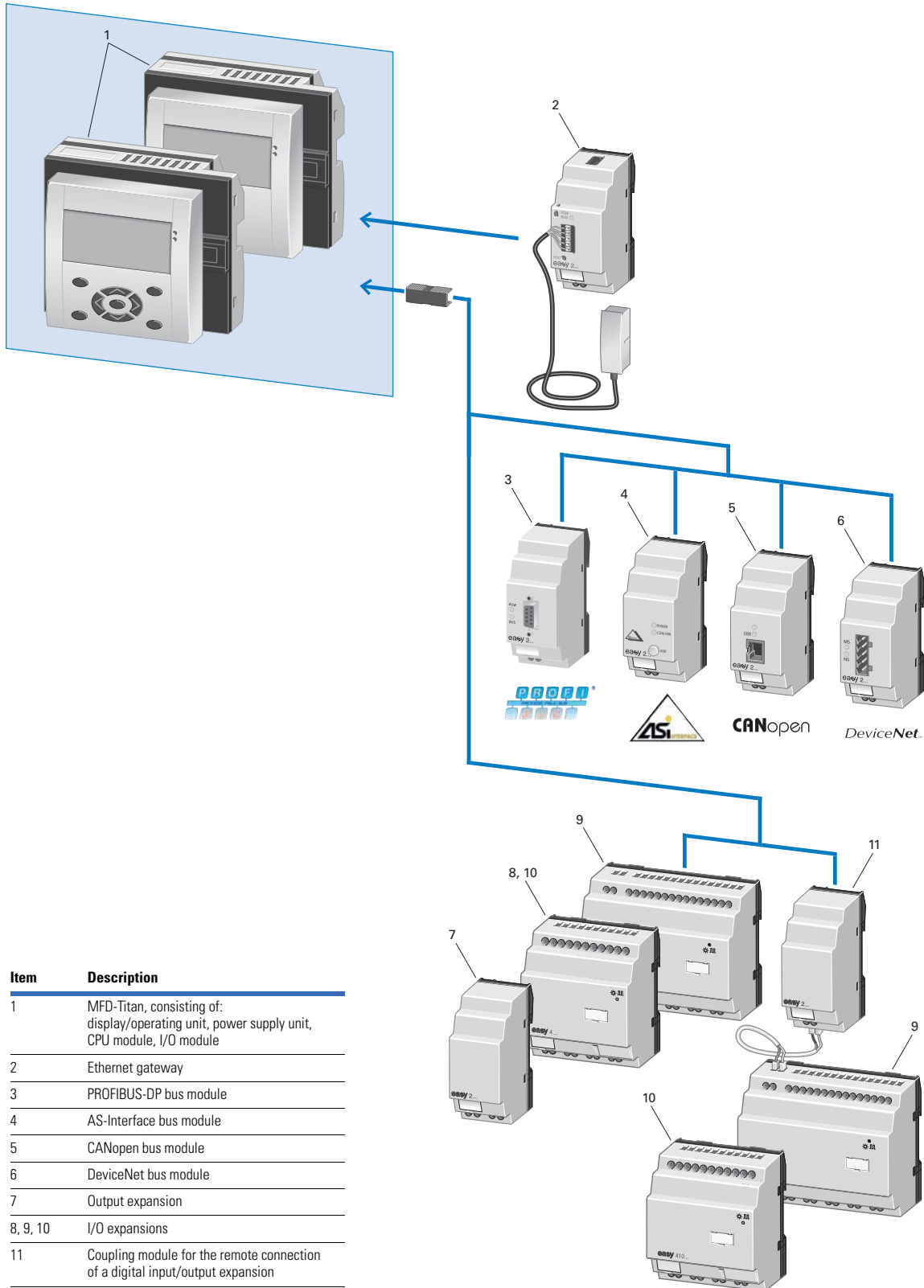
## Control Relays and Timers

### Programmable Relays

#### System Overview

#### MFD-Titan Multi-Function Display

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## Product Selection

## MFD-80-B

**MFD-Titan Display/Operator Units**

Monochrome display 132 x 64 pixels with switchable backlight and removable front frame.

Description	Keypad	Eaton Logo	Custom Engraving	Catalog Number
MFD display, NEMA 4X indoor rated	—	—	—	<b>MFD-80-X</b>
MFD display, NEMA 4X indoor rated	—	■	—	<b>MFD-80</b>
MFD display, NEMA 4X indoor rated	—	—	■	<b>MFD-80-ETCH</b> ①
MFD display with keypad ②	■	—	—	<b>MFD-80-B-X</b>
MFD display with keypad ②	■	■	—	<b>MFD-80-B</b>
MFD display with keypad ②	—	—	■	<b>MFD-80-B-ETCH</b> ①

## MFD-CP4

**MFD-Titan Text/Graphics Display Power Module**

For use with MFD-Titan displays for use as remote text/graphics display.

Supply Voltage	Description	Catalog Number
100–240 Vac	AC power supply / communication module (no cable)	<b>MFD-AC-CP4</b>
	AC module for easy500/700 relays and cable MFD-CP4-500-CAB5	<b>MFD-AC-CP4-500</b>
	AC module for easy800 relays and cable MFD-CP4-800-CAB5	<b>MFD-AC-CP4-800</b>
24 Vdc	DC power supply / communication module (no cable)	<b>MFD-CP4</b>
	DC module for easy500/700 relays and cable MFD-CP4-500-CAB5	<b>MFD-CP4-500</b>
	DC module for easy800 relays and cable MFD-CP4-800-CAB5	<b>MFD-CP4-800</b>

## MFD-CP

**MFD-Titan Controller Modules**

For use with MFD-Titan display/operator units. Add MFD-Titan I/O modules as needed.

Supply Voltage	Description	Catalog Number
100–240 Vac	Program and screen memory	<b>MFD-AC-CP8-ME</b>
	Program and screen memory, with easyNet	<b>MFD-AC-CP8-NT</b>
24 Vdc	Program and screen memory	<b>MFD-CP8-ME</b>
	Program and screen memory, with easyNet	<b>MFD-CP8-NT</b>
	Double program and screen memory (as MFD-CP8)	<b>MFD-CP10-ME</b>
	Double program and screen memory (as MFD-CP8), with easyNet	<b>MFD-CP10-NT</b>

**Notes**

- ① To order an MFD display with custom engraving, a marking file with the required text and/or graphics must be created as a Labeleditor ZIP file. The ZIP file has to be sent to the Eaton factory, and the name of the file must be referenced in the order notes section. To download the Labeleditor configuration software, please visit [www.eaton.com/software](http://www.eaton.com/software).
- ② To obtain a NEMA 4X indoor rating on MFD displays with keypads, use with a protective membrane cover MFD-XM-80.

#### MFD-R16



#### MFD-Titan I/O Modules

For use with MFD-Titan controller modules.

Supply Voltage	Description	Inputs		Outputs			Catalog Number
		Digital	Analog <sup>①</sup>	Relay	Transistor	Analog	
100–240 Vac	16 I/O	12	—	4	—	—	MFD-AC-R16
		12	4	4	—	—	MFD-R16
24 Vdc	17 I/O	12	4	—	4	—	MFD-T16
		12	4	4	—	1	MFD-RA17
		12	4	—	4	1	MFD-TA17

#### MFD-TP\_



#### MFD-Titan I/O Modules with Temperature Detection

For use with MFD-CP8\_ <sup>②</sup> and MFD-CP10\_ MFD-Titan controller modules.

Supply Voltage	Inputs			Outputs			Temperature Ranges	Catalog Number
	Digital	Can Be Used For Analog	Pt100	Relay 10 A (UL)	Transistor	Analog		
24 Vdc	6	2	2	—	4	—	–40 ° to +90 °C/0 ° to +250 °C/0 ° to +400 °C	MFD-TP12-PT-A
	6	2	2	—	4	—	–200 ° to +200 °C/0 ° to +850 °C	MFD-TP12-PT-B
	6	2	—	—	4	—	–40 ° to +90 °C/0 ° to +250 °C	MFD-TP12-NI-A
	6	2	2	—	4	1	–40 ° to +90 °C/0 ° to +250 °C/0 ° to +400 °C	MFD-TAP13-PT-A
	6	2	2	—	4	1	–200 ° to +200 °C/0 ° to +850 °C	MFD-TAP13-PT-B
	6	2	—	—	4	1	–40 ° to +90 °C/0 ° to +250 °C	MFD-TAP13-NI-A

### Accessories

#### Miscellaneous Parts

Description	Catalog Number
MFD-Titan display protective membrane cover	MFD-XM-80
MFD-Titan display protective plastic cover	MFD-XS-80
MFD-Titan display DIN rail mount kit	MFD-TS-144

#### Notes

- ① Analog inputs optional. Use of analog inputs will result in a decrease in the same number of available digital inputs
- ② Version 8 and higher MFD-CP8\_ controllers are compatible with the temperature detection modules.

## Technical Data and Specifications

### MFD-80, MFD-CP4, MFD-CP8

Type	MFD-80...	MFD-CP4/CP8
Connection cables		
Solid	—	0.2–4.0 mm <sup>2</sup> (AWG 22–12)
Flexible	—	0.2–2.5 mm <sup>2</sup> (AWG 22–12)
Degree of protection	IP65	IP20
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4
Ambient operating temperature	Clearly legible at –5 °C to +50 °C	–25 °C to +55 °C
Transport and storage temperature	–40 °C to +70 °C	–40 °C to +70 °C
Hazardous location	CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C	CSA Class I, Div. 2, Groups A, B, C, D; Temp. Code T3C

### MFD-Titan I/O Modules

Type	MFD-AC-R16	MFD-R16	MFD-RA17	MFD-T16	MFD-TA17
Supply voltage	Supply via MFD-CP8 module	Supply via MFD-CP8 module	Supply via MFD-CP8 module	Supply via MFD-CP8 module	Supply via MFD-CP8 module
Heat dissipation	0.5 W	0.5 W	0.5 W	0.5 W	0.5 W
Continuous current outputs <sup>①</sup>	8 A	8 A	8 A	0.5 A	0.5 A
Short-circuit proof with power factor 1	Line protection B16, 600 A	Line protection B16, 600 A	Line protection B16, 600 A	—	—
Short-circuit proof with power factor 0.7...0.7	Line protection B16, 600 A	Line protection B16, 600 A	Line protection B16, 600 A	—	—
Connection cables					
Solid	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)
Flexible	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)
Degree of protection	IP20	IP20	IP20	IP20	IP20
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1,2,3,4				
Ambient operating temperature	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C	–25 °C to +55 °C
Transport and storage temperature	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C	–40 °C to +70 °C
Mounting	Snap fitted to MFD-CP8 module	Snap fitted to MFD-CP8 module	Snap fitted to MFD-CP8 module	Snap fitted to MFD-CP8 module	Snap fitted to MFD-CP8 module

### MFD-CP4 and CP8 Communication Modules

Type	MFD-80...	MFD-CP4-...	MFD-CP8...	MFD-AC-CP8...
Supply voltage	Supply from -CP	24 Vdc	24 Vdc	100–240 Vac
Heat dissipation	3 W	1.5 W	3 W	8 VA
Mounting	Front mounting in 2 x 22.5 mm Standard drill holes	Snap fitted to MFD-80	Snap fitted to MFD-80 or on 35 mm DIN rail or screw mounting with ZB4-101-GF1 mounting feet	

#### Note

- <sup>①</sup> Relay = 8 A with resistive load, 3 A with inductive load.  
Transistor outputs = 0.5 A/24 Vdc, maximum four outputs switchable in parallel.

# 3.3

## Control Relays and Timers

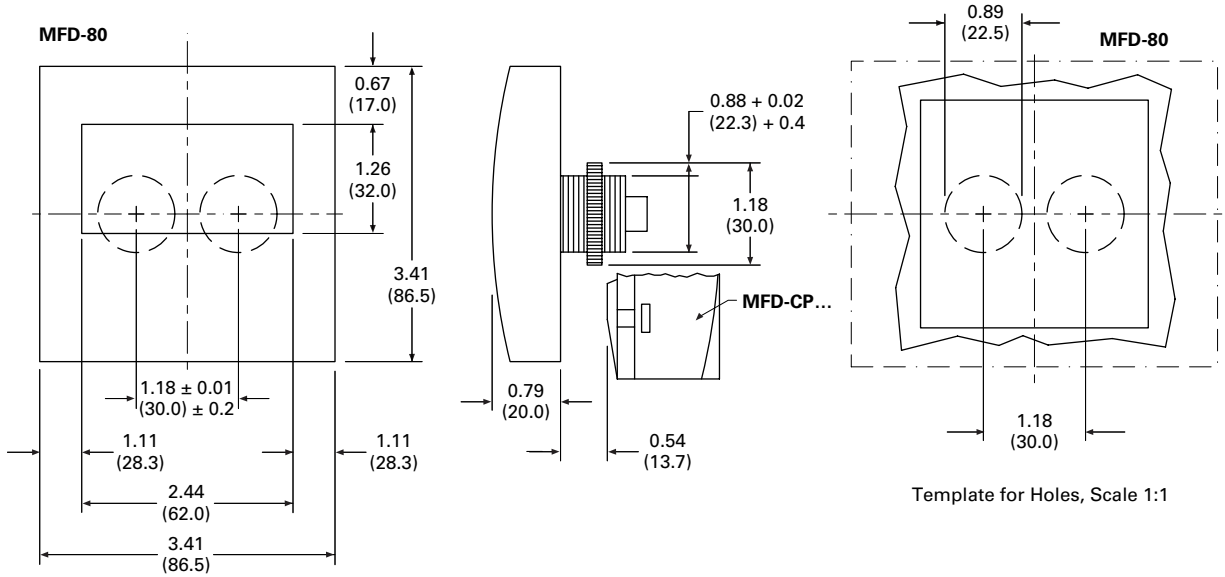
### Programmable Relays

#### Dimensions

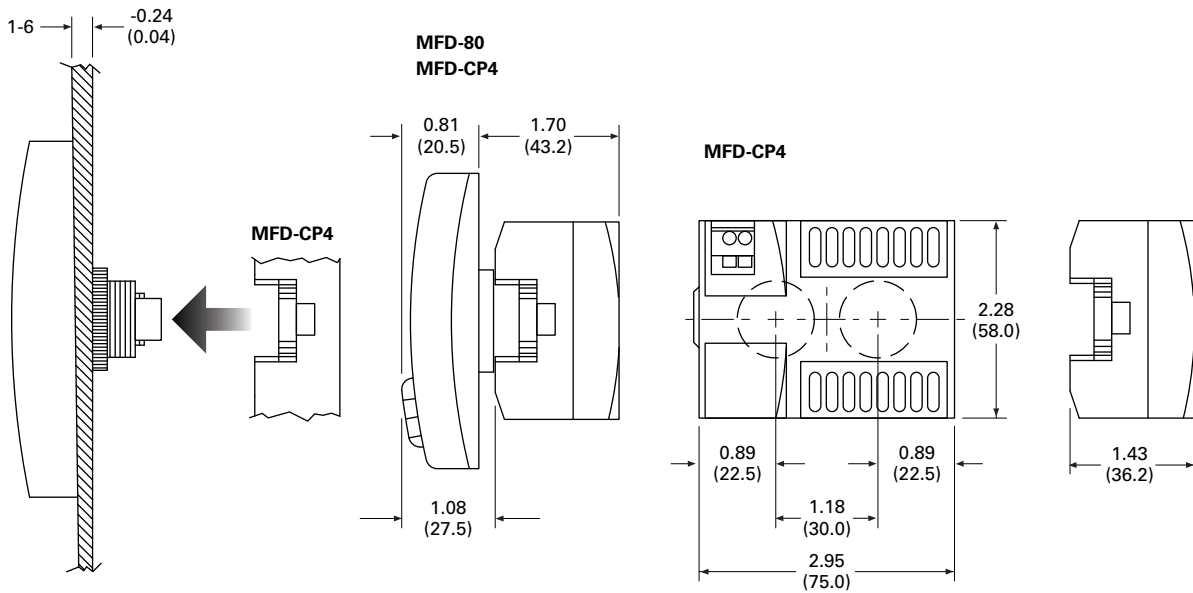
Approximate Dimensions in Inches (mm)

#### MFD-80 Series, Drawing Number MD05013005E

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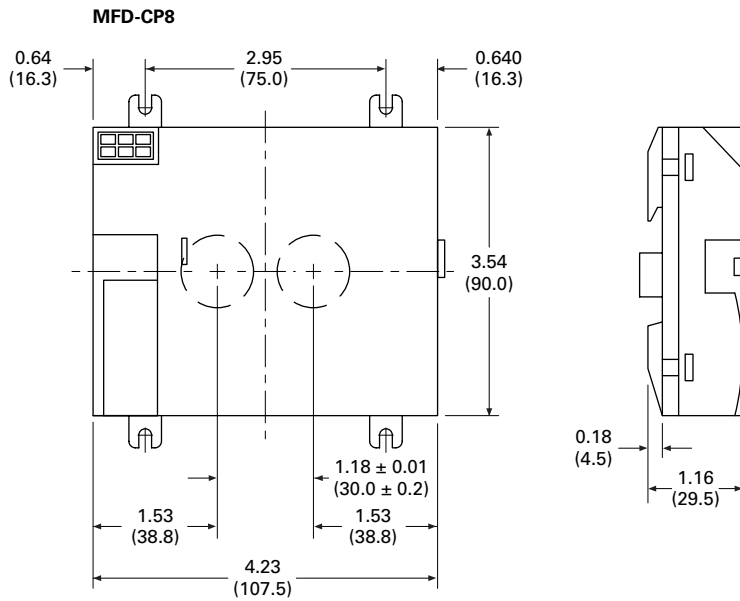


#### MFD-CP4, MFD-80 and MFD-CP4 Series Combined, Drawing Number MD013013E

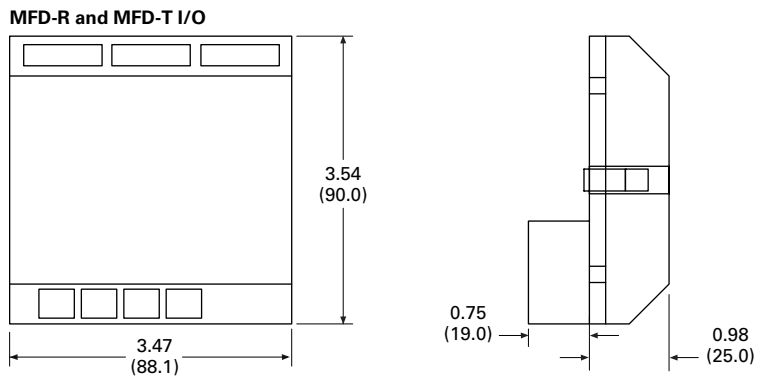


Approximate Dimensions in Inches (mm)

### MFD-CP8 Series, Drawing Number MD05013006E



### MFD-R/MFD-T I/O Module, Drawing Number MD05013007E





#### easyRelay Communication Modules



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MFD-Titan Multi-Function Displays . . . . .	<b>V7-T3-33</b>
easyRelay Communication Modules	
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### easyRelay Communication Modules

#### Product Description

Four network modules are available for easily connecting to world-standard networks. The network modules can be used with the easy700/800 programmable relays and MFD-Titan multi-function displays.

Available communication modules support:

- DeviceNet
- PROFIBUS-DP
- AS-Interface
- CANopen

All modules operate exclusively as nodes on the given network.

#### Product Selection

The Ethernet gateway connects devices provided with an RS-232 serial interface with the Ethernet network. This gateway can be used with easy500 as well as easy700/800 relays and MFD-Titan displays.

#### EASY209-SE



#### Ethernet Gateway Module

Description		Catalog Number
Ethernet gateway	Serial interface easyRelay or MFD-...CP8/CP10_ to Ethernet, for connecting to easyOPC server, easySoft or easyCom	<b>EASY209-SE</b> ①

#### EASY204-DP



#### Network Interface Modules

Description		Catalog Number
DeviceNet interface module	Addresses available 0 to 63	<b>EASY222-DN</b>
PROFIBUS-DP interface module	Device addresses available 1 to 126	<b>EASY204-DP</b>
AS-Interface interface module with 4 in and 4 out	Device: 4 inputs, 4 outputs, 4 parameter bits Addresses available 0 to 31	<b>EASY205-ASI</b>
CANopen interface module	Addresses available 1 to 127	<b>EASY221-CO</b>

#### Note

① To set up the Ethernet gateway, download the EASY209-SE configuration software at [www.eaton.com/easyrelays](http://www.eaton.com/easyrelays).

### Technical Data and Specifications

#### easy700/800/MFD Communication Interface Modules EASY204-DP, EASY205-ASI, EASY221-CO, EASY222-DN, EASY209-SE ①

Description	Specification
Supply voltage	24 Vdc
Heat dissipation ②	1 W
Connection cables	
Solid	0.2–4.0 mm <sup>2</sup> (AWG 22–12)
Flexible	0.2–2.5 mm <sup>2</sup> (AWG 22–12)
Degree of protection	IP20
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1,2,3,4
Ambient operating temperature	–25 °C to +55 °C
Transport and storage temperature	–40 °C to +70 °C
Certification, standards	EN 50178, IEC/EN 60947, UL, CSA
Mounting	On 35 mm DIN rail or screw mounting with ZB4-101-GF1 mounting feet

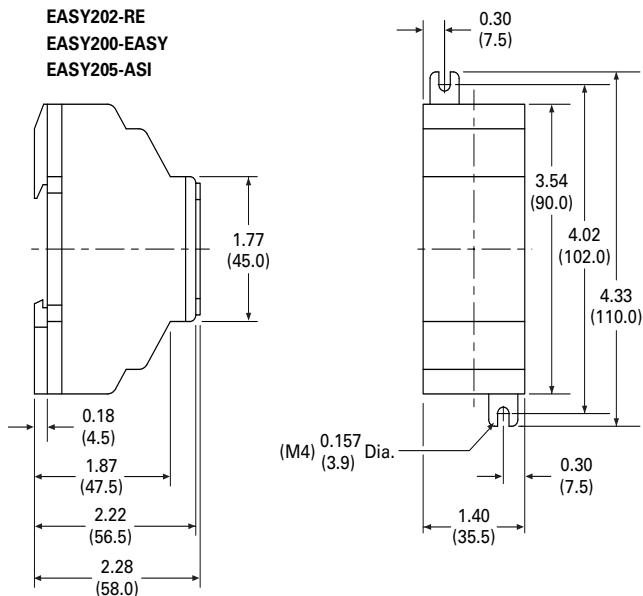
#### Notes

- ① EASY209-SE is also compatible with easy500 programmable relays.
- ② EASY204-DP dissipates 2 W.

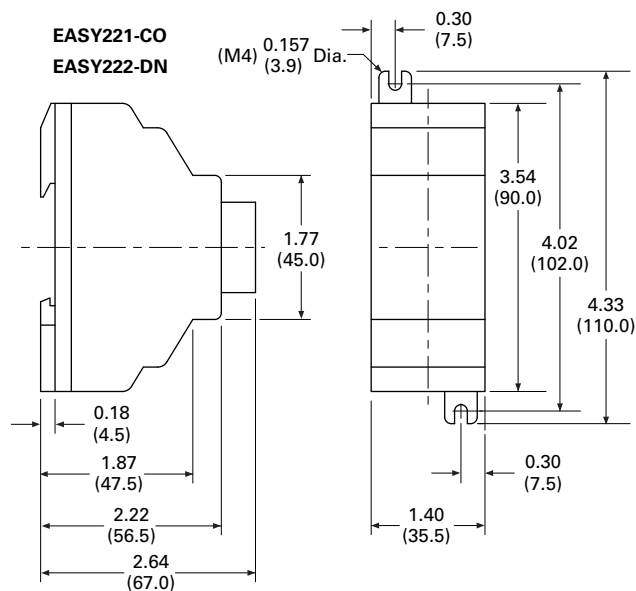
### Dimensions

Approximate Dimensions in Inches (mm)

#### EASY202-RE/EASY200-EASY/EASY205-ASI/ EASY209-SE Series, Drawing Number MD05013012E



#### EASY221-CO/EASY222-DN Series, Drawing Number MD05013010E



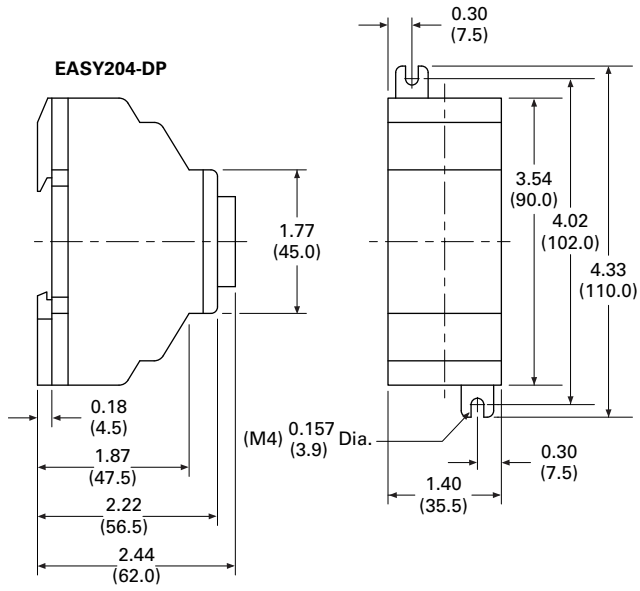
# 3.3

## Control Relays and Timers

### Programmable Relays

EASY204-DP Series,  
Drawing Number MD05013011E

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### easyRelay Power Supplies, Accessories and Software



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## easyRelay Power Supplies, Accessories and Software

### Product Description

**Power Supplies**—12 Vdc and 24 Vdc power supplies for applications where only 100–240 Vac is available.

**Accessories**—Memory modules, cables and other components to complete your automation solutions.

**Software**—The easySoft software is used to program all of the easyRelays and MFD-Titan displays. The Windows®-based software provides straightforward circuit diagram input and editing and the diagrams can be displayed in the format desired. When easy800 and MFD-Titan controllers are connected using easyNet, all connected devices can be accessed and their programs loaded from a single controller.

easySoft includes an integrated offline simulation tool that allows users to test a circuit diagram before commissioning.

### Product Selection

Power supply units are primary switched-mode power supplies that are optimally suited for the easyRelay and easySafety product series in terms of functions and design. The new and high-performance power supply units support safe operation in plants and machines. They are simple and flexible in handling.

Fast diagnosis of the voltage output: continuous light on the LED—fault-free operation; flashing on the LED—short circuit or overload on voltage output.

- Suitable for worldwide use due to wide range input from 85 V to 264 Vac, 50/60 Hz
- Output voltages can be connected in parallel to increase power output or for redundant operation to achieve greater system availability
- Compliance with international standards and approvals

The primary switched-mode power supply units can be used everywhere:

- Safety extra low voltage (SELV to EN 60 950)
- Radio interference Class B to EN 55 011 and EN 55 022 for use in industrial and public networks

### EASY...-POW



### Power Supply Units

Rated input voltage 100–240 Vac, single-phase.

Input Voltage Range	Rated Output Voltage	Output Voltage Setting Range	Rated Output Power	Rated Output Current	Catalog Number
100–240 Vac	24 Vdc/12 Vdc	—	8 W	0.35 A/20 mA	<b>EASY200-POW</b>
	24 Vdc	—	30 W	1.25 A	<b>EASY400-POW</b>
	24 Vdc	—	60 W	2.5 A	<b>EASY500-POW</b>
	24 Vdc	—	100 W	4.2 A	<b>EASY600-POW</b>

#### Bluetooth Adapter

Conveniently commission and service machines and other equipment remotely.

- Simple communication with easy800 or MFD-Titan from outside loud and/or dangerous areas
- An 8-digit PIN security code prevents unauthorized remote access
- Simple recognition in Windows 7
- Full online functionality with easySoft-Pro V6.91 or higher
- Has all necessary radio type approvals for USA, Canada and Europe

#### EASY800-BLT-ADP



#### Bluetooth Adapter

Description	Catalog Number
easy800/MFD Bluetooth adapter	<b>EASY800-BLT-ADP</b>
The Bluetooth adapter provides wireless connectivity to easySoft-Pro for easy programming download and upload. Use it with the easyRemote Display Android App for simple and fast access to your easy800 relays up to a distance of 10 meters.	

#### Accessories

##### easySoft



#### Programming Software

Description	Catalog Number
Programming software for easy500/700	<b>EASY-SOFT-BASIC</b>
Programming software for easy800, easy 802/806 and MFD-Titan includes SWD-Assist for configuration of the SmartWire-DT network	<b>EASY-SOFT-PRO</b>

#### EASY-USB-CAB



#### Programming Cables

Description	Catalog Number
easy500/700 to PC programming cable—USB	<b>EASY-USB-CAB</b>
easy500/700 to PC programming cable—RS-232	<b>EASY-PC-CAB</b>
easy800/MFD to PC programming cable—RS-232	<b>EASY800-PC-CAB</b>
easy800/MFD to PC programming cable—USB	<b>EASY800-USB-CAB</b>
easy802/806 to PC programming cable—USB, 2m	<b>EU4A-RJ45-USB-CAB1</b>

#### MFD-CP4-800-CAB5



#### Cables and Connectors

Description	Catalog Number
easy500/700 to MFD-CP4 communication cable, 5m	<b>MFD-CP4-500-CAB5</b>
easy800 to MFD-CP4 communication cable, 5m	<b>MFD-CP4-800-CAB5</b>
easy800 to MFD-CP8 communication cable, 2m	<b>MFD-800-CAB</b>
easy800 to MFD-CP8 communication cable, 5m	<b>MFD-800-CAB5</b>
easy800 modem, printer, programming cable	<b>EASY800-MO-CAB</b>
easy802/806 to MFD-CP4 communication cable, 1.5m	<b>EU4A-RJ45-CAB2</b>
easy802/806 to XV HMI communication cable, 2m	<b>EU4A-RJ45-CAB1</b>
easy800/MFD easyNet cable, 0.3m networking cable	<b>EASY-NT-30</b>
easy800/MFD easyNet cable, 0.8m networking cable	<b>EASY-NT-80</b>
easy800/MFD easyNet cable, 1.5m networking cable	<b>EASY-NT-150</b>
easy800/MFD easyNet cable (cable only, no connectors, see EASY-NT-RJ45), 100m	<b>EASY-NT-CAB</b>
RJ45 network connectors for easyNet cable (EASY-NT-CAB), 10/pack	<b>EASY-NT-RJ45</b>
easy800/MFD network termination resistor, 2/pack	<b>EASY-NT-R</b>

#### EASY800-MO-CAB



**EASY-M-32K****EASY-M-256K****Memory Storage Modules**

Description	Catalog Number
easy500/700 32K memory storage module	<b>EASY-M-32K</b>
easy800/MFD 256K memory storage module	<b>EASY-M-256K</b>
easy800/MFD 512K memory storage module	<b>EASY-M-512K</b>

**Panel Window****Mounting Kit****Simulator****Miscellaneous Parts**

Description	Catalog Number
easy500 panel window	<b>SKF-FF4</b>
easy700/800 panel window	<b>SKF-FF6</b>
easy500/700/800 panel window mounting kit to front mount units	<b>SKF-HA</b>
High current input adapter, six-channel	<b>EASY256-HCI</b>
Base to expander, interface connector	<b>EASY-LINK-DS</b>
easy500 relay simulator	<b>EASY412-DC-SIM-NA</b>
Mounting feet, 9/pack	<b>ZB4-101-GF1</b>
Grounding kit	<b>ZB4-102-KS1</b>

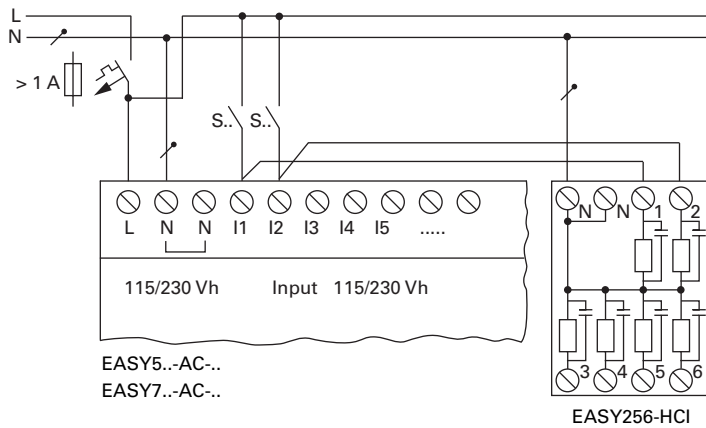
#### Technical Data and Specifications

##### easyRelay Power Supplies

Type	EASY200-POW	EASY400-POW
Supply voltage	100–240 Vac	100–240 Vac
Maximum range	85–264 Vac	85–264 Vac
Output voltage	24 Vdc ( $\pm 3\%$ )	24 Vdc ( $\pm 3\%$ )
Output current (rated value)	0.25 A	1.25 A
Overcurrent limitation form	0.3 A	1.4 A
Short-circuit proof (secondary)	Yes	Yes
Overload proof	Yes	Yes
Potential isolation (prim./sec.)	Yes, SELV, (to EN 600950, VDE 805)	Yes, SELV, (to EN 600950, VDE 805)
Others	Additional output voltage 12 DC, 20 mA	Additional output voltage 12 DC, 20 mA
Connection cables		
Solid	0.2–4.0 mm <sup>2</sup> (AWG 22–12)	0.2–4.0 mm <sup>2</sup> (AWG 22–12)
Flexible	0.2–2.5 mm <sup>2</sup> (AWG 22–12)	0.2–2.5 mm <sup>2</sup> (AWG 22–12)
Degree of protection	IP20	IP20
RFI suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4	EN 55011, EN 55022 Class B, IEC 61000-6-1, 2, 3, 4
Ambient operating temperature	–25 °C to +55 °C	–25 °C to +55 °C
Transport and storage temperature	–40 °C to +70 °C	–40 °C to +70 °C
Mounting	On 35 mm DIN rail or screw mounting with ZB4-101-GF1 mounting feet	

#### Wiring Diagram

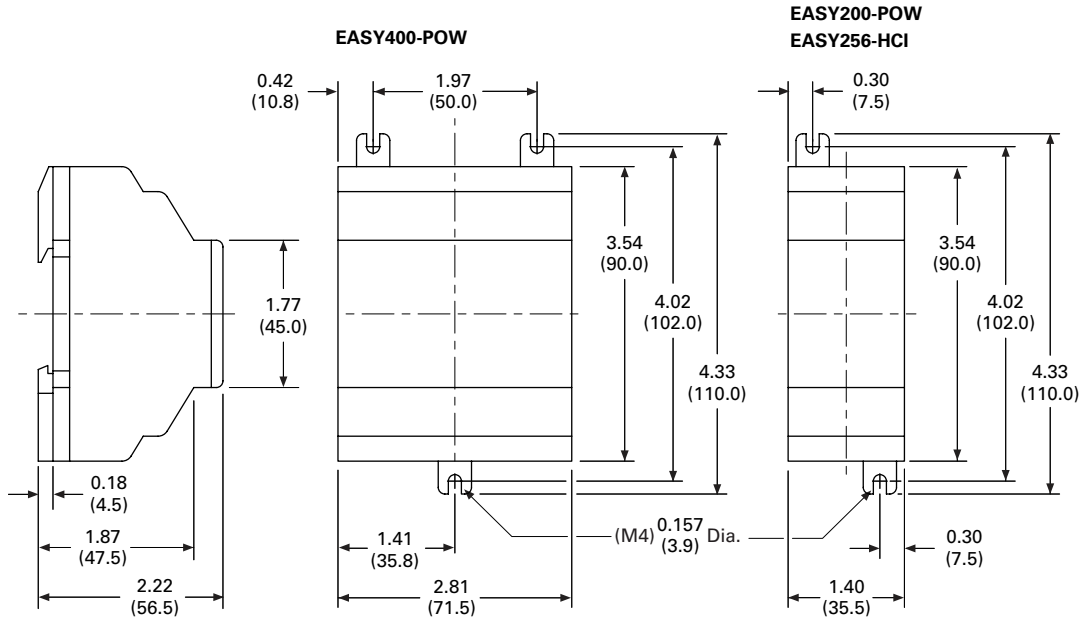
##### EASY256-HCI



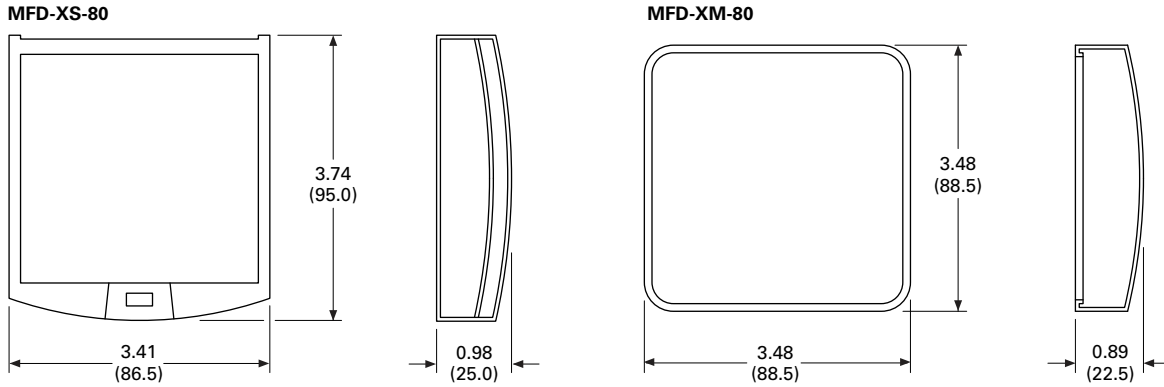
### Dimensions

Approximate Dimensions in Inches (mm)

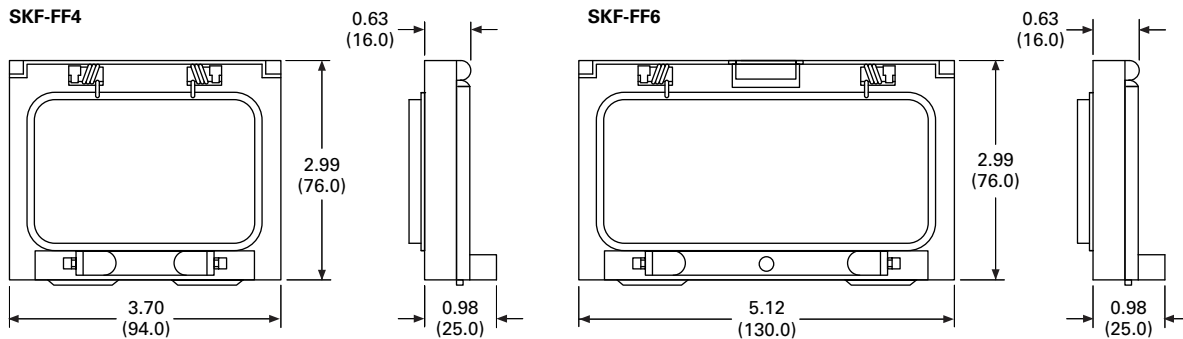
#### EASY200-POW/EASY256-HCI and EASY400-POW Series, Drawing Number MD05013004E



#### MFD-XS-80 and MFD-XM-80 Series, Drawing Number MD05013009E



#### SKF-FF4 and SKF-FF6 Series, Drawing Number MD05013014E





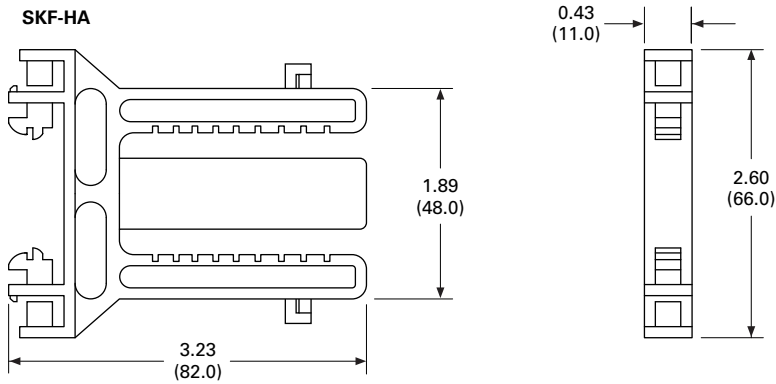
# 3.3

## Control Relays and Timers

### Programmable Relays

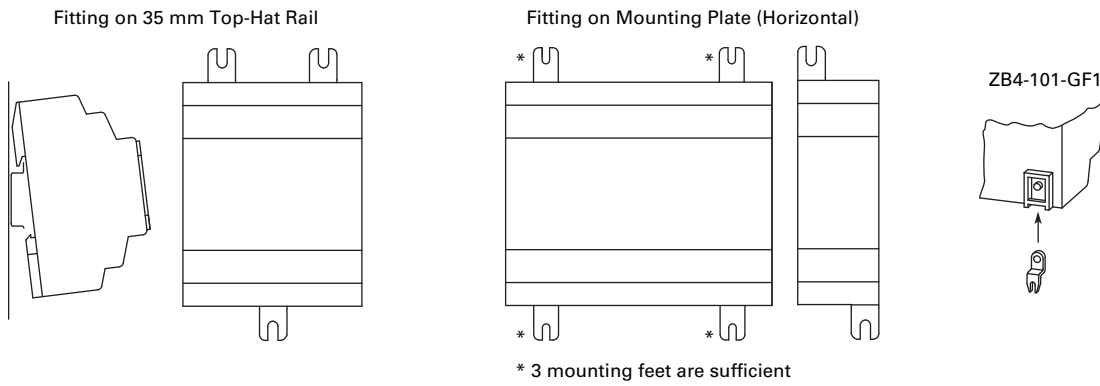
Approximate Dimensions in Inches (mm)

#### SKF-HA Series, Drawing Number MD05013015E

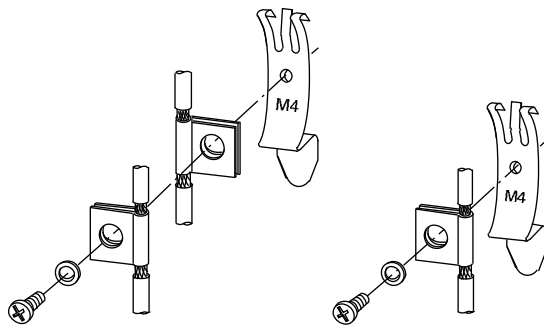


3

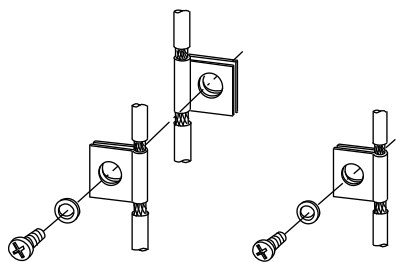
#### ZB4-101-GF1 Mounting Feet



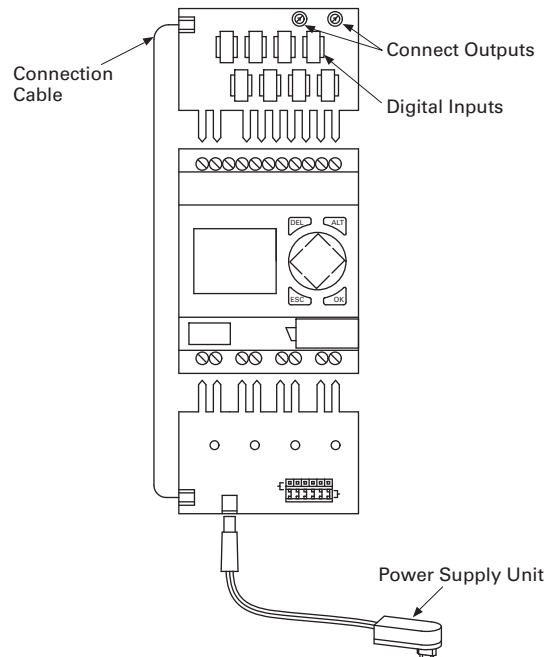
#### ZB4-102-KS1 Series— Grounding the Screen for Top-Hat Rail



#### ZB4-102-KS1 Series— Grounding the Screen for Mounting Plate



#### EASY412-DC-SIM-NA Series



## General Purpose Plug-In Relay



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D3RR/D3RF Series . . . . .	V7-T3-67
D4 Series . . . . .	V7-T3-76
D5RR/D5RF Series . . . . .	V7-T3-80
D7PR/D7PF Series . . . . .	V7-T3-89
D8 Series . . . . .	V7-T3-103
D9 Series . . . . .	V7-T3-108
Accessories . . . . .	V7-T3-112

## 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



**Note:** UL when used with the appropriate socket.



**Note:** UL when used with the appropriate socket.



**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	12 A	6 A	10 A	10 A
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-T3-53 to V7-T3-56	V7-T3-57 to V7-T3-66	V7-T3-67 to V7-T3-75

## General Purpose Plug-In Relays, continued

## Relay Series

D4



D5RR/D5RF



D7PR/D7PF



## Approvals



Note: UL when used with the appropriate socket.

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	10 A at 250 Vac	5 A at 240 Vac	10 A	10 A	15 A	15 A	15 A
Material	AgCdO		Silver alloy		Silver alloy		
Dielectric strength	5000 V		1500 V		1500 V	2500 V	2500 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		3 VA		1.2 VA	1.5 VA	1.5 VA
Watts (Vdc)	0.5 W		1.4 W		0.9 W	1.4 W	1.5 W

## General Data

Ambient temperature							
Storage	−40 °F to +158 °F (−40 °C to +70 °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	15 milliseconds		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-T3-76 to V7-T3-79

V7-T3-80 to V7-T3-88

V7-T3-89 to V7-T3-102

# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

3

#### 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 220 Vac	25 A at 220 Vac	25 A at 220 Vac	8 A at 220 Vac
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	<b>V7-T3-103 to V7-T3-107</b>	<b>V7-T3-108 to V7-T3-111</b>

### D1 Series Relay



## 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


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Technical Data and Specifications . . . . .	<b>V7-T3-55</b>
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D3RR/D3RF Series . . . . .	<b>V7-T3-67</b>
D4 Series . . . . .	<b>V7-T3-76</b>
D5RR/D5RF Series . . . . .	<b>V7-T3-80</b>
D7PR/D7PF Series . . . . .	<b>V7-T3-89</b>
D8 Series . . . . .	<b>V7-T3-103</b>
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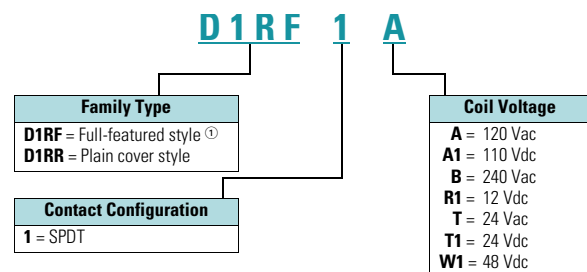
### Standards and Certifications



 When used with accompanying Eaton screw terminal socket.

### Catalog Number Selection

#### D1RF/D1RR Series



#### Note

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

# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

3

#### 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
<b>Full Featured</b>			
12 Vdc	SPDT	188	<b>D1RF1R1</b>
24 Vac 50/60 Hz	SPDT	180	<b>D1RF1T</b>
24 Vdc	SPDT	750	<b>D1RF1T1</b>
110 Vdc	SPDT	13,800	<b>D1RF1A1</b>
120 Vac 50/60 Hz	SPDT	4430	<b>D1RF1A</b>
240 Vac 50/60 Hz	SPDT	15,720	<b>D1RF1B</b>
<b>Plain Cover</b>			
12 Vdc	SPDT	188	<b>D1RR1R1</b>
24 Vdc	SPDT	750	<b>D1RR1T1</b>
48 Vdc	SPDT	2600	<b>D1RR1W1</b>
110 Vdc	SPDT	13,800	<b>D1RR1A1</b>
120 Vac 50/60 Hz	SPDT	4430	<b>D1RR1A</b>
240 Vac	SPDT	15,270	<b>D1RR1B</b>

#### 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 <sup>2</sup>	Screw clamping	10	<b>D1RAA</b> ①
Flange mount adapter	—	—	—	Flange	—	—	25	<b>PFC-D11</b>
Metal spring clip	—	—	—	—	—	—	25	<b>PMC-1781</b>
Protection diode	B	6 to 250 Vdc	—	—	—	—	20	<b>MOD-BD250</b>
LED indicator	B	24 Vac/Vdc	—	—	—	—	20	<b>MOD-BLG24</b>
	B	120/240 Vac/Vdc	—	—	—	—	20	<b>MOD-BLG240</b>
MOV suppressor	B	120 Vac/Vdc	—	—	—	—	20	<b>MOD-BMV120</b>
	B	24 Vac/Vdc	—	—	—	—	20	<b>MOD-BMV24</b>
	B	240 Vac/Vdc	—	—	—	—	20	<b>MOD-BMV240</b>
Plastic DIN rail end stop	—	—	—	—	—	—	25	<b>PPF-P</b>

#### Note

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

**Technical Data and Specifications****D1RF/D1RR Relay Specifications**

Description	D1RR	D1RF
<b>Contact Characteristics</b>		
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	20 A at 120 Vac 50/60 Hz	20 A at 120 Vac 50/60 Hz
	20 A at 277 Vac 50/60 Hz	20 A at 277 Vac 50/60 Hz
	20 A at 28 Vdc	20 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)
<b>Coil Characteristics</b>		
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)
<b>Performance</b>		
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)
<b>Environment</b>		
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
<b>Features</b>		
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



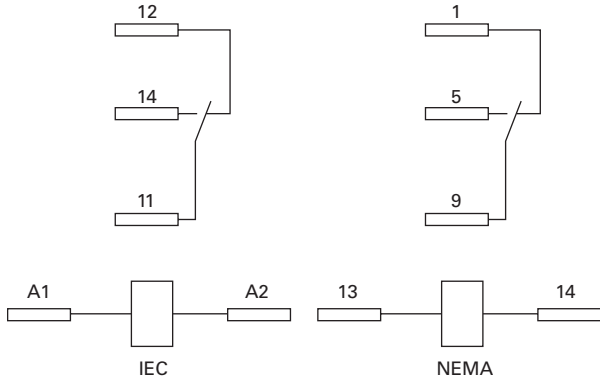
# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

#### Wiring Diagram

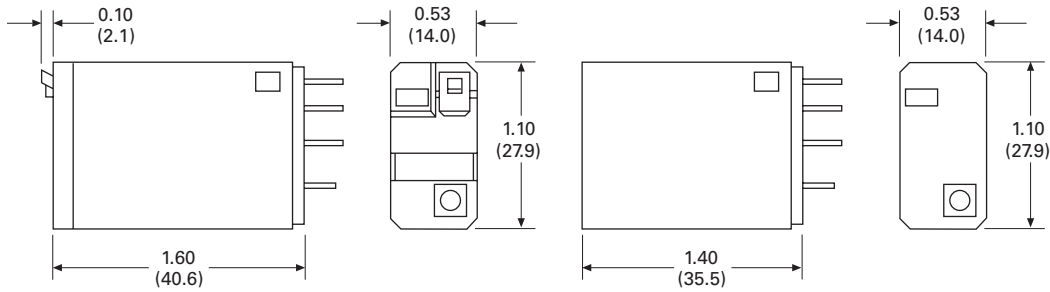
##### D1RF/D1RR



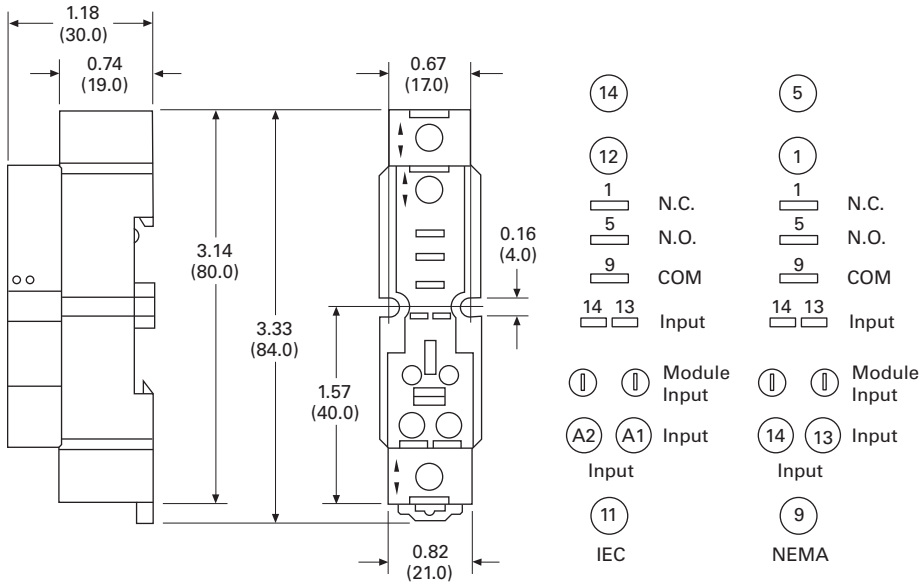
#### Dimensions

Approximate Dimensions in Inches (mm)

##### D1RF/D1RR



##### D1RAA



## D2 Series Relay



## D2RR/D2RF Series

## Product Description

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

## Features

**D2RR**

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

## Contents

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D5RR/D5RF Series . . . . .	<b>V7-T3-80</b>
D7PR/D7PF Series . . . . .	<b>V7-T3-89</b>
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Accessories . . . . .	<b>V7-T3-112</b>

## Standards and Certifications



When used with accompanying Eaton screw terminal socket.

**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

# 3.4

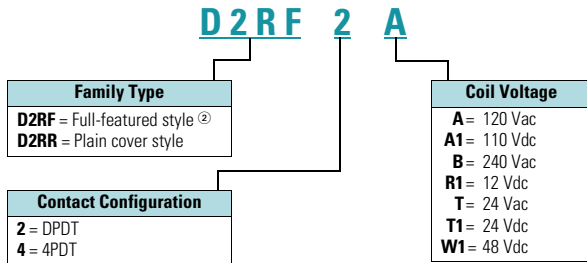
## Control Relays and Timers

### General Purpose Plug-In Relays

#### Catalog Number Selection

##### D2RF/D2RR ①

3



#### 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	—	—

#### 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
<b>Full Featured Style</b>			
12 Vdc	DPDT	160	<b>D2RF2R1</b>
24 Vac	DPDT	180	<b>D2RF2T</b>
24 Vdc	DPDT	650	<b>D2RF2T1</b>
48 Vdc	DPDT	2600	<b>D2RF2W1</b>
110/125 Vdc	DPDT	11,000	<b>D2RF2A1</b>
120 Vac	DPDT	4430	<b>D2RF2A</b>
220/240 Vac	DPDT	15,720	<b>D2RF2B</b>
12 Vdc	4PDT	160	<b>D2RF4R1</b>
24 Vac	4PDT	180	<b>D2RF4T</b>
24 Vdc	4PDT	650	<b>D2RF4T1</b>
48 Vdc	4PDT	2600	<b>D2RF4W1</b>
110/125 Vdc	4PDT	11,000	<b>D2RF4A1</b>
120 Vac	4PDT	4430	<b>D2RF4A</b>
220/240 Vac	4PDT	15,720	<b>D2RF4B</b>
<b>Plain Cover Style</b>			
12 Vdc	DPDT	160	<b>D2RR2R1</b>
24 Vac	DPDT	180	<b>D2RR2T</b>
24 Vdc	DPDT	650	<b>D2RR2T1</b>
120 Vac	DPDT	4430	<b>D2RR2A</b>
220/240 Vac	DPDT	15,720	<b>D2RR2B</b>
12 Vdc	4PDT	160	<b>D2RR4R1</b>
24 Vac	4PDT	180	<b>D2RR4T</b>
24 Vdc	4PDT	650	<b>D2RR4T1</b>
110/125 Vdc	4PDT	11,000	<b>D2RR4A1</b>
120 Vac	4PDT	4430	<b>D2RR4A</b>
220/240 Vac	4PDT	15,720	<b>D2RR4B</b>

# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

#### Accessories

##### D2RF/D2RR Sockets and Accessories

3

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 <sup>2</sup>	Elevator	1	<b>D2PAL</b> ①
	None	300	10	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Screw clamping	10	<b>D2PA6</b>
	B	300	10	DIN rail/panel	14/16 (2) AWG, 2.5/1.5 (2) mm <sup>2</sup>	Elevator	1	<b>D2PAP</b> ①
	B	300	10	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Screw clamping	10	<b>D2PA7</b> ①
	None	300	10	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Screw clamping	5	<b>D2PA4</b>
Flange mount adapter	—	—	—	Flange	—	—	25	<b>PFC-D2D72</b>
Plastic ejector clip	—	—	—	—	—	—	10	<b>PWC-D24</b>
Metal spring clip	—	—	—	—	—	—	25	<b>PQC-1782</b>
	—	—	—	—	—	—	25	<b>PQC-1342</b>
Hold-down spring	—	—	—	—	—	—	100	<b>PYC-A1</b>
Protection diode	B	6 to 250 Vdc	—	—	—	—	20	<b>MOD-BD250</b>
LED indicator	B	24 Vac/Vdc	—	—	—	—	20	<b>MOD-BLG24</b>
	B	120/240 Vac/Vdc	—	—	—	—	20	<b>MOD-BLG240</b>
MOV suppressor	B	120 Vac/Vdc	—	—	—	—	20	<b>MOD-BMV120</b>
	B	24 Vac/Vdc	—	—	—	—	20	<b>MOD-BMV24</b>
	B	240 Vac/Vdc	—	—	—	—	20	<b>MOD-BMV240</b>
Coil bus jumpers	—	—	—	—	—	—	10	<b>D2PJ1</b>
Plastic DIN rail end stop	—	—	—	—	—	—	25	<b>PPF-P</b>

**Note**

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

## Technical Data and Specifications

### D2RF/D2RR Relay Specifications

Description	D2RR2/D2RR4	D2RF
<b>Contact Characteristics</b>		
Contact rating	12 A / 6 A	6 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 120 Vac 50/60 Hz	10 A at 277 Vac 50/60 Hz
	8 A at 277 Vac 50/60 Hz	8 A at 120 Vac 50/60 Hz
	8 A at 28 Vdc	8 A at 28 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
Pilot duty	B300	B300
Minimum switching requirement	100 mA at 5 Vdc (0.5 W)	100 mA at 5 Vdc (0.5 W)
<b>Coil Characteristics</b>		
Operating range		
% of nominal (AC)	85 to 110%	85 to 110%
% of nominal (DC)	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)
	10% (DC)	10% (DC)
<b>Performance</b>		
Electrical life (UL 508) operations at rated current	200,000	200,000
Mechanical life operations unpowered	10,000,000	10,000,000
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
<b>Environment</b>		
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
<b>Features</b>		
Cover options	Plain cover	Full featured
Features	Mechanical flag indicator	Locking pushbutton/ Bipolar LED/ Removable ID tag/ Mechanical flag indicator
Product certifications	RoHS/UL/CE/CSA	RoHS/UL/CE/CSA

# 3.4

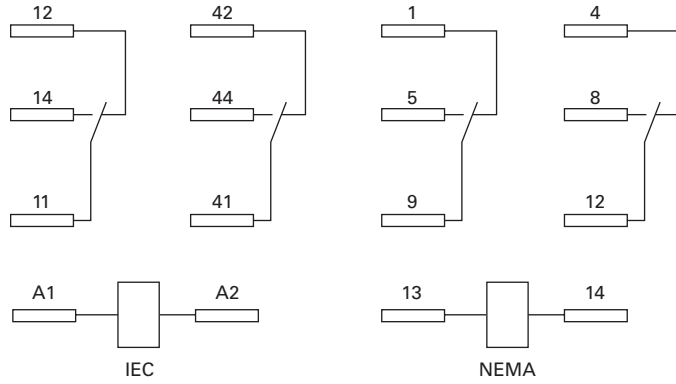
## Control Relays and Timers

### General Purpose Plug-In Relays

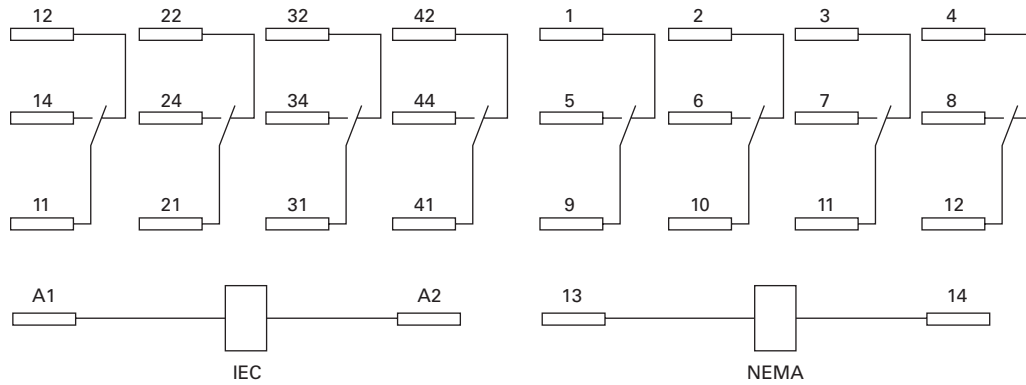
#### Wiring Diagrams

##### D2RF2/D2RR2

3



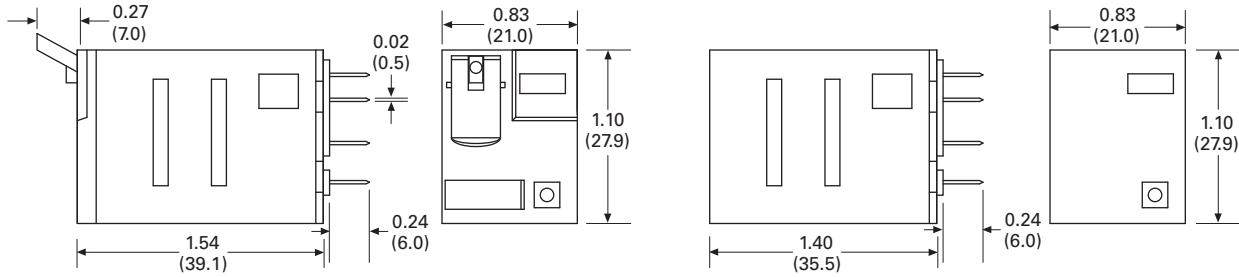
##### D2RF4/D2RR4



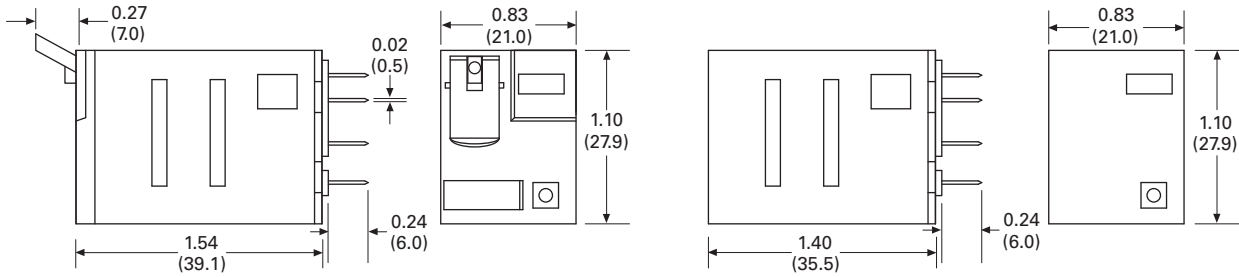
### Dimensions

Approximate Dimensions in Inches (mm)

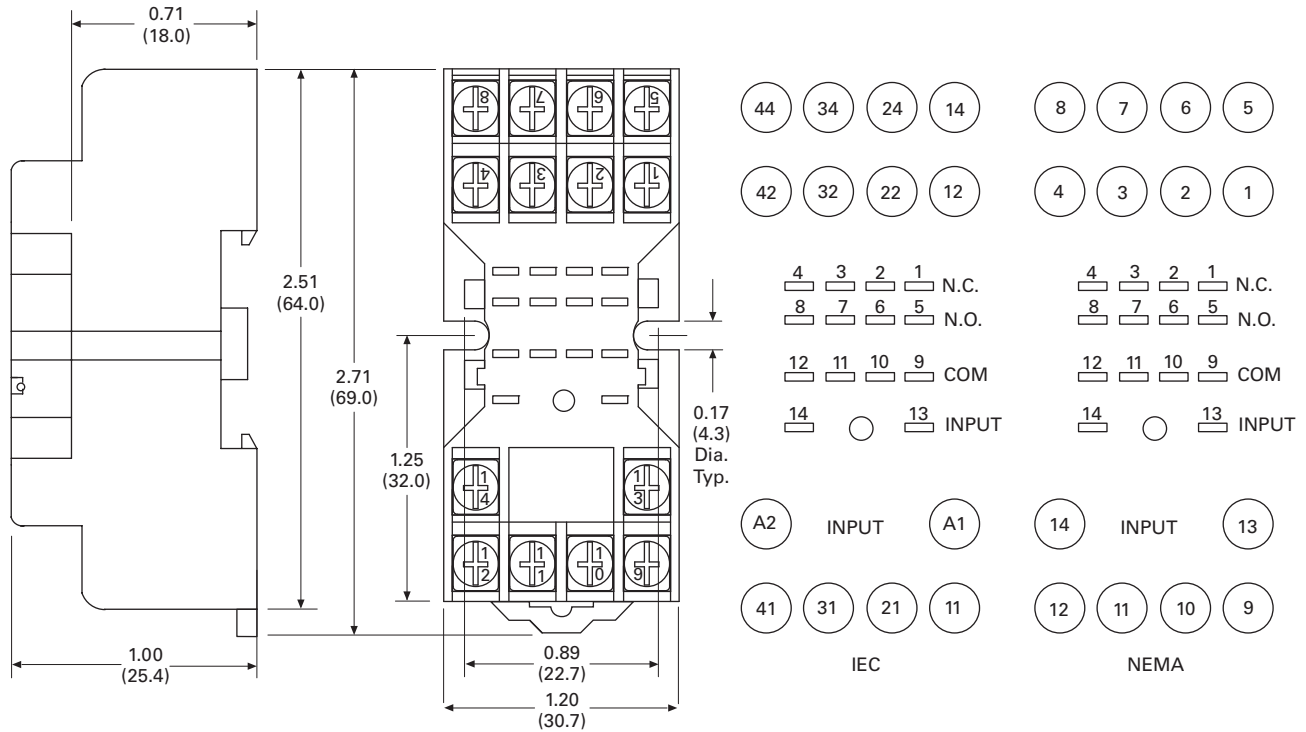
#### D2RF2/D2RR2



#### D2RF4/D2RR4



#### D2PA6





# 3.4

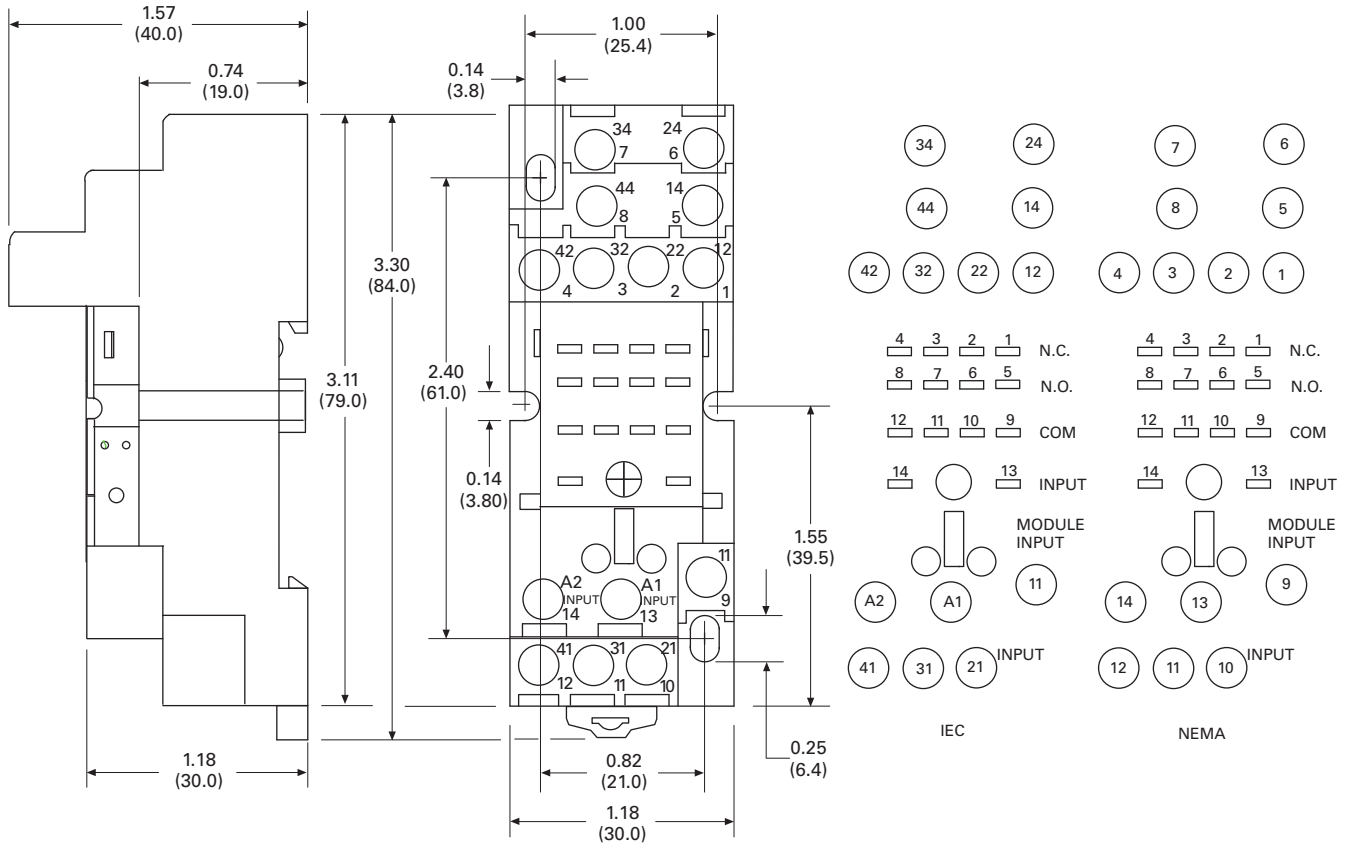
## Control Relays and Timers

### General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

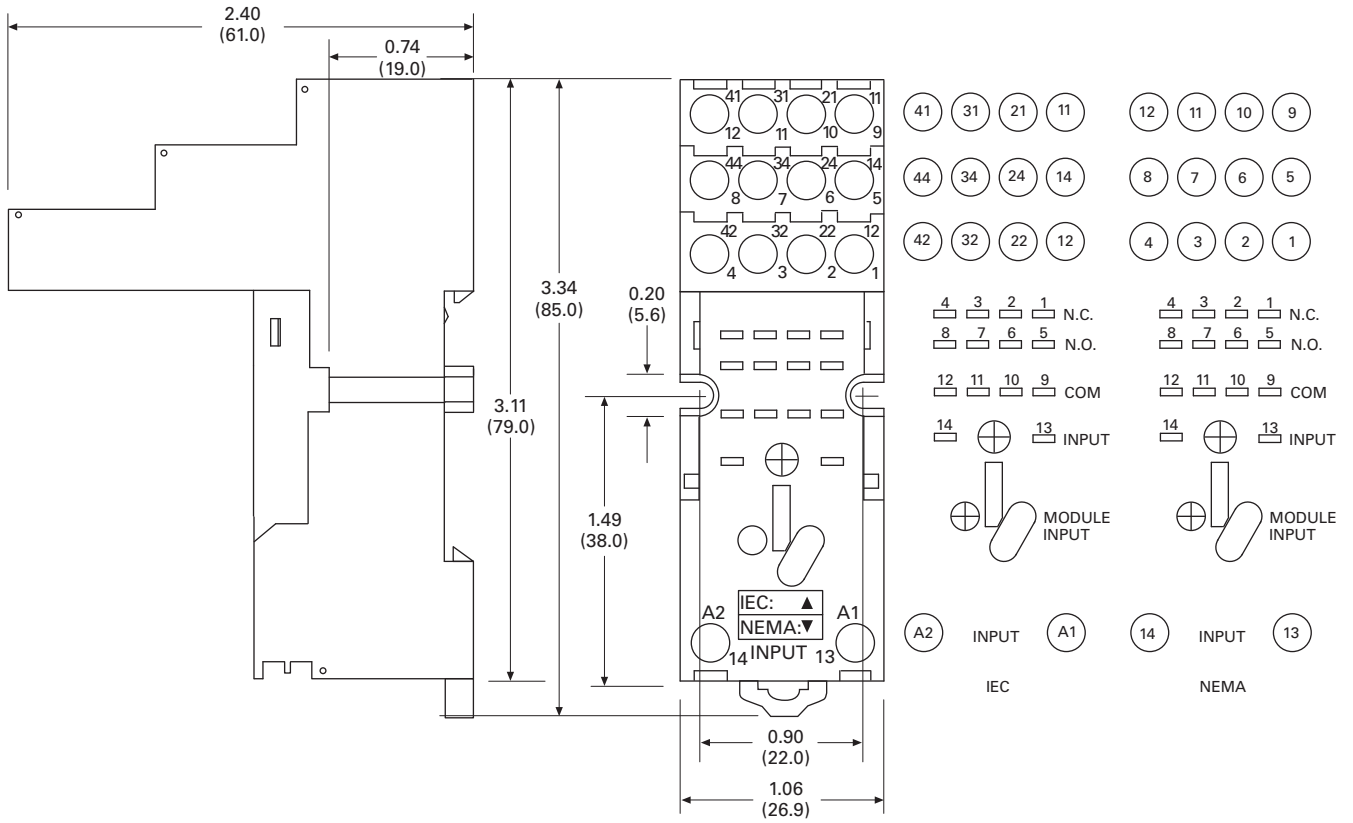
#### D2PA7

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Approximate Dimensions in Inches (mm)

### D2PAP



# 3.4

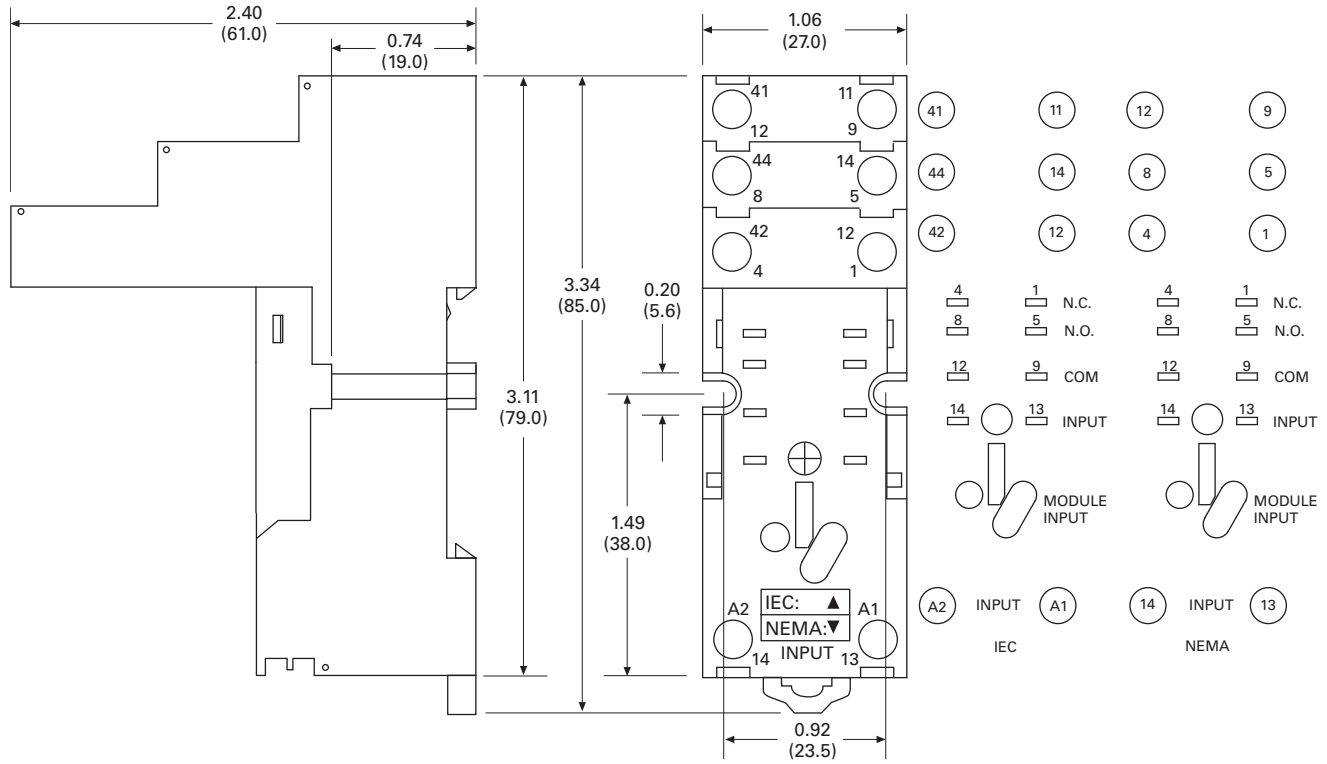
## Control Relays and Timers

### General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

#### D2PAL

3



## D3 Series Relay



## 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

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D4 Series . . . . .	V7-T3-76
D5RR/D5RF Series . . . . .	V7-T3-80
D7PR/D7PF Series . . . . .	V7-T3-89
D8 Series . . . . .	V7-T3-103
D9 Series . . . . .	V7-T3-108
Accessories . . . . .	V7-T3-112

## Standards and Certifications



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

**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

# 3.4

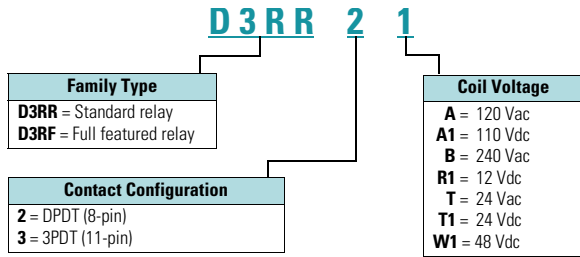
## Control Relays and Timers

### General Purpose Plug-In Relays

#### Catalog Number Selection

##### D3RR/D3RF Series ①

3



#### 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
<b>Full Featured Style</b>			
120 Vac	DPDT	1700	<b>D3RF2A</b>
240 Vac	DPDT	7200	<b>D3RF2B</b>
12 Vdc	DPDT	120	<b>D3RF2R1</b>
24 Vdc	DPDT	470	<b>D3RF2T1</b>
120 Vac	3PDT	1700	<b>D3RF3A</b>
220/240 Vac	3PDT	7200	<b>D3RF3B</b>
24 Vac	3PDT	72	<b>D3RF3T</b>
24 Vdc	3PDT	470	<b>D3RF3T1</b>
<b>Plain Cover Style</b>			
120 Vac	DPDT	1700	<b>D3RR2A</b>
110/125 Vdc	DPDT	10,000	<b>D3RR2A1</b>
220/240 Vac	DPDT	7200	<b>D3RR2B</b>
12 Vdc	DPDT	120	<b>D3RR2R1</b>
24 Vac	DPDT	72	<b>D3RR2T</b>
24 Vdc	DPDT	470	<b>D3RR2T1</b>
48 Vdc	DPDT	1800	<b>D3RR2W1</b>
120 Vac	3PDT	1700	<b>D3RR3A</b>
110/125 Vdc	3PDT	10,000	<b>D3RR3A1</b>
220/240 Vac	3PDT	7200	<b>D3RR3B</b>
12 Vdc	3PDT	120	<b>D3RR3R1</b>
24 Vac	3PDT	72	<b>D3RR3T</b>
24 Vdc	3PDT	470	<b>D3RR3T1</b>

# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

#### Accessories

##### D3RR/D3RF Series Sockets and Accessories

3

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) mm <sup>2</sup>	Screw clamping	1	<b>D3PA6</b> <sup>①</sup>
	A	300	12	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Elevator	10	<b>D3PAL8</b> <sup>①</sup>
	None	300/600	15/10	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Screw clamping	10	<b>D3PA2</b>
	A	600	5	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Screw clamping	1	<b>D3PA7</b> <sup>①</sup>
	A	300	12	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Elevator	10	<b>D3PAL11</b> <sup>①</sup>
	None	300/600	15/5	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Screw clamping	10	<b>D3PA3</b>
Metal spring clip	—	—	—	—	—	—	25	<b>PQC-1332</b>
	—	—	—	—	—	—	10	<b>PQC-1351</b>
Protection diode	A	6 to 250 Vdc	—	—	—	—	20	<b>MOD-AD250</b>
LED indicator	A	24 Vac/Vdc	—	—	—	—	20	<b>MOD-ALG24</b>
	A	120/240 Vac/Vdc	—	—	—	—	20	<b>MOD-ALG240</b>
MOV suppressor	A	120 Vac/Vdc	—	—	—	—	20	<b>MOD-AMV120</b>
	A	24 Vac/Vdc	—	—	—	—	20	<b>MOD-AMV24</b>
	A	240 Vac/Vdc	—	—	—	—	20	<b>MOD-AMV240</b>
R/C suppressor	A	6 to 24 Vac/Vdc	—	—	—	—	20	<b>MOD-RC24</b>
	A	110 to 240 Vac/Vdc	—	—	—	—	20	<b>MOD-RC240</b>
Write-on plastic labels	—	—	—	—	—	—	10	<b>PWF-D3D5</b>
Coil bus jumpers	—	—	—	—	—	—	10	<b>D3PJ1</b>
Plastic DIN rail end stop	—	—	—	—	—	—	25	<b>PPF-P</b>

**Note**

<sup>①</sup> Protection category (finger safe), EN 60529: IP20.

## Technical Data and Specifications

### D3RR/D3RF Series Relay Specifications

Description	D3RR	D3RF
<b>Contact Characteristics</b>		
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	16 A at 277 Vac 50/60 Hz	16 A at 277 Vac 50/60 Hz
	16 A at 120 Vac 50/60 Hz	16 A at 120 Vac 50/60 Hz
	16 A at 28 Vdc	16 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)
<b>Coil Characteristics</b>		
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)
<b>Performance</b>		
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)
<b>Environment</b>		
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
<b>Features</b>		
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



# 3.4

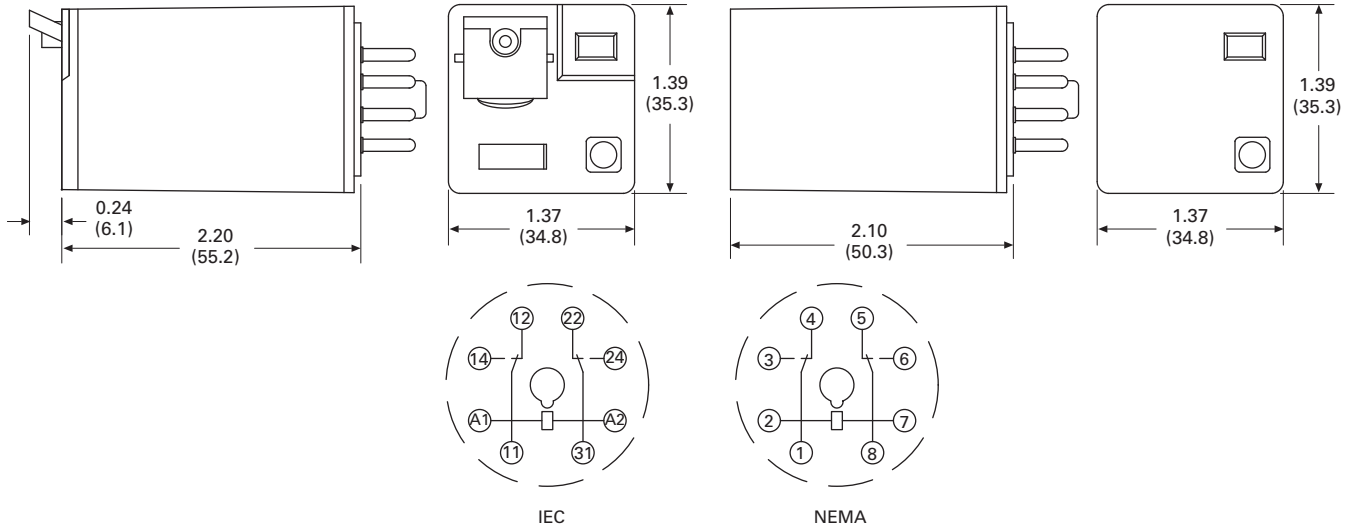
## Control Relays and Timers

### General Purpose Plug-In Relays

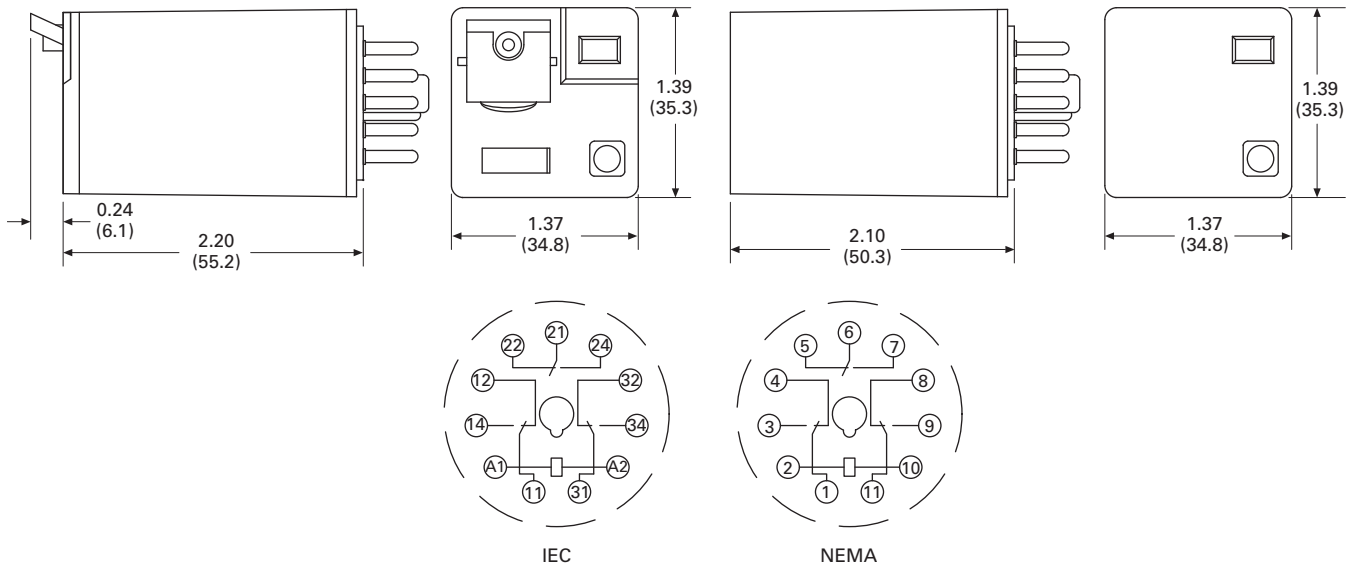
#### Dimensions

Approximate Dimensions in Inches (mm)

#### D3RR2/D3RF2

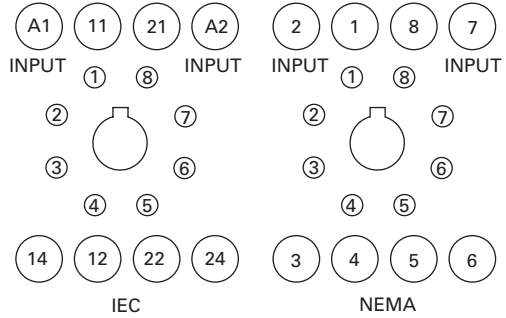
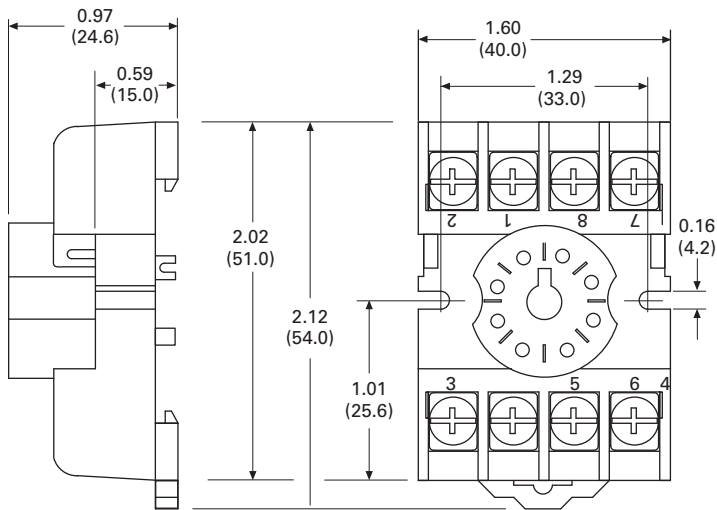


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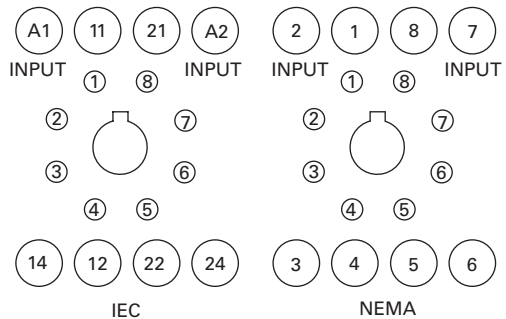
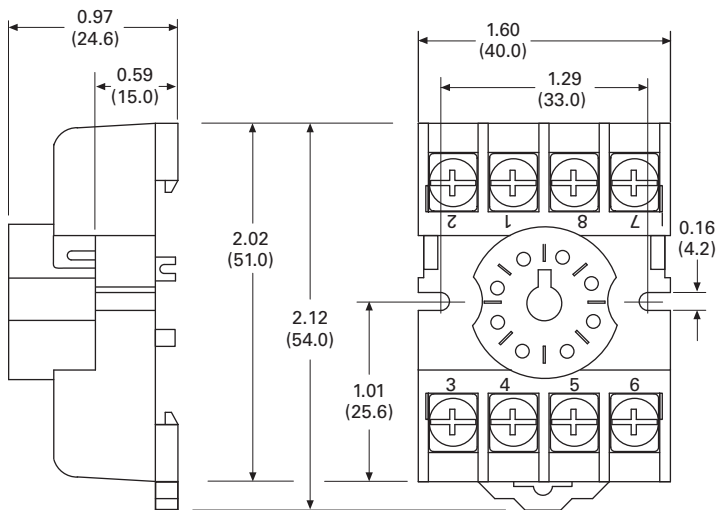
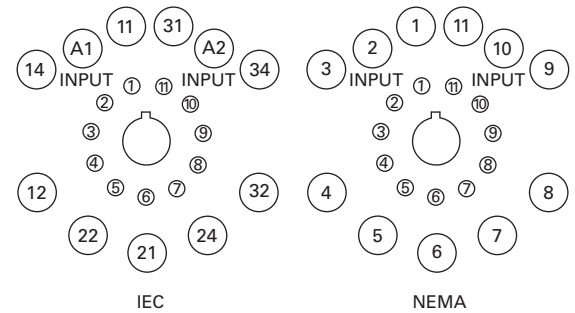
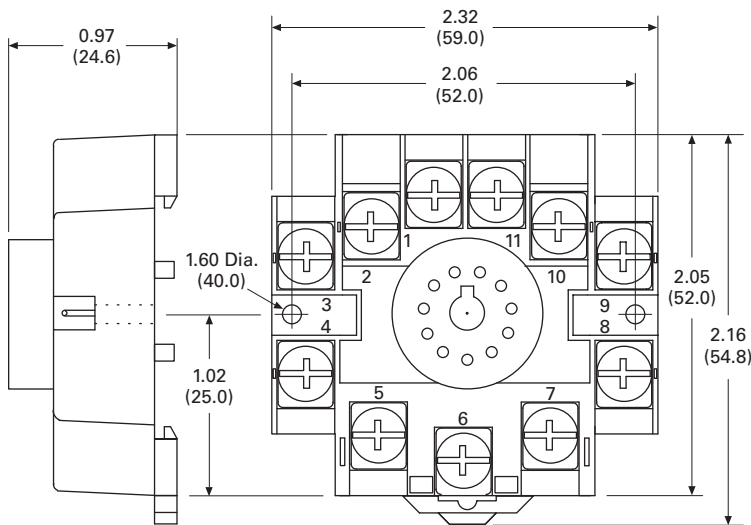


Approximate Dimensions in Inches (mm)

### D3PA2



### D3PA3



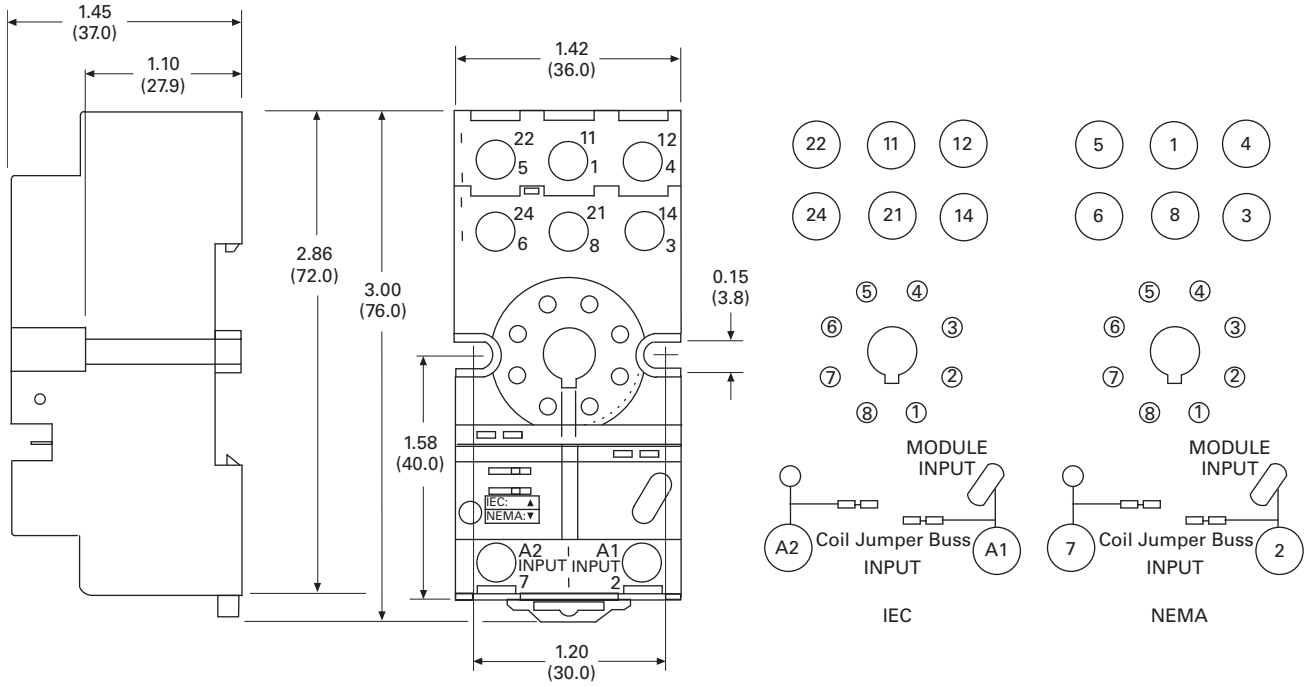
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## Control Relays and Timers

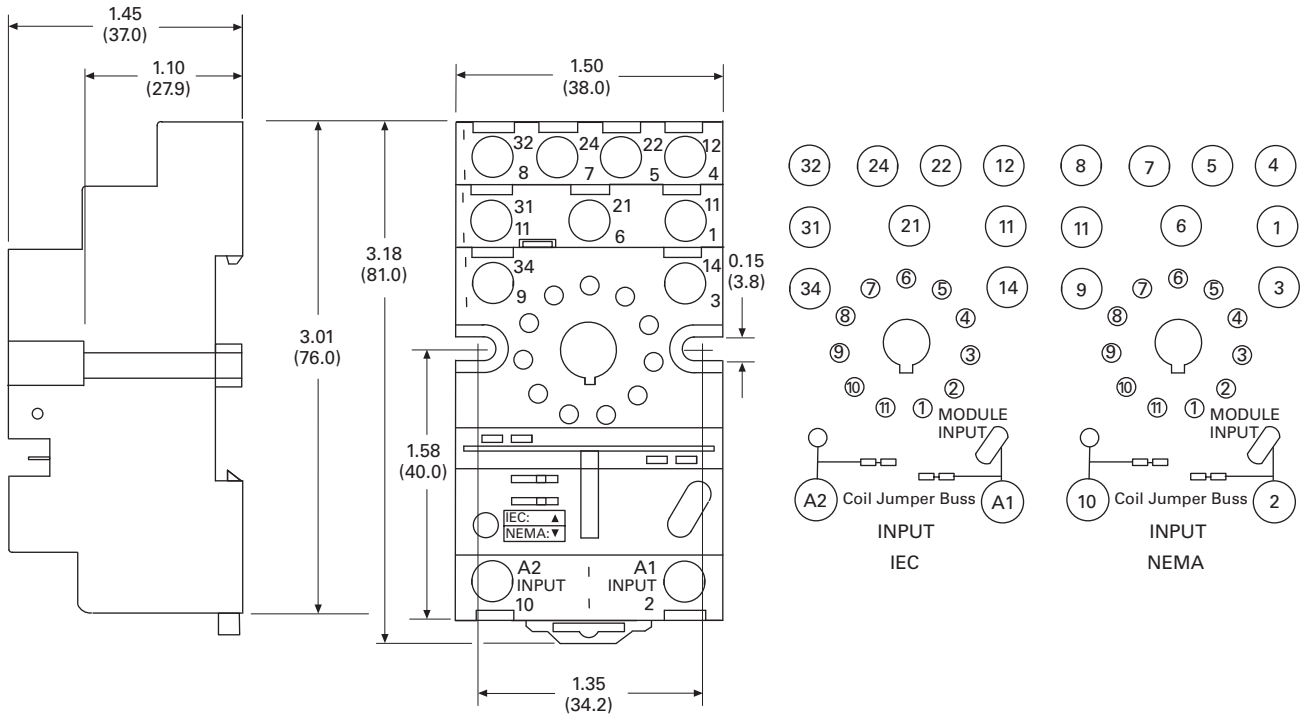
### General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

#### D3PA6

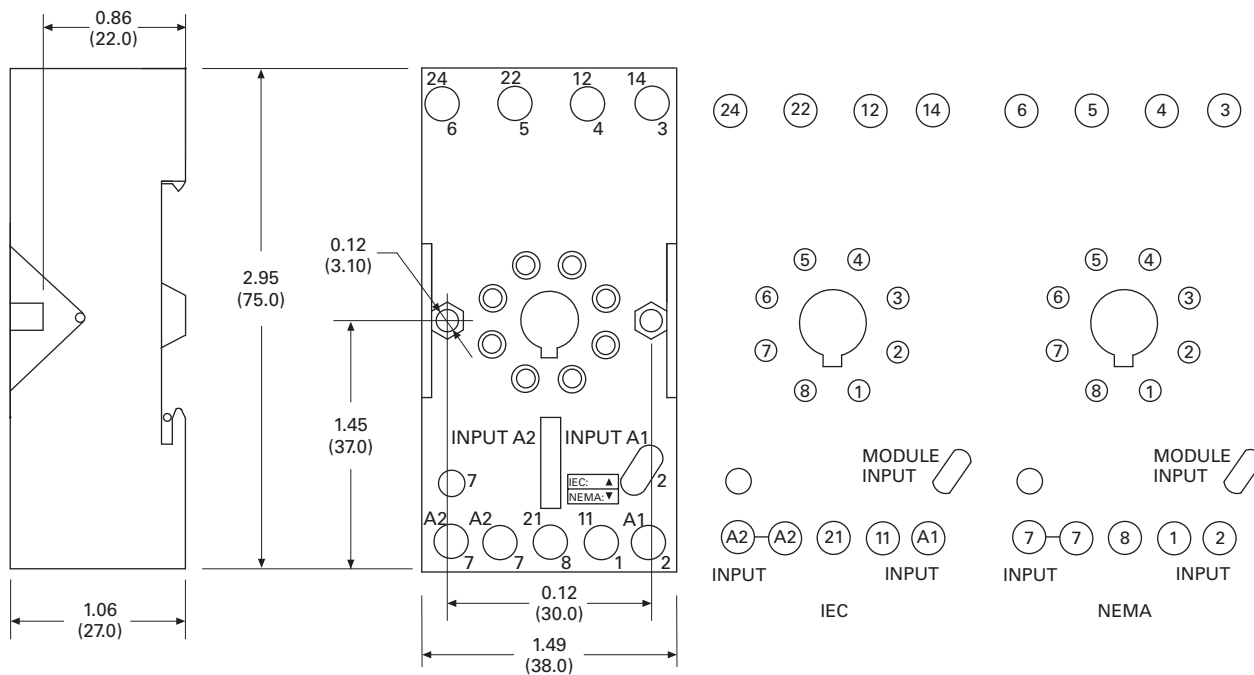


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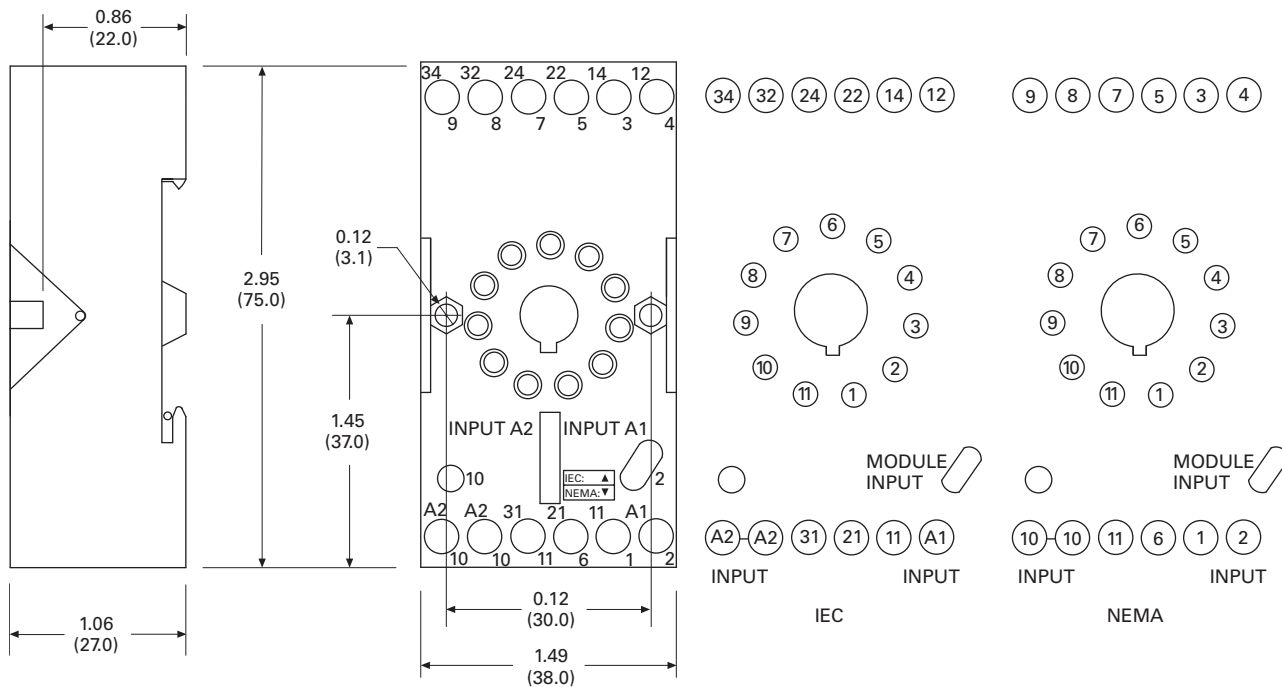


Approximate Dimensions in Inches (mm)

### D3PAL8



### D3PAL11



D4 Series Relay



### 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

File # E1491, E65657

File # LR701519

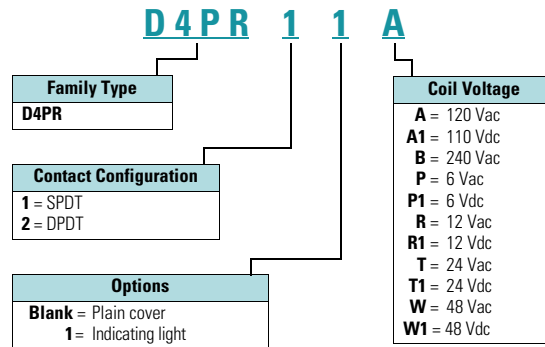


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#### Catalog Number Selection

##### D4 Series ①



#### Product Selection

##### D4 Relay/Socket Quick Reference

Relay Type	Socket	Hold-Down Clip
D4PR1	D4PA1	②
D4PR2	D4PA2	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
<b>DIN Rail Sockets</b>		
Single-pole	10	<b>D4PA1</b>
Two-pole	10	<b>D4PA2</b>
<b>SPDT with Indicating Light</b>		
120 Vac	1	<b>D4PR11A</b>
110 Vdc	1	<b>D4PR11A1</b>
240 Vac	1	<b>D4PR11B</b>
6 Vac	50	<b>D4PR11P</b>
6 Vdc	50	<b>D4PR11P1</b>
12 Vac	50	<b>D4PR11R</b>
12 Vdc	1	<b>D4PR11R1</b>
24 Vac	1	<b>D4PR11T</b>
24 Vdc	1	<b>D4PR11T1</b>
48 Vdc	50	<b>D4PR11W1</b>
<b>Standard SPDT</b>		
120 Vac	1	<b>D4PR1A</b>
110 Vdc	50	<b>D4PR1A1</b>
240 Vac	50	<b>D4PR1P</b>
6 Vac	1	<b>D4PR1P1</b>
6 Vdc	50	<b>D4PR1R</b>
12 Vac	1	<b>D4PR1R1</b>
12 Vdc	1	<b>D4PR1R1-A2</b>
24 Vac	1	<b>D4PR1T</b>
24 Vdc	1	<b>D4PR1T1</b>
48 Vdc	1	<b>D4PR1W1</b>

Voltage/Poles	Standard Pack	Catalog Number
<b>DPDT with Indicating Light</b>		
120 Vac	1	<b>D4PR21A</b>
110 Vdc	1	<b>D4PR21A1</b>
240 Vac	1	<b>D4PR21B</b>
6 Vac	50	<b>D4PR21P</b>
6 Vdc	1	<b>D4PR21P1</b>
12 Vac	50	<b>D4PR21R</b>
12 Vdc	1	<b>D4PR21R1</b>
24 Vac	1	<b>D4PR21T</b>
24 Vdc	1	<b>D4PR21T1</b>
48 Vdc	50	<b>D4PR21W1</b>
<b>Standard DPDT</b>		
120 Vac	1	<b>D4PR2A</b>
110 Vdc	50	<b>D4PR2A1</b>
240 Vac	50	<b>D4PR2B</b>
6 Vac	50	<b>D4PR2P</b>
6 Vdc	1	<b>D4PR2P1</b>
12 Vac	50	<b>D4PR2R</b>
12 Vdc	1	<b>D4PR2R1</b>
24 Vac	1	<b>D4PR2T</b>
24 Vdc	1	<b>D4PR2T1</b>
48 Vdc	1	<b>D4PR2W1</b>

## Technical Data and Specifications

## D4 Series

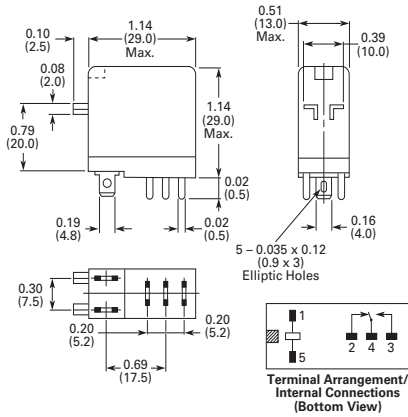
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Description	Resistive Load (p.f. = 1)	Inductive Load (p.f. = 0.4, L/R = 7 ms)
<b>D4PR1</b>		
Rated load	250 Vac 10 A	250 Vac 7.5 A
	30 Vdc 10 A	30 Vdc 5 A
Carry current	10 A	10 A
Max. operating voltage	380 Vac/125 Vdc	380 Vac/125 Vdc
Max. operating current	10 A	10 A
Contact material	AgCdO	AgCdO
Max. switching capacity	2500 VA	1875 VA
	300 W	150 W
Min. permissible load	100 mA, 5 Vdc	100 mA, 5 Vdc
Pickup voltage (max.)	80% AC/70% DC	80% AC/70% DC
Dropout voltage (min.)	30% AC/15% DC	30% AC/15% DC
Voltage (max.)	110%	110%
Mechanical life (min.)	10,000,000 AC/20,000,000 DC	10,000,000 AC/20,000,000 DC
Electrical life at all contact ratings (min.)	100,000	100,000
Maximum hp ratings	1/3 hp (125 Vac)	1/3 hp (125 Vac)
	1/2 hp (250 Vac)	1/2 hp (250 Vac)
	1/2 hp (277 Vac)	1/2 hp (277 Vac)
<b>D4PR2</b>		
Rated load	240 Vac 5 A	250 Vac 2 A
	30 Vdc 5 A	30 Vdc 3 A
Carry current	5 A	5 A
Max. operating voltage	380 Vac/125 Vdc	380 Vac/125 Vdc
Max. operating current	5 A	5 A
Contact material	AgCdO	AgCdO
Max. switching capacity	1250 VA	500 VA
	150 W	90 W
Min. permissible load	10 mA, 5 Vdc	10 mA, 5 Vdc
Pickup voltage (max.)	80% AC/70% DC	80% AC/70% DC
Dropout voltage (min.)	30% AC/15% DC	30% AC/15% DC
Voltage (max.)	110%	110%
Mechanical life (min.)	10,000,000 AC/20,000,000 DC	10,000,000 AC/20,000,000 DC
Electrical life at all contact ratings (min.)	100,000	100,000
Maximum hp ratings	1/6 hp (120 Vac)	1/6 hp (120 Vac)
	1/3 hp (240 Vac)	1/3 hp (240 Vac)
	1/3 hp (265 Vac)	1/3 hp (265 Vac)

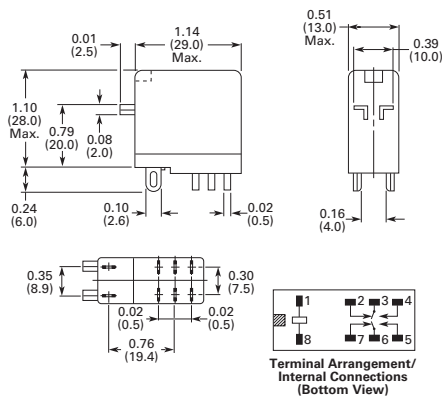
### Dimensions

Approximate Dimensions in Inches (mm)

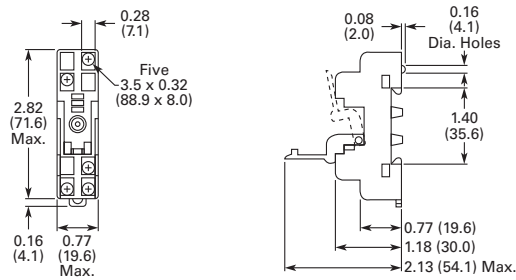
#### D4PR1



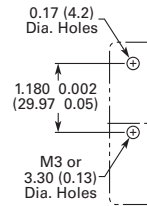
#### D4PR2



#### D4PA1

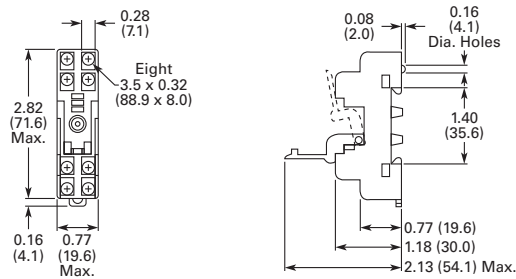


Terminal Arrangement

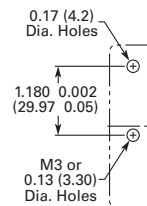


Mounting Holes

#### D4PA2



Terminal Arrangement



Mounting Holes



D5 Series Relay



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D3RR/D3RF Series.....	<b>V7-T3-67</b>
D4 Series.....	<b>V7-T3-76</b>
D5RR/D5RF Series	
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Accessories.....	<b>V7-T3-112</b>

### 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

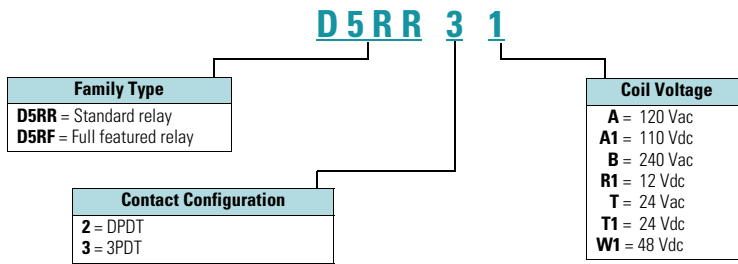
#### Standards and Certifications



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

### Catalog Number Selection

#### D5 Series



### 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	—	—

# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

3

D5 Series Relay



#### D5 Series

Coil Voltage	Contact Configuration	Coil Resistance (Ohms)	Catalog Number
<b>Full Featured</b>			
120 Vac	DPDT	1700	<b>D5RF2A</b>
110/125 Vdc	DPDT	10,000	<b>D5RF2A1</b>
220/240 Vac	DPDT	7200	<b>D5RF2B</b>
12 Vdc	DPDT	120	<b>D5RF2R1</b>
24 Vac	DPDT	72	<b>D5RF2T</b>
24 Vdc	DPDT	470	<b>D5RF2T1</b>
120 Vac	3PDT	1700	<b>D5RF3A</b>
110/125 Vdc	3PDT	10,000	<b>D5RF3A1</b>
220/240 Vac	3PDT	7200	<b>D5RF3B</b>
12 Vdc	3PDT	120	<b>D5RF3R1</b>
24 Vac	3PDT	72	<b>D5RF3T</b>
24 Vdc	3PDT	470	<b>D5RF3T1</b>
<b>Side Flange Cover</b>			
220/240 Vac	DPDT	7200	<b>D5RB2B</b>
12 Vdc	DPDT	120	<b>D5RB2R1</b>
24 Vac	DPDT	72	<b>D5RB2T</b>
24 Vdc	DPDT	470	<b>D5RB2T1</b>
<b>Plain Cover</b>			
120 Vac	DPDT	1700	<b>D5RR2A</b>
110/125 Vdc	DPDT	10,000	<b>D5RR2A1</b>
220/240 Vac	DPDT	7200	<b>D5RR2B</b>
24 Vac	DPDT	72	<b>D5RR2T</b>
24 Vdc	DPDT	470	<b>D5RR2T1</b>
120 Vac	3PDT	1700	<b>D5RR3A</b>
110/125 Vdc	3PDT	10,000	<b>D5RR3A1</b>
220/240 Vac	3PDT	7200	<b>D5RR3B</b>
12 Vdc	3PDT	120	<b>D5RR3R1</b>
24 Vac	3PDT	72	<b>D5RR3T</b>
24 Vdc	3PDT	470	<b>D5RR3T1</b>

## 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 <sup>2</sup>	Elevator	10	<b>D5PAL</b> ①
	None	300	15	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Screw clamping	10	<b>D5PA2</b>
	None	300	15	Chassis	(Output): 16 AWG, 1 mm <sup>2</sup>	Solder	10	<b>D5PA3L</b>
	None	300	15	Chassis	(Output): 16 AWG, 1 mm <sup>2</sup>	Solder	10	<b>D5PA3S</b>
Metal spring clip	—	—	—	—	—	—	10	<b>PQC-1351</b>
Protection diode	A	6 to 250 Vdc	—	—	—	—	20	<b>MOD-AD250</b>
LED indicator	A	24 Vac/Vdc	—	—	—	—	20	<b>MOD-ALG24</b>
	A	120/240 Vac/Vdc	—	—	—	—	20	<b>MOD-ALG240</b>
MOV suppressor	A	120 Vac/Vdc	—	—	—	—	20	<b>MOD-AMV120</b>
	A	24 Vac/Vdc	—	—	—	—	20	<b>MOD-AMV24</b>
	A	240 Vac/Vdc	—	—	—	—	20	<b>MOD-AMV240</b>
R/C suppressor	A	6 to 24 Vac/Vdc	—	—	—	—	20	<b>MOD-RC24</b>
	A	110 to 240 Vac/Vdc	—	—	—	—	20	<b>MOD-RC240</b>
Write-on plastic labels	—	—	—	—	—	—	10	<b>PWF-D3D5</b>
Coil bus jumpers	—	—	—	—	—	—	10	<b>D3PJ1</b>
Plastic DIN rail end stop	—	—	—	—	—	—	25	<b>PFP-P</b>

**Note**

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

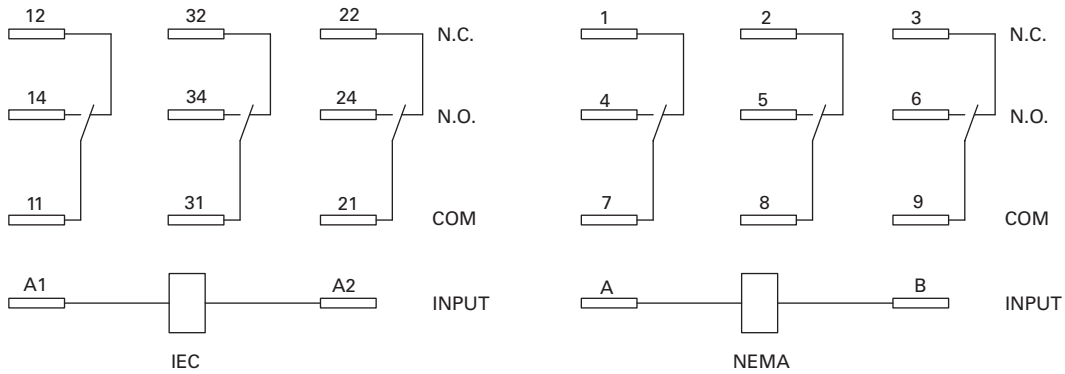
## Technical Data and Specifications

### D5 Series

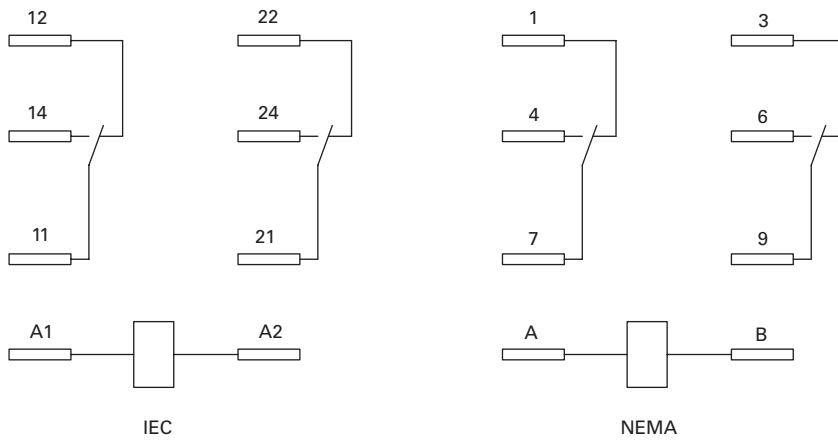
Description	D5RR	D5RF
<b>Contact Characteristics</b>		
Contact rating	10 A	10 A
Terminal style	Plug-in	Plug-in
Contact materials	Silver alloy	Silver alloy
Maximum switching voltage	300 V	300 V
Switching current at voltage—resistive		
	16 A at 277 Vac 50/60 Hz	16 A at 277 Vac 50/60 Hz
	16 A at 120 Vac 50/60 Hz	16 A at 120 Vac 50/60 Hz
	16 A at 28 Vdc	16 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)
<b>Coil Characteristics</b>		
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)
<b>Performance</b>		
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)
<b>Environment</b>		
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
<b>Features</b>		
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

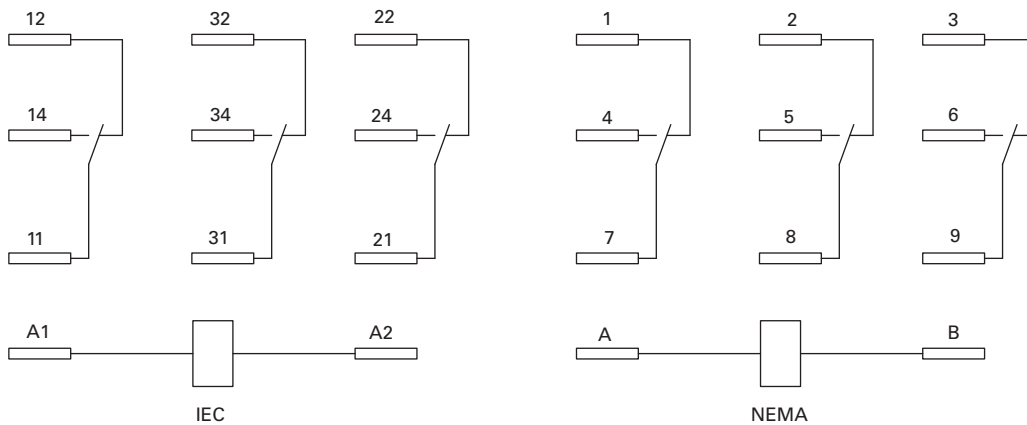
#### D5PA3L and D5PA3S



#### D5RR2/D5RF2 DPDT



#### D5RR3/D5RF3 3PDT



# 3.4

## Control Relays and Timers

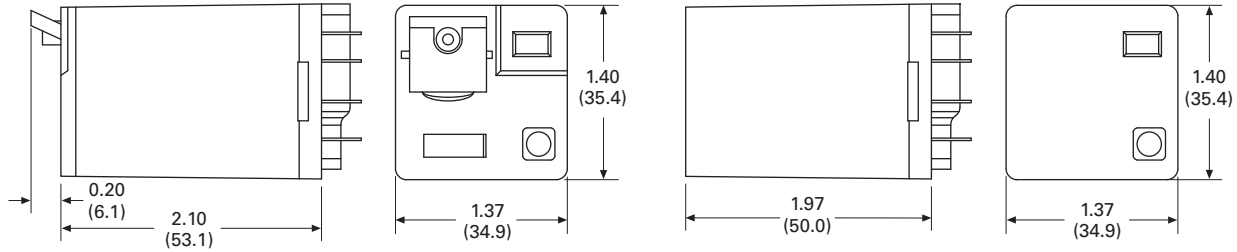
### General Purpose Plug-In Relays

#### Dimensions

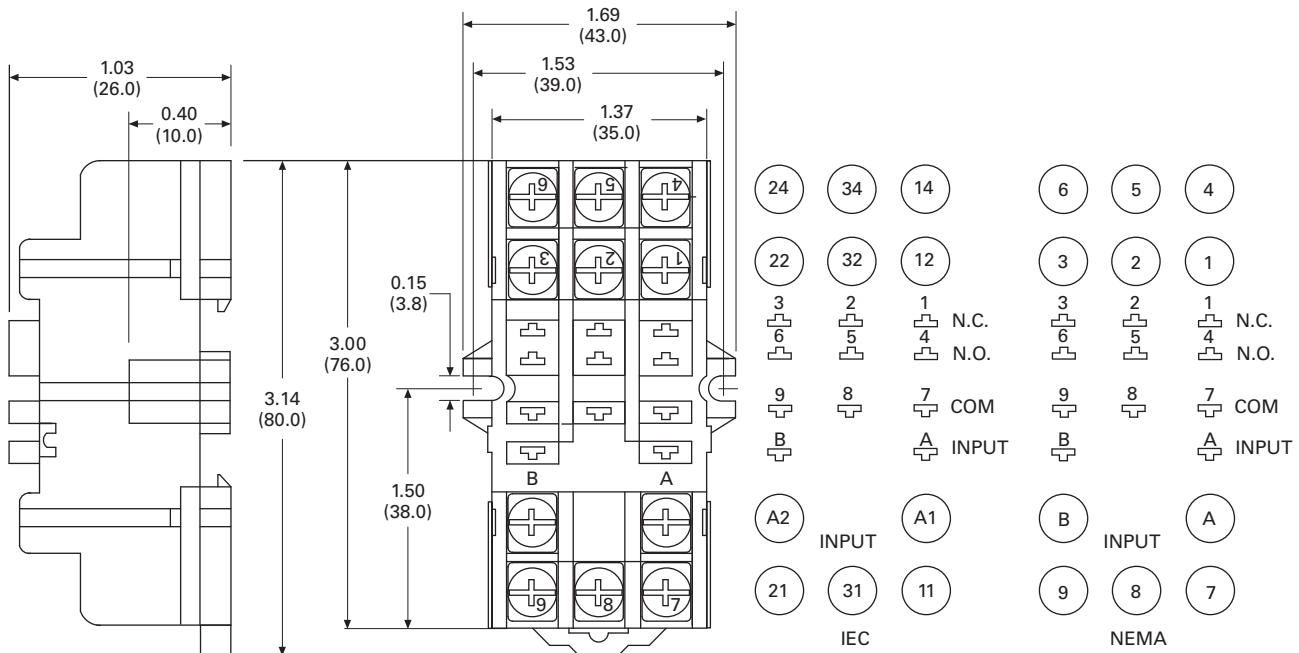
Approximate Dimensions in Inches (mm)

#### D5RR and D5RF

3

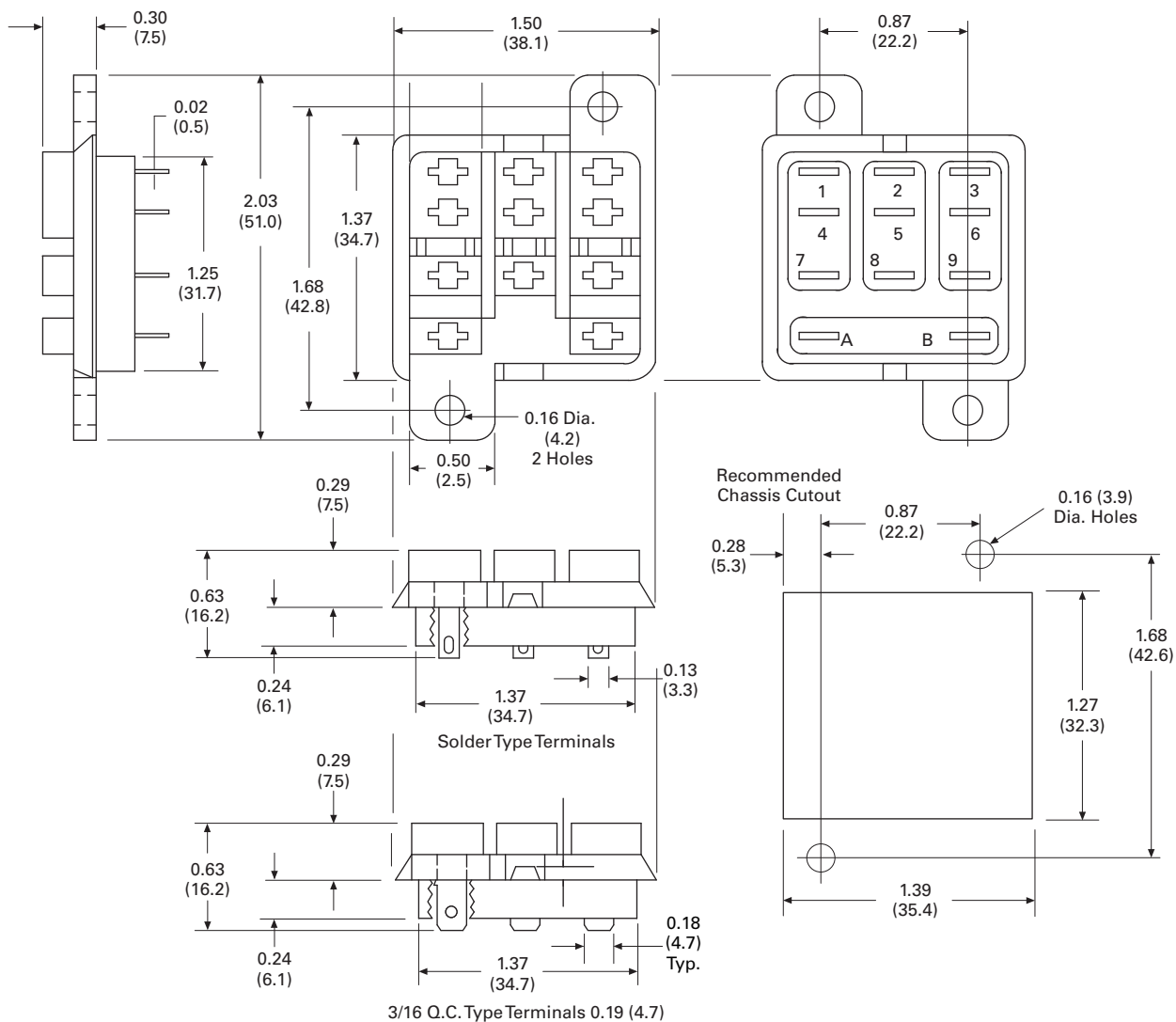


#### D5PA2



Approximate Dimensions in Inches (mm)

### D5PA3L and D5PA3S





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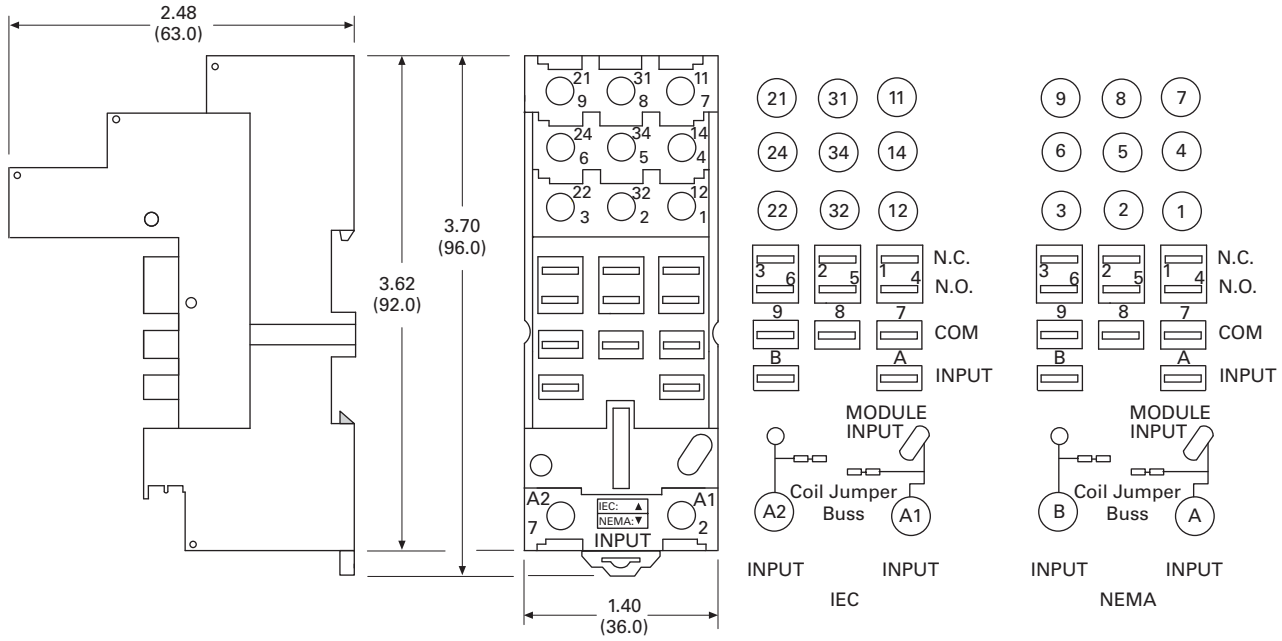
## Control Relays and Timers

### General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

#### D5PAL

3



## D7 Series Relay



## 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


## Contents

**Description**

<b>Description</b>	<b>Page</b>
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D4 Series	V7-T3-76
D5RR/D5RF Series	V7-T3-80
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Accessories	V7-T3-92
Technical Data and Specifications	V7-T3-93
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D9 Series	V7-T3-108
Accessories	V7-T3-112

## Standards and Certifications

 File # E37317, E65657

 File # LR217017, LR217069



 RoHS COMPLIANT

**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

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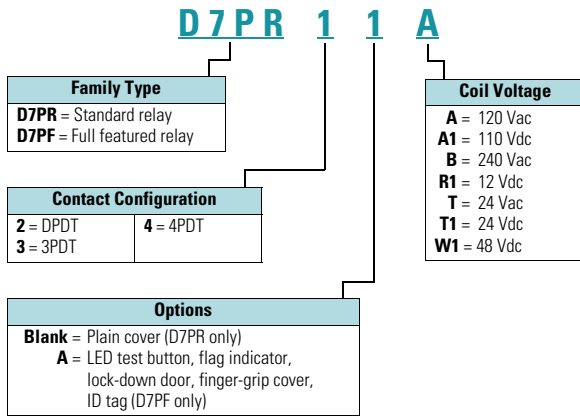
## Control Relays and Timers

### General Purpose Plug-In Relays

#### Catalog Number Selection

##### D7 Series

3



#### 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
<b>Full Featured</b>			
120 Vac	DPDT	4430	<b>D7PF2AA</b>
110/125 Vdc	DPDT	11,000	<b>D7PF2AA1</b>
220/240 Vac	DPDT	15,720	<b>D7PF2AB</b>
12 Vdc	DPDT	160	<b>D7PF2AR1</b>
24 Vac	DPDT	180	<b>D7PF2AT</b>
24 Vdc	DPDT	650	<b>D7PF2AT1</b>
24 Vac	3PDT	103	<b>D7PF3AT</b>
24 Vdc	3PDT	400	<b>D7PF3AT1</b>
120 Vac	4PDT	2220	<b>D7PF4AA</b>
110/125 Vdc	4PDT	7340	<b>D7PF4AA1</b>
240 Vac	4PDT	9120	<b>D7PF4AB</b>
12 Vdc	4PDT	96	<b>D7PF4AR1</b>
24 Vac	4PDT	84.5	<b>D7PF4AT</b>
24 Vdc	4PDT	388	<b>D7PF4AT1</b>
48 Vac	4PDT	410	<b>D7PF4AW1</b>
<b>Plain Cover</b>			
120 Vac	DPDT	4430	<b>D7PR2A</b>
110/125 Vdc	DPDT	11,000	<b>D7PR2A1</b>
12 Vdc	DPDT	160	<b>D7PR2R1</b>
24 Vac	DPDT	180	<b>D7PR2T</b>
24 Vdc	DPDT	650	<b>D7PR2T1</b>
120 Vac	3PDT	2770	<b>D7PR3A</b>
240 Vac	3PDT	12,100	<b>D7PR3B</b>
12 Vdc	3PDT	100	<b>D7PR3R1</b>
24 Vac	3PDT	103	<b>D7PR3T</b>
24 Vdc	3PDT	400	<b>D7PR3T1</b>
120 Vac	4PDT	2220	<b>D7PR4A</b>
110/125 Vdc	4PDT	7340	<b>D7PR4A1</b>
240 Vac	4PDT	9120	<b>D7PR4B</b>
24 Vac	4PDT	84.5	<b>D7PR4T</b>
24 Vdc	4PDT	388	<b>D7PR4T1</b>

# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

#### Accessories

##### D7 Sockets and Accessories

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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) mm <sup>2</sup>	Screw clamping	—	<b>D7PAA</b> ①
	None	300	10	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Screw clamping	1	<b>D7PA9</b>
	A	300	16	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Screw clamping	—	<b>D7PAD</b> ①
	A	300	16	DIN rail/panel	12/14 (2) AWG, 4/2.5 (2) mm <sup>2</sup>	Screw clamping	—	<b>D7PAB</b> ①
Flange mount adapter	—	—	—	Flange	—	—	25	<b>PFC-D2D72</b>
	—	—	—	Flange	—	—	25	<b>PFC-D73</b>
	—	—	—	Flange	—	—	25	<b>PFC-D74</b>
Metal spring clip	—	—	—	—	—	25	<b>PQC-1342</b>	
Plastic ID clip	—	—	—	—	—	10	<b>PQC-1349</b>	
Metal spring clip	—	—	—	—	—	25	<b>PQC-1784</b>	
Plastic ID clip	—	—	—	—	—	10	<b>PMC-1784</b>	
Hold-down spring	—	—	—	—	—	25	<b>PYC-B2</b>	
Metal spring clip	—	—	—	—	—	10	<b>PQC-1783</b>	
Plastic ID clip	—	—	—	—	—	10	<b>PMC-1783</b>	
Protection diode	A	6 to 250 Vdc	—	—	—	—	20	<b>MOD-AD250</b>
LED indicator	A	24 Vac/Vdc	—	—	—	—	20	<b>MOD-ALG24</b>
	A	120/240 Vac/Vdc	—	—	—	—	20	<b>MOD-ALG240</b>
MOV suppressor	A	120 Vac/Vdc	—	—	—	—	20	<b>MOD-AMV120</b>
	A	24 Vac/Vdc	—	—	—	—	20	<b>MOD-AMV24</b>
	A	240 Vac/Vdc	—	—	—	—	20	<b>MOD-AMV240</b>
R/C suppressor	A	6 to 24 Vac/Vdc	—	—	—	—	20	<b>MOD-RC24</b>
	A	110 to 240 Vac/Vdc	—	—	—	—	20	<b>MOD-RC240</b>
Protection diode	B	6 to 250 Vdc	—	—	—	—	20	<b>MOD-BD250</b>
LED indicator	B	24 Vac/Vdc	—	—	—	—	20	<b>MOD-BLG24</b>
	B	120/240 Vac/Vdc	—	—	—	—	20	<b>MOD-BLG240</b>
MOV suppressor	B	120 Vac/Vdc	—	—	—	—	20	<b>MOD-BMV120</b>
	B	24 Vac/Vdc	—	—	—	—	20	<b>MOD-BMV24</b>
	B	240 Vac/Vdc	—	—	—	—	20	<b>MOD-BMV240</b>
Plastic DIN rail end stop	—	—	—	—	—	25	<b>PPF-P</b>	

#### Note

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

## Technical Data and Specifications

### D7PR Relay

Description	D7PR (DPDT)	D7PR (3PDT)	D7PR (4PDT)
<b>Contact Characteristics</b>			
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)
<b>Coil Characteristics</b>			
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)
<b>Performance</b>			
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)
<b>Environment</b>			
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
<b>Features</b>			
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

# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

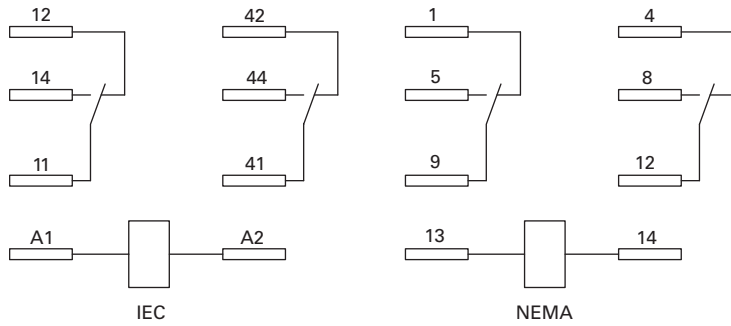
3

#### D7PF Relay

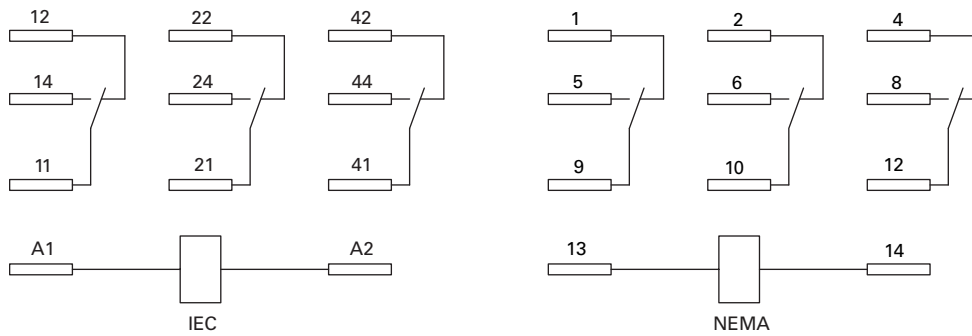
Description	D7PF (DPDT)	D7PF (3PDT)	D7PF (4PDT)
<b>Contact Characteristics</b>			
Contact rating	15 A	15 A	15 A
Terminal style	Plug-in	Plug-in	Plug-in
Contact materials	Silver alloy	Silver alloy	Silver alloy
Maximum switching voltage	300 V	300 V	300 V
Switching current at voltage—resistive	15 A at 120 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)
<b>Coil Characteristics</b>			
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)
<b>Performance</b>			
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)
<b>Environment</b>			
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
<b>Features</b>			
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

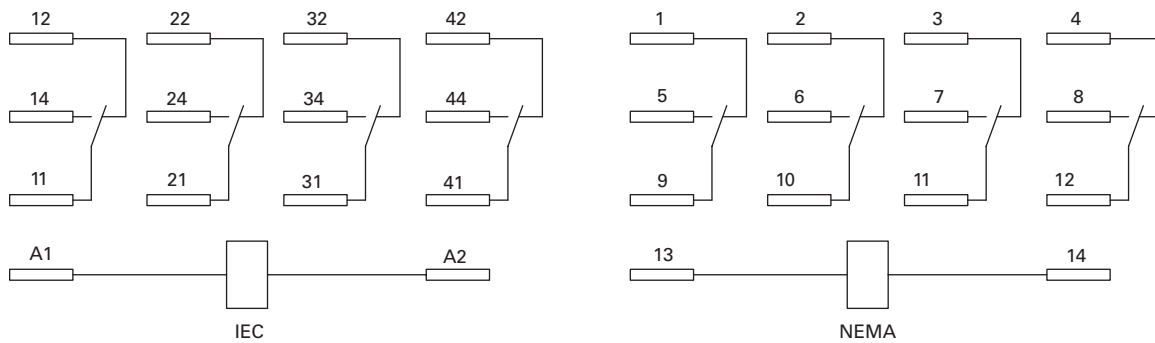
#### D7PR2/D7PF2



#### D7PR3/D7PF3



#### D7PR4/D7PF4





# 3.4

## Control Relays and Timers

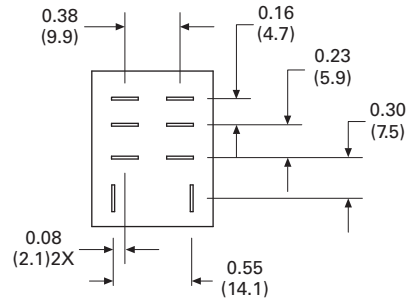
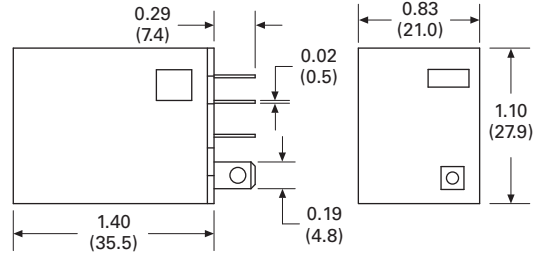
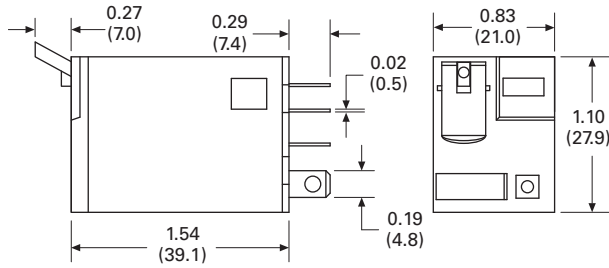
### General Purpose Plug-In Relays

#### Dimensions

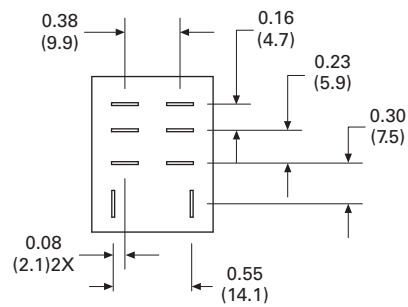
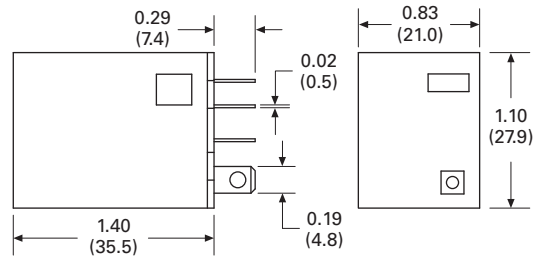
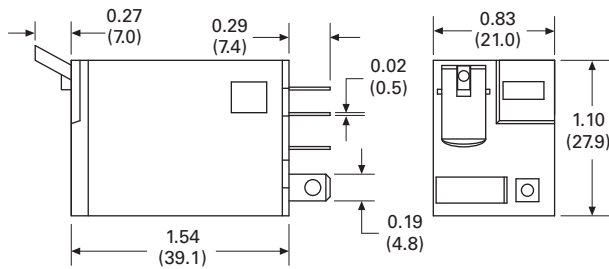
Approximate Dimensions in Inches (mm)

#### D7PR1/D7PF1

3

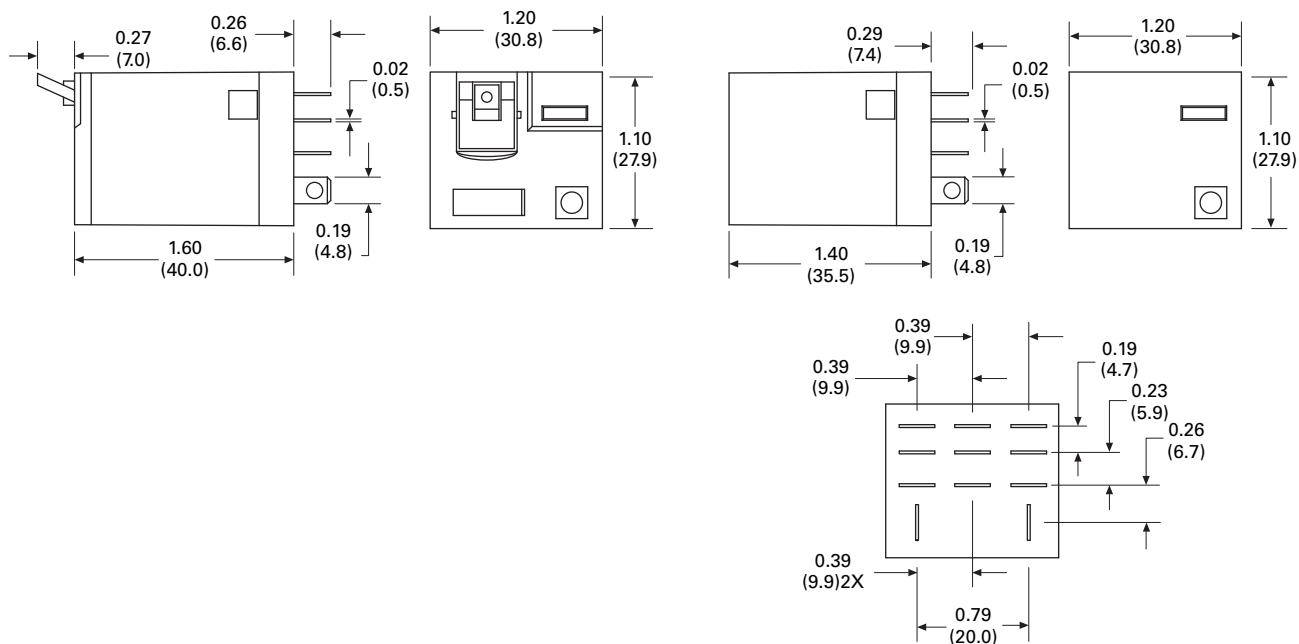


#### D7PR2/D7PF2

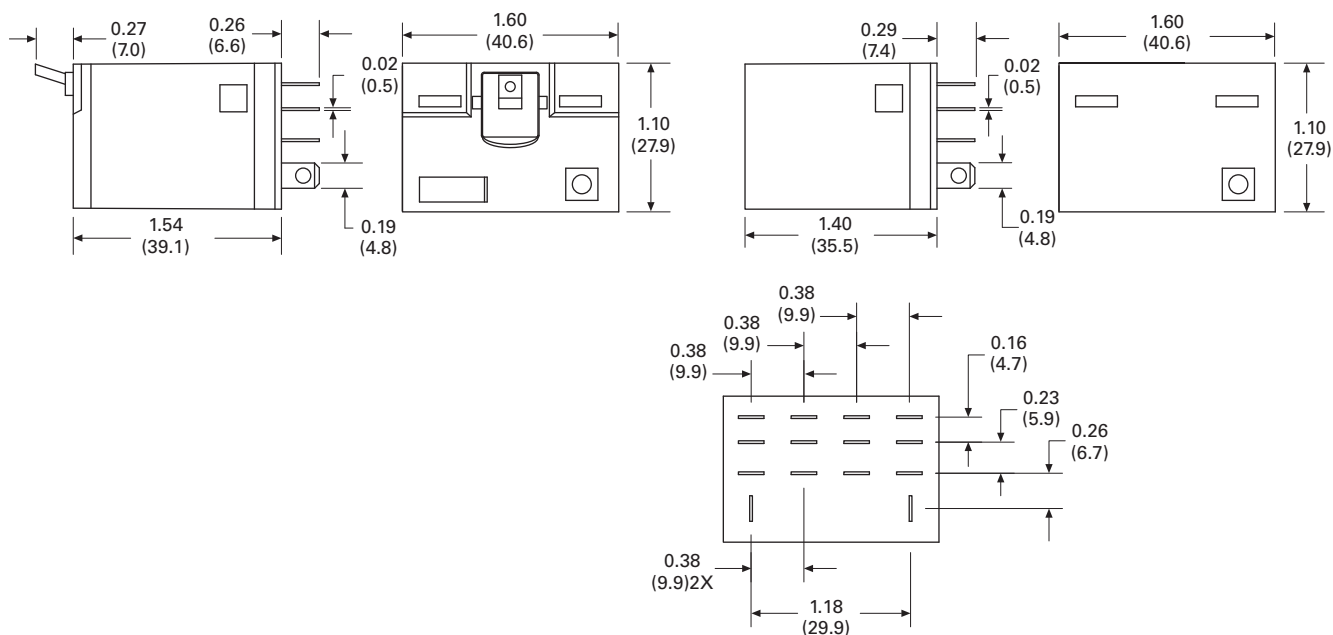


Approximate Dimensions in Inches (mm)

### D7PR3/D7PF3



### D7PR4/D7PF4



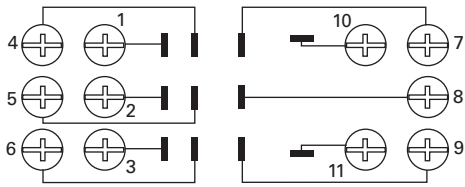
# 3.4

## Control Relays and Timers

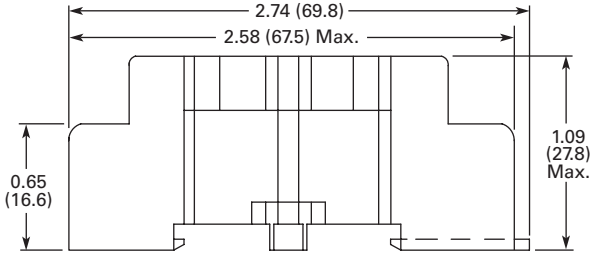
### General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

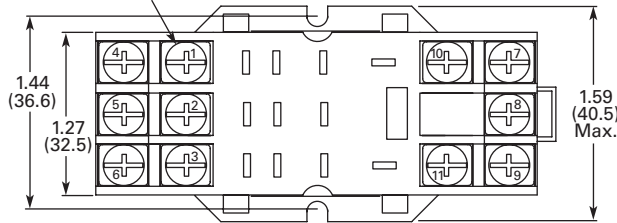
#### D7PA3



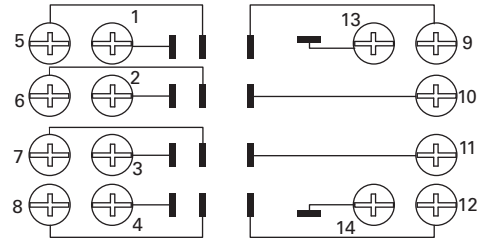
Wiring Diagram (Top View)



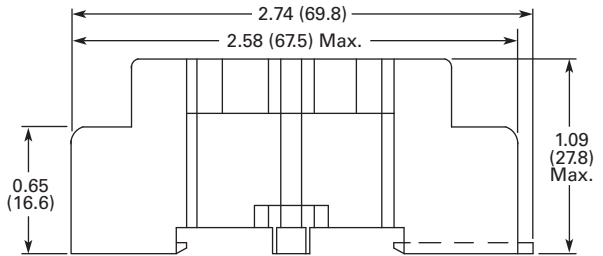
Combination Slotted/Phillips  
Head Screws 6-32 x 5/16"



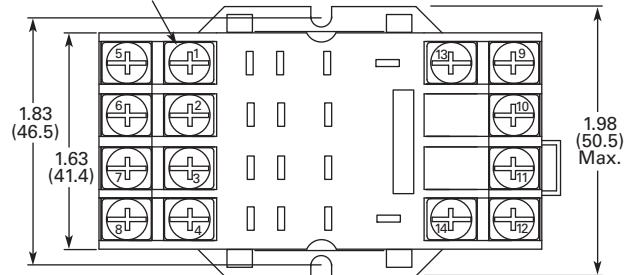
#### D7PA4



Wiring Diagram (Top View)

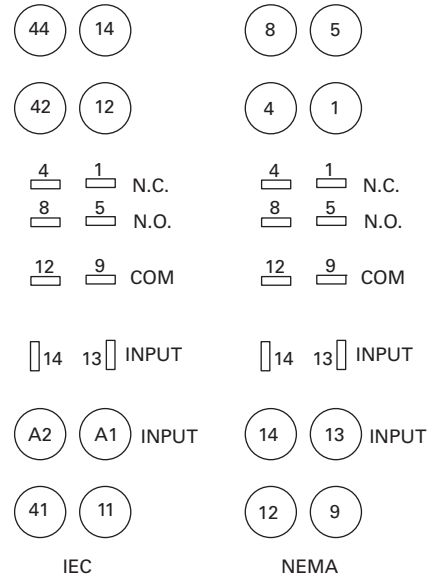
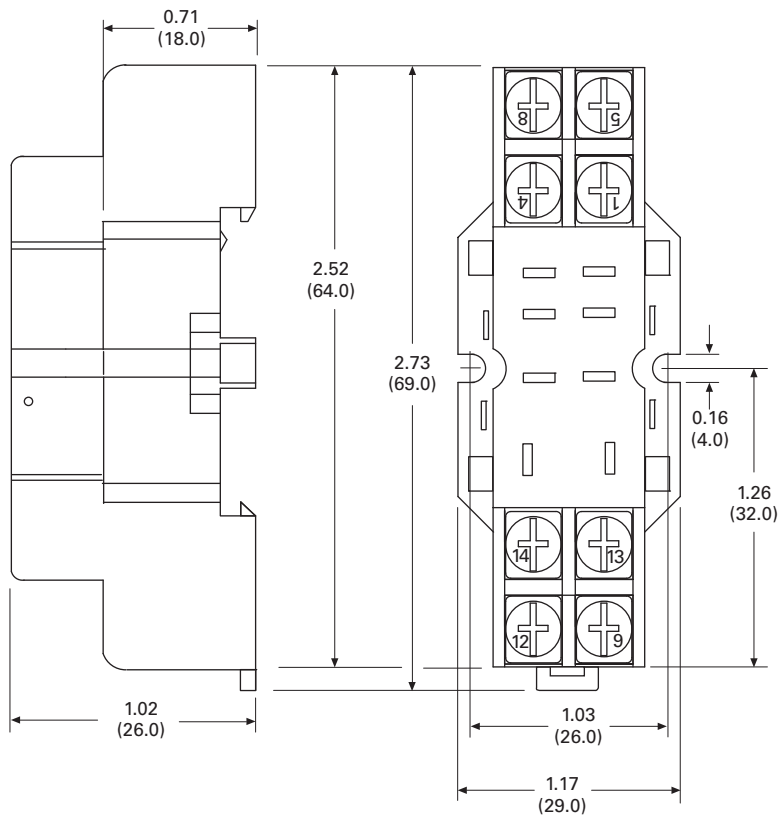


Combination Slotted/Phillips  
Head Screws 6-32 x 5/16"



Approximate Dimensions in Inches (mm)

### D7PA9 Standard Mount



# 3.4

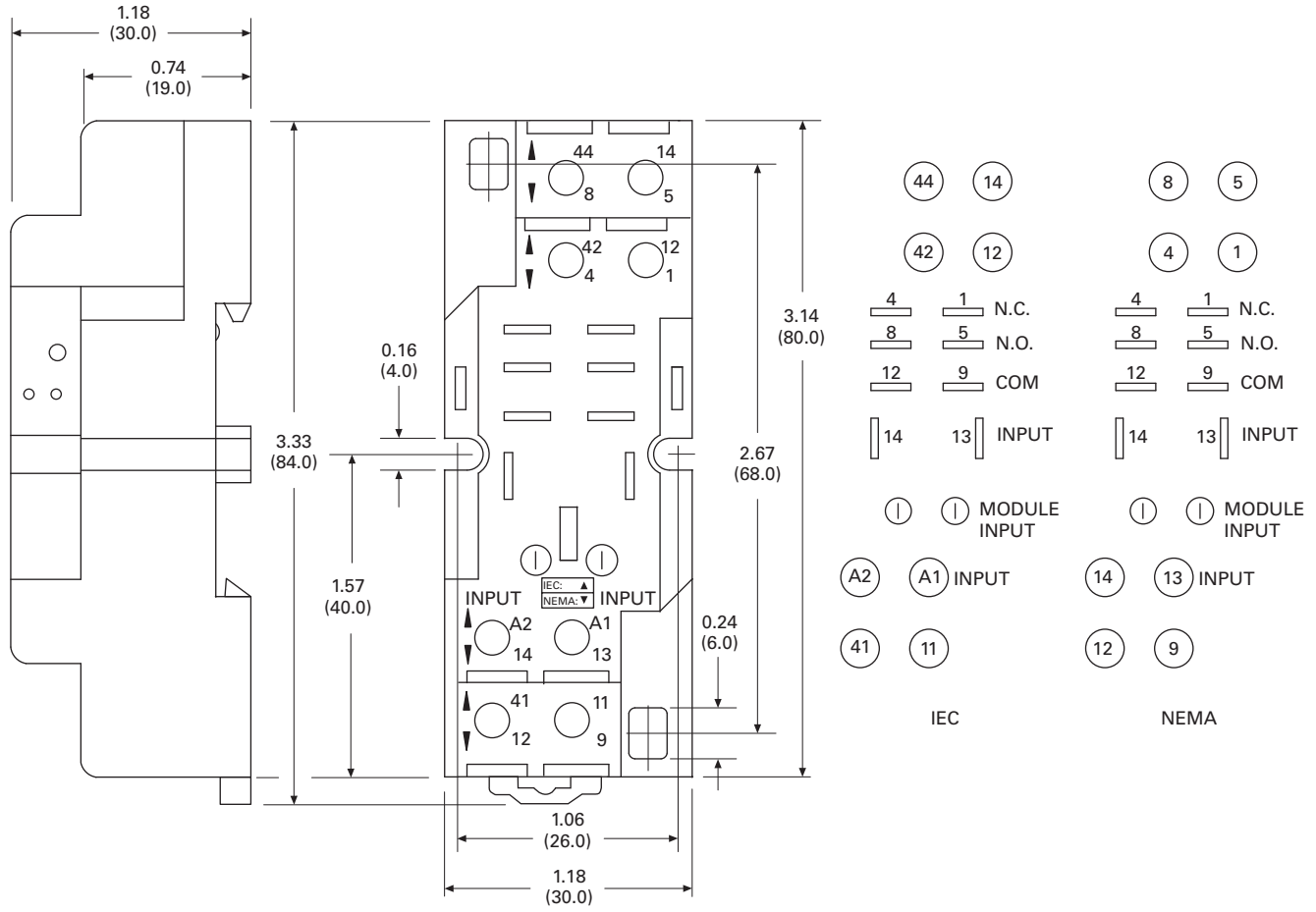
## Control Relays and Timers

### General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

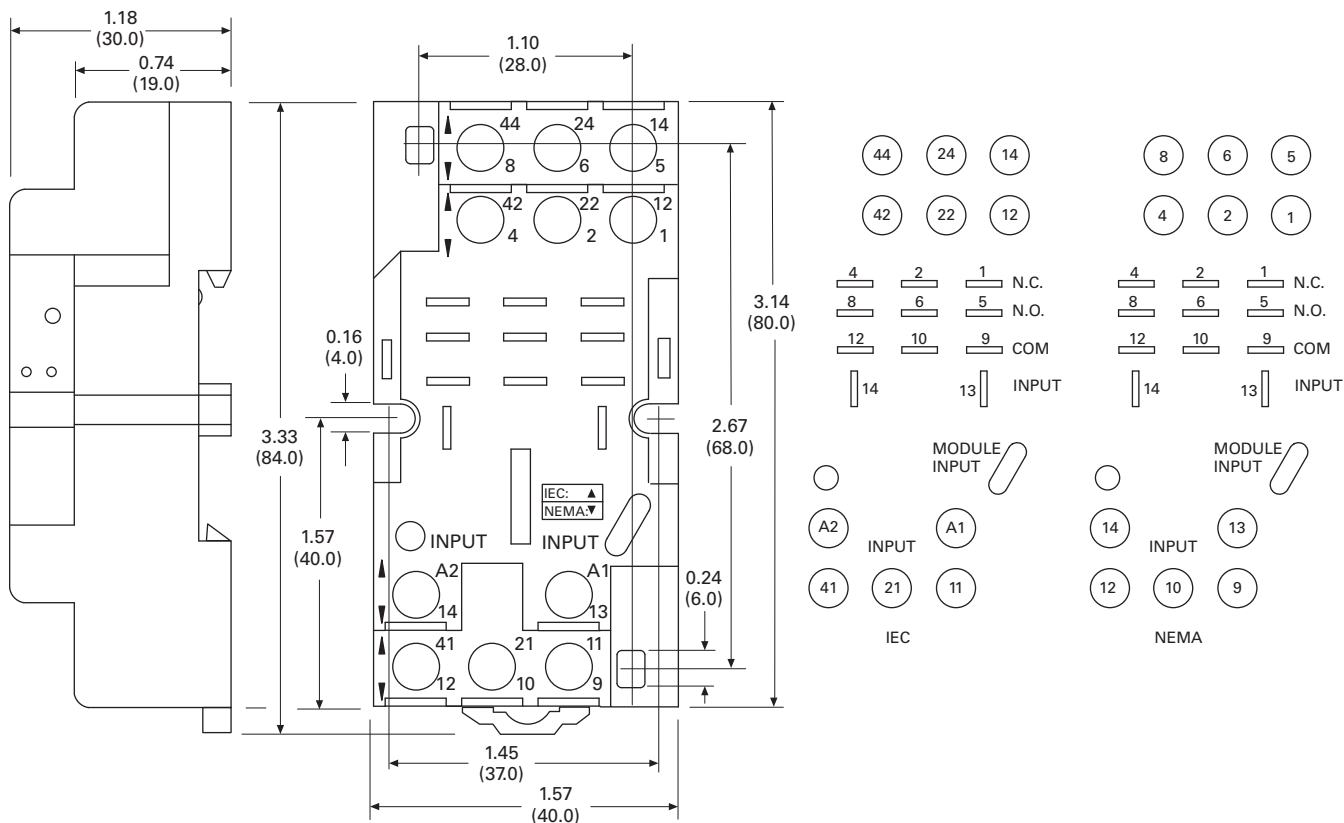
D7PAA

3



Approximate Dimensions in Inches (mm)

**D7PAB**



# 3.4

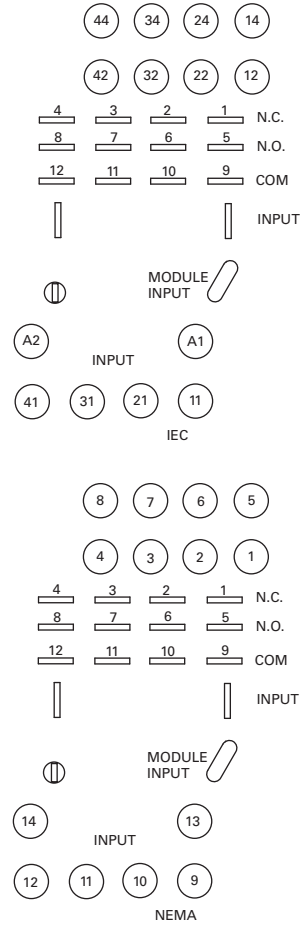
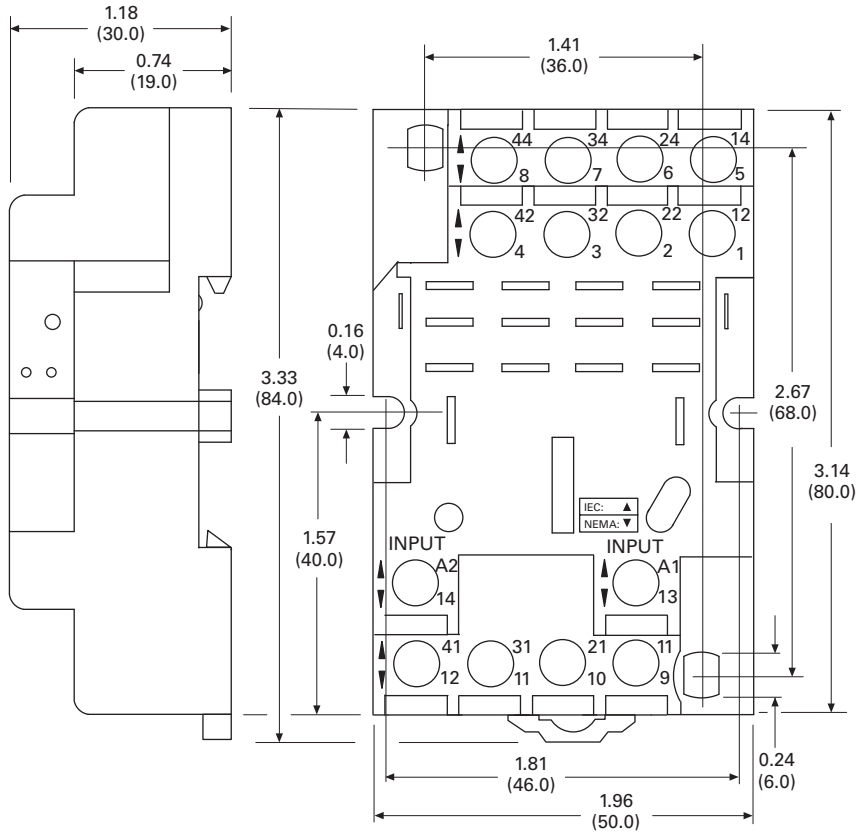
## Control Relays and Timers

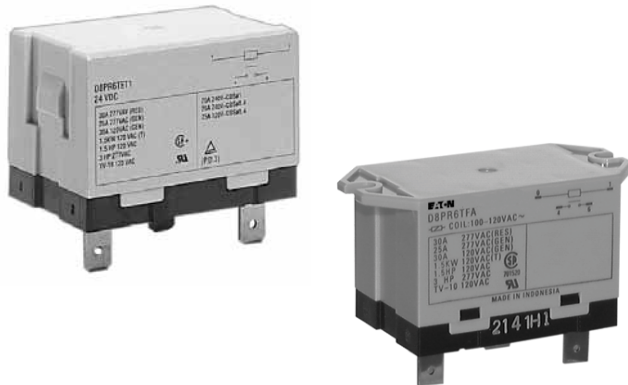
### General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

#### D7PAD

3



**D8 Series Relay****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

**Contents****Description**

Description	Page
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D3RR/D3RF Series	V7-T3-67
D4 Series	V7-T3-76
D5RR/D5RF Series	V7-T3-80
D7PR/D7PF Series	V7-T3-89
D8 Series	
Catalog Number Selection	V7-T3-104
Product Selection	V7-T3-104
Technical Data and Specifications	V7-T3-105
Dimensions	V7-T3-105
D9 Series	V7-T3-108
Accessories	V7-T3-112

**Standards and Certifications**

 File # E1491

 File # LR701520





# 3.4

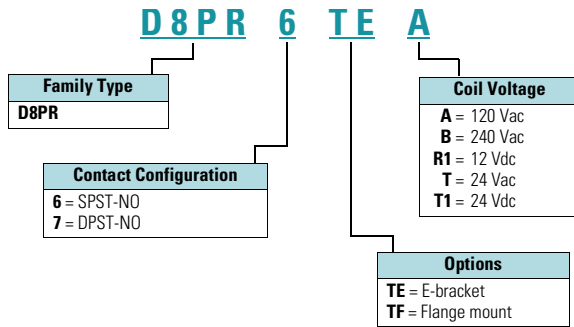
## Control Relays and Timers

### General Purpose Plug-In Relays

3

#### Catalog Number Selection

##### D8 Series ①



#### 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
<b>SPST E-Bracket</b>		
Coil voltage		
24 Vac	1	<b>D8PR6TET</b>
24 Vdc	1	<b>D8PR6TET1</b>
<b>SPST Flange Mount</b>		
120 Vac	1	<b>D8PR6TFA</b>
24 Vdc	1	<b>D8PR6TFT1</b>
<b>DPST E-Bracket</b>		
Coil voltage		
120 Vac	1	<b>D8PR7TEA</b>
<b>DPST Flange Mount</b>		
120 Vac	1	<b>D8PR7TFA</b>
24 Vdc	1	<b>D8PR7TFT1</b>
<b>Sockets</b>		
DIN rail adapter	10	<b>D8PA1</b>
Screw terminal adapter	10	<b>D8PA2</b>
Bracket adapter	10	<b>D8PA5</b>
<b>Accessory</b>		
DIN rail end stop	100	<b>PFP-M</b>

##### 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.

## 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)

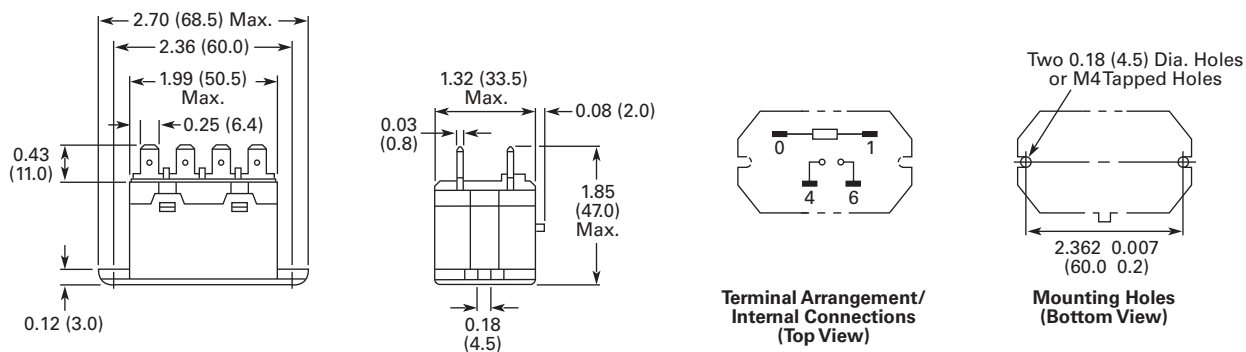
### Coil Data

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



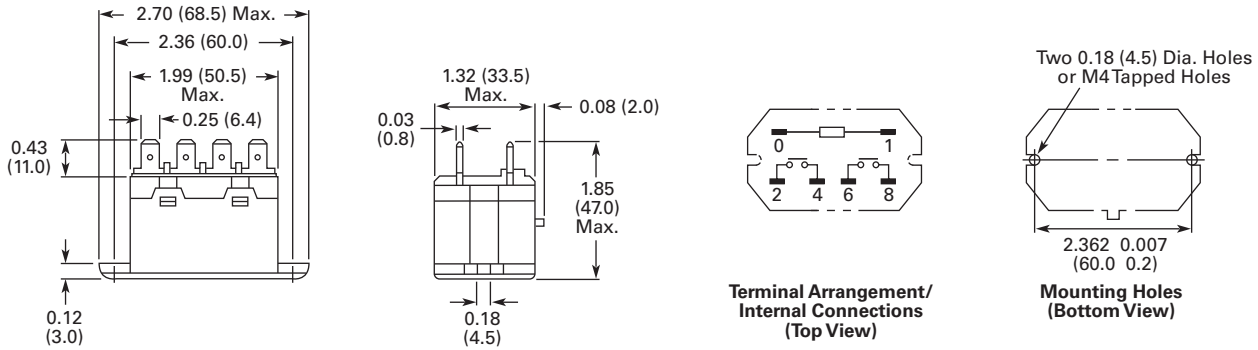
# 3.4

## Control Relays and Timers

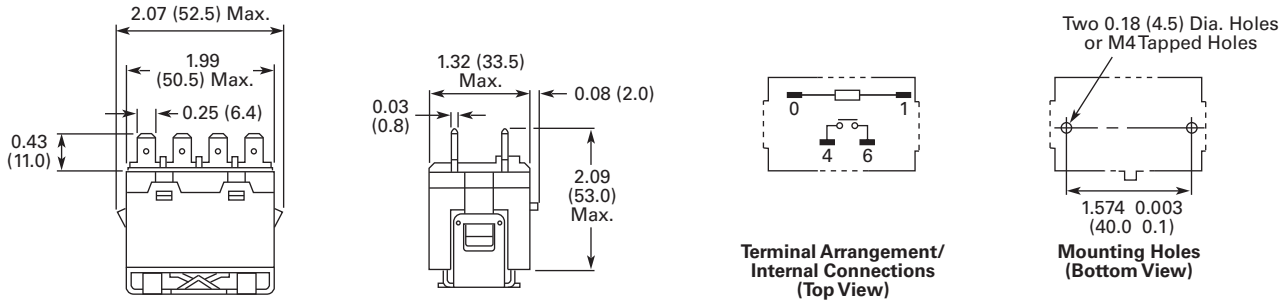
### General Purpose Plug-In Relays

Approximate Dimensions in Inches (mm)

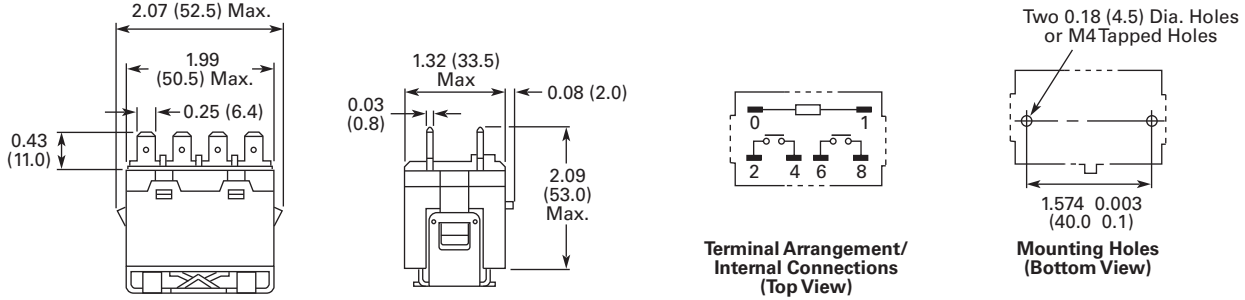
#### D8PR7TF



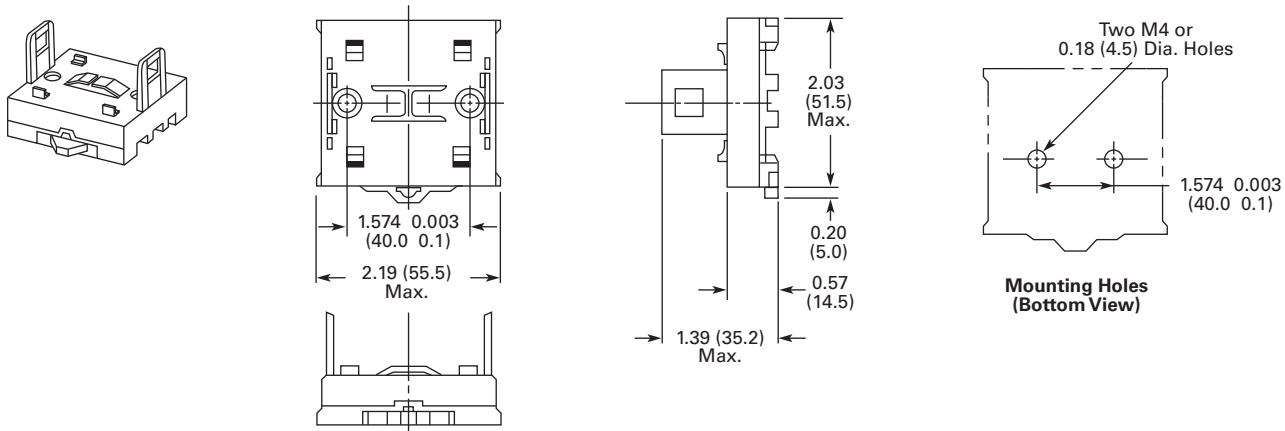
#### D8PR6TE with D8PA5 Bracket Attached



#### D8PR7TE with D8PA5 Bracket Attached



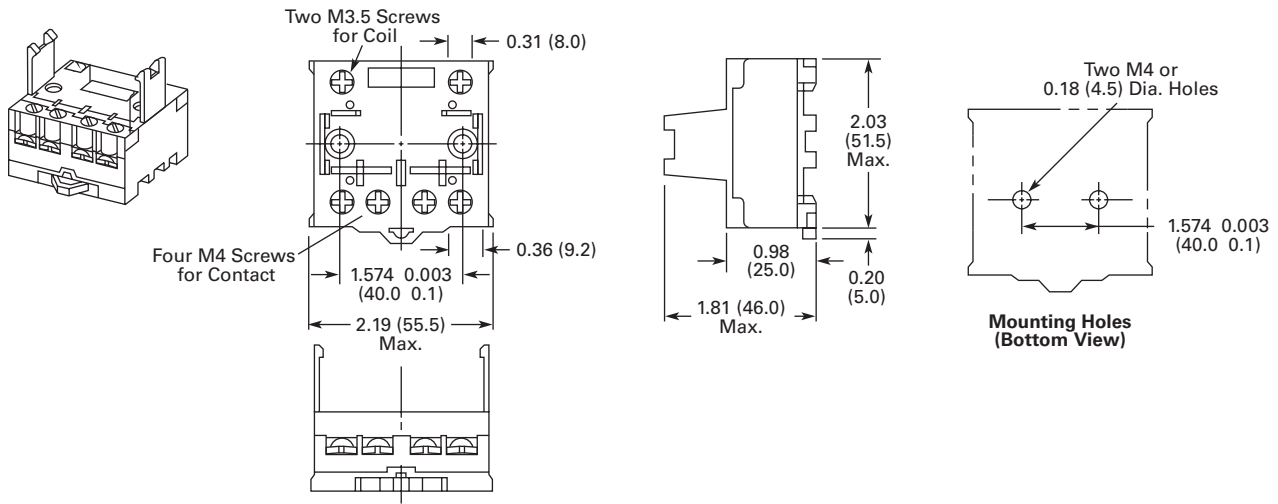
#### D8PA1



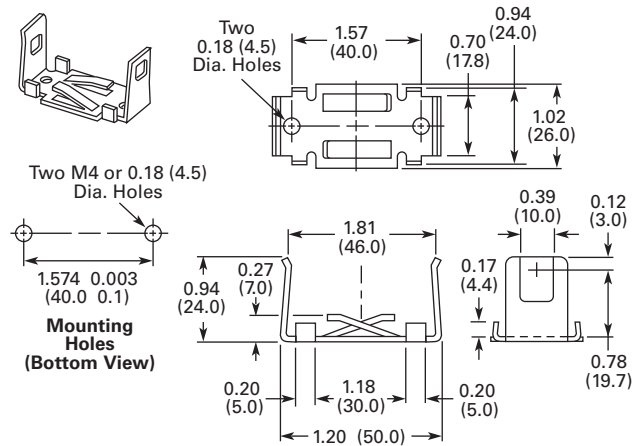
**Note:** Minimum spacing around relay = 0.20 inches (5 mm).

Approximate Dimensions in Inches (mm)

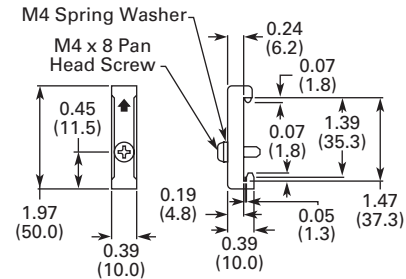
### D8PA2



### D8PA5



### PFP-M DIN Rail End Stop



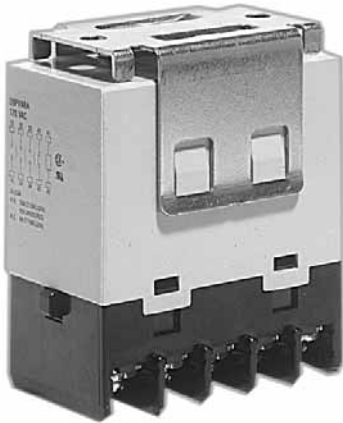
# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

3

D9 Series Relay



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D2RR/D2RF Series.....	V7-T3-57
D3RR/D3RF Series.....	V7-T3-67
D4 Series.....	V7-T3-76
D5RR/D5RF Series.....	V7-T3-80
D7PR/D7PF Series.....	V7-T3-89
D8 Series.....	V7-T3-103
D9 Series	
Product Selection.....	V7-T3-109
Technical Data and Specifications.....	V7-T3-109
Dimensions.....	V7-T3-110
Accessories.....	V7-T3-112

### 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

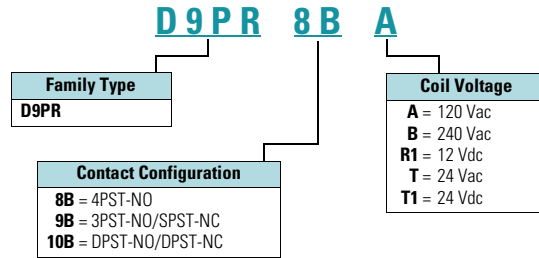


File # E1491



File # LR701520

#### Catalog Number Selection



## Product Selection

### D9 Series

	Catalog Number		Catalog Number
<b>4PST-NO Power Relay</b>		<b>DPST-NO/DPST-NC Power Relay</b>	
Coil voltage		Coil voltage	
24 Vac	<b>D9PR8BT</b>	24 Vac	<b>D9PR10BT</b>
120 Vac	<b>D9PR8BA</b>	120 Vac	<b>D9PR10BA</b>
240 Vac	<b>D9PR8BB</b>	24 Vac	<b>D9PR10BT1</b>
24 Vdc	<b>D9PR8BT1</b>		
<b>3PST-NO/SPST-NC Power Relay</b>			
120 Vac	<b>D9PR9BA</b>		

## Technical Data and Specifications

### Coil Resistance

Coil Voltage	Ohms	mA	Coil Voltage	Ohms	mA
24 Vac	—	75	12 Vdc	72	167
120 Vac	—	21.6	24 Vdc	288	83
240 Vac	—	10.8	110 Vdc	6050	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

# 3.4

## Control Relays and Timers

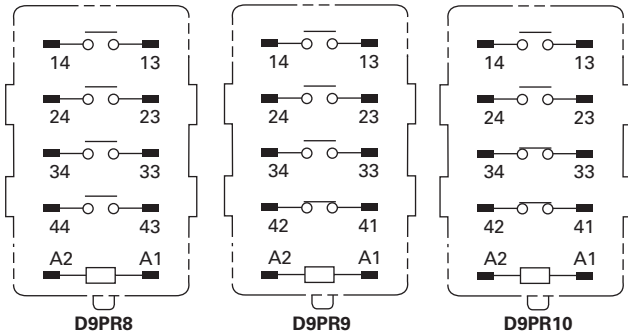
### General Purpose Plug-In Relays

3

#### 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

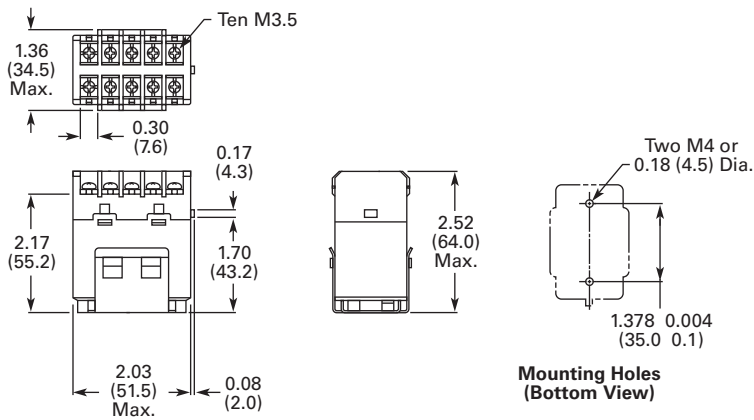


#### Dimensions

Approximate Dimensions in Inches (mm)

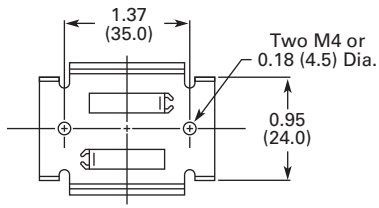
#### D9PR

##### Screw Terminal Brackets

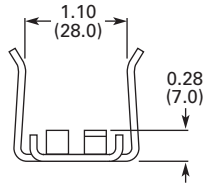
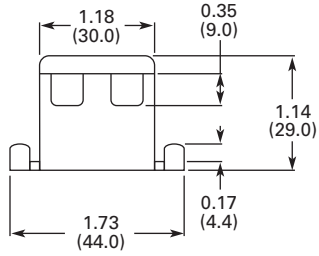
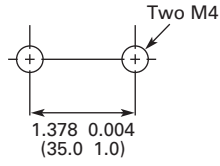


Approximate Dimensions in Inches (mm)

### Mounting Bracket



### Mounting Holes





# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

#### Accessories



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Coil Bus Jumpers	V7-T3-116
Write-On Plastic Labels/ID Tags	V7-T3-116
Flange Mount Adapters	V7-T3-117

#### Accessories

##### Accessories Selection Guide

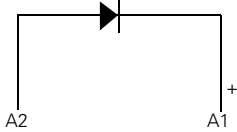
Eaton offers a variety of simple-to-install relay accessories that allow you to customize the features of a relay system to meet your exact needs.

##### 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.

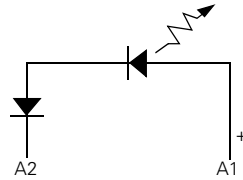
#### Circuit Diagrams

##### Diode Circuit



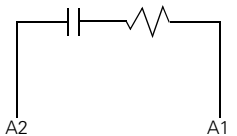
The diode module protects external drive circuitry from inductive voltages generated when removing coil voltages.

##### LED Circuit



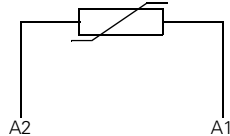
The LED status lamp verifies that power is being supplied to the coil. Ideal for both AC and DC applications. Polarity sensitive for DC applications.

##### RC Circuit



Snubs back EMF of relay coil.

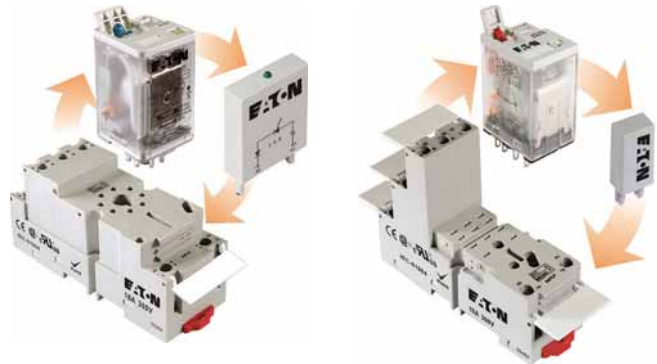
##### Metal Oxide Varistor (MOV) Circuit



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

# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

3




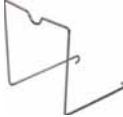




#### Relay Clips

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
	<b>PMC-1781</b>	D1RAA	D1RR, D1RF
	<b>PQC-1782</b>	D2PAL, D2PAP, D2PA7	D2RR2, D2RF2, D2RR3, D2RF4
	<b>PQC-1342</b>	D2PA6, D7PAA, D7PA9	D2RR4, D2RF4
	<b>PQC-1332</b>	D3PA6, D3PA7	D3RR2, D3RF2, D3RR3, D3RF3
	<b>PQC-1351</b>	D3PAL8, D3PA2, D3PAL11, D3PA3, D5PAL, D5PA2, D5PA3L, D5PA3S	D3RR2, D3RF2, D3RR3, D3RF4, D5RR, D5RF
	<b>PQC-1783</b>	D7PAB	D7PR1, D7PF1, D7PR2, D7PF3
	<b>PQC-1784</b>	D7PAD	D7PR4, D7PF4
	<b>PYC-B2</b>	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.

PWC-D24



### Plastic Ejector/Hold-Down Clips

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

### 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.

PQC-1349



### Plastic ID Clips

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

PMC-1783



PMC-1783	D7PAB	D7PF1, D7PF2
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PMC-1784



PMC-1784	D7PAD	D7PF4
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# 3.4

## Control Relays and Timers

### General Purpose Plug-In Relays

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#### Coil Bus Jumpers

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.



#### System Diagrams

##### Coil Bus Jumpers ①



#### 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.

#### Coil Bus Jumpers

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

#### Write-On Plastic Labels/ID Tags

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

**Note**

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

### 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

9575H Series 3000 Relay



### 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.

### Contents

#### Description

9575H Series 3000—Type AA, AC and DC	
Product Selection . . . . .	V7-T3-119
Accessories . . . . .	V7-T3-119
Technical Data and Specifications . . . . .	V7-T3-120
Dimensions . . . . .	V7-T3-121

#### Page

#### 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 <sup>①</sup>

Relay Style	Catalog Number <sup>②</sup>
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
<b>Volts AC</b>		
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
<b>Volts DC</b>		
110	—	P
220	—	Q
6	—	R
12	—	S
24	—	T
48	—	W

## Accessories

### Enclosure <sup>③</sup>

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

3

##### 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:  $\pm 10\%$  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

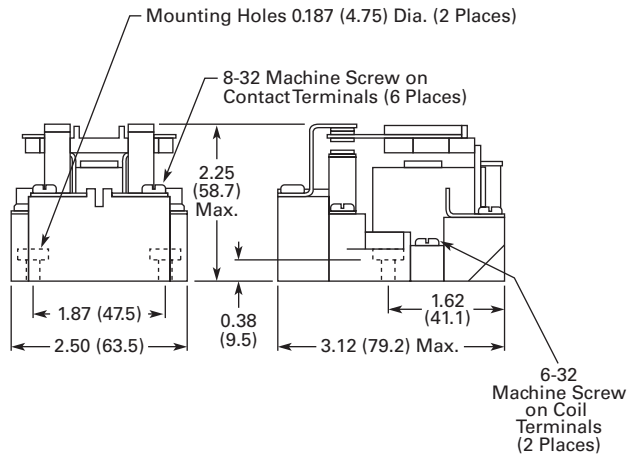
#### Temperature Ranges

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

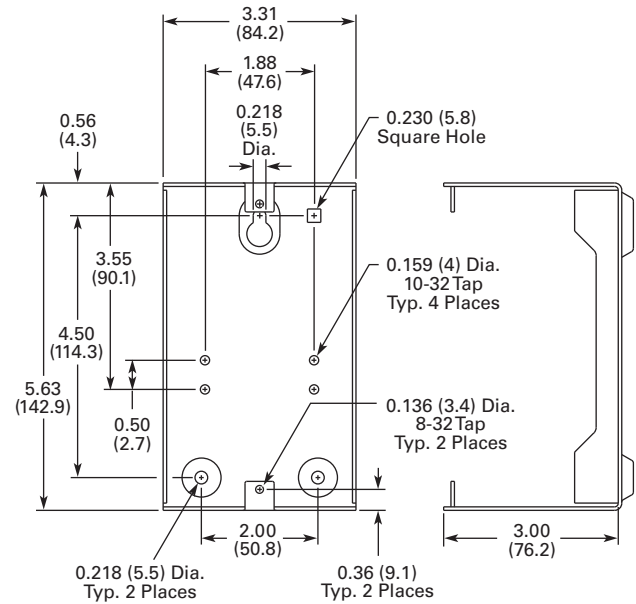
### Dimensions

Approximate Dimensions in Inches (mm)

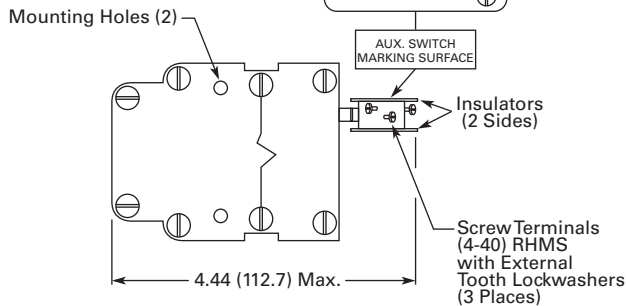
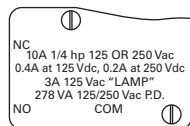
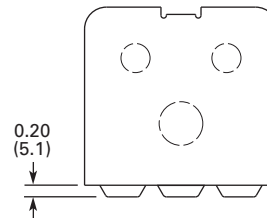
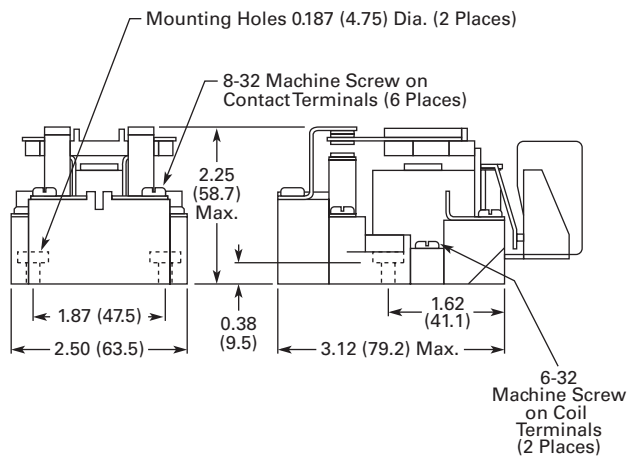
#### 9575H3 DPDT Relay



#### 9575H2449



#### 9575H3 DPDT Relay with Auxiliary SPDT Switch



RELAY TOP VIEW

# 3.6

## Control Relays and Timers

### Solid-State Relays

3

#### Solid-State Relays



#### Contents

##### Description

Solid-State Relays

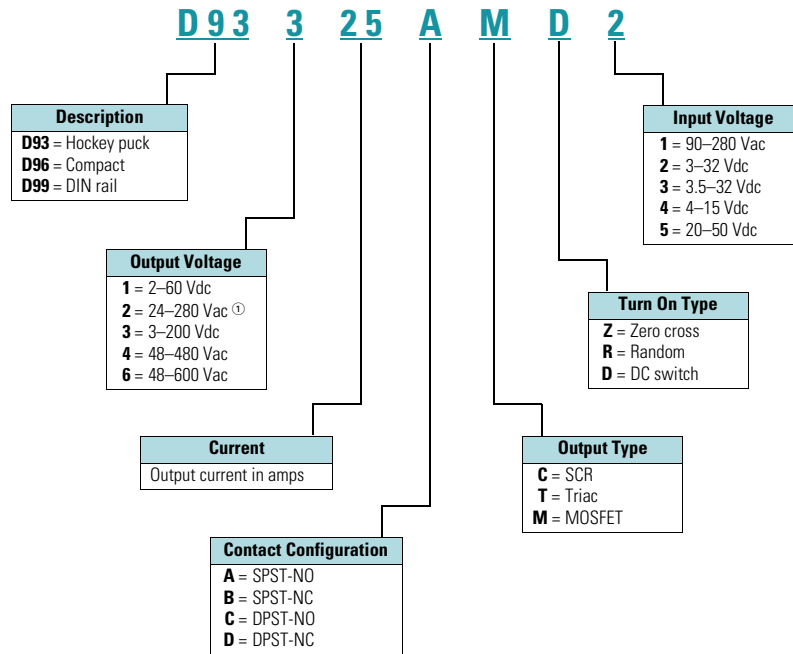
D93 Series .....	V7-T3-123
D96 Series .....	V7-T3-130
D99 Series .....	V7-T3-135

##### Page

### Product Overview

### Catalog Number Selection

#### Solid-State Relays—D93, D96 and D99 Series



**Note**

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

## D93 Series—Solid-State Relays



## 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.

## Contents

### Description

Description	Page
D93 Series	
Product Selection . . . . .	V7-T3-124
Accessories . . . . .	V7-T3-124
Technical Data and Specifications . . . . .	V7-T3-125
Dimensions . . . . .	V7-T3-129
D96 Series . . . . .	V7-T3-130
D99 Series . . . . .	V7-T3-135

### 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



# 3.6

## Control Relays and Timers

### Solid-State Relays

#### Product Selection

D93210ACZ1

#### D93 Series

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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
<b>Output Characteristics</b>							
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 <sup>2</sup> t for fusing (A <sup>2</sup> )		72	300	1700	312	250	300
<b>Input Characteristics</b>							
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
<b>Performance Characteristics</b>							
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
<b>Environment</b>							
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
<b>Miscellaneous Characteristics</b>							
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

# 3.6

## Control Relays and Timers

### Solid-State Relays

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#### D93 Series, continued

Description	Units	D93240ACZ1	D93240ACZ2	D93240ATZ2	D93250ACZ1	D93250ACZ2
<b>Output Characteristics</b>						
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 <sup>2</sup> t for fusing (A <sup>2</sup> )		1250	1250	438	1250	1250
<b>Input Characteristics</b>						
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
<b>Performance Characteristics</b>						
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
<b>Environment</b>						
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
<b>Miscellaneous Characteristics</b>						
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
<b>Output Characteristics</b>						
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 <sup>2</sup> t for fusing (A <sup>2</sup> )		5000	5000	NA	NA	NA
<b>Input Characteristics</b>						
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
<b>Performance Characteristics</b>						
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
<b>Environment</b>						
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
<b>Miscellaneous Characteristics</b>						
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



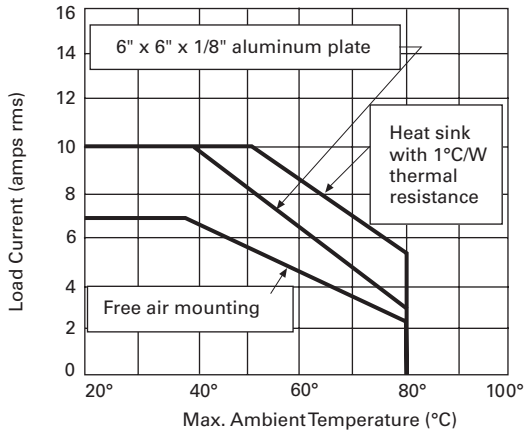
# 3.6

## Control Relays and Timers

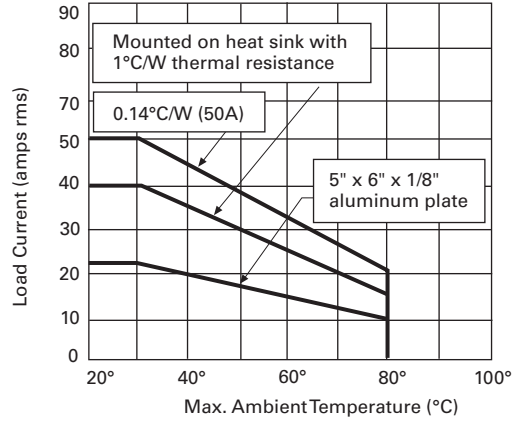
### Solid-State Relays

#### Temperature Derating Curves

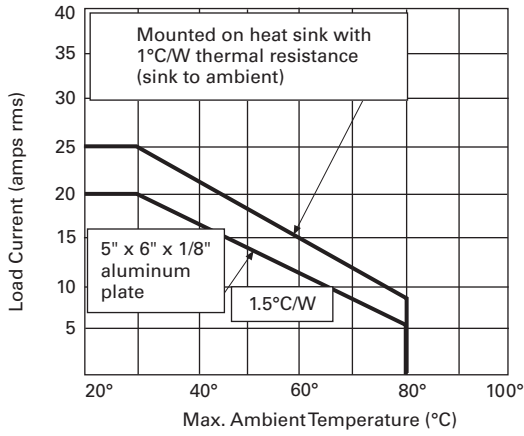
##### 10 Amp Styles



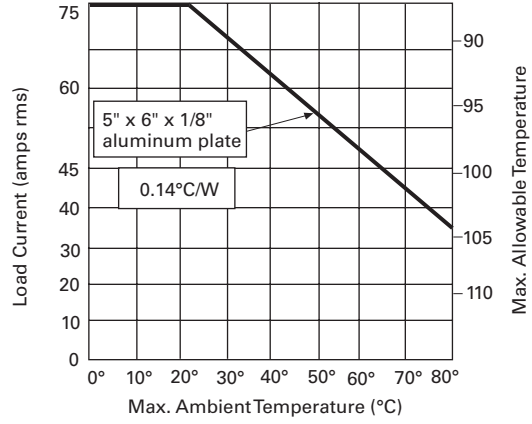
##### 40 and 50 Amp Styles



##### 25 Amp Styles



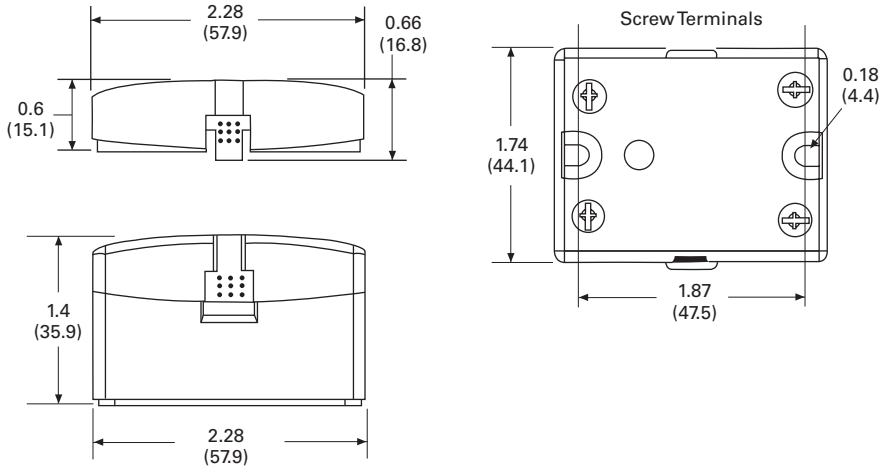
##### 75 Amp Styles



### Dimensions

Approximate Dimensions in Inches (mm)

#### D93 Series



D96 Series—Solid-State Relays



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### 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
- CSA certified
- CE marked
- RoHS compliant



## 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	<b>D96115ACZ3</b>
3.5–32 Vdc	3–150 Vdc	SPST-NO	DC switch	8	<b>D96208ACZ3</b>
90–280 Vac	24–280 Vac	SPST-NO	Random	10	<b>D96210ACR1</b>
3–32 Vdc	24–280 Vac	SPST-NO	Random	10	<b>D96210ACR2</b>
90–280 Vac	24–280 Vac	SPST-NO	Zero cross	10	<b>D96210ACZ1</b>
3–32 Vdc	24–280 Vac	SPST-NO	Zero cross	10	<b>D96210ACZ2</b>
3–32 Vdc	24–280 Vac	SPST-NC	Random	10	<b>D96210BCR2</b>
90–280 Vac	48–480 Vac	SPST-NO	Random	10	<b>D96410ACR1</b>
3–32 Vdc	48–480 Vac	SPST-NO	Random	10	<b>D96410ACR2</b>
90–280 Vac	48–480 Vac	SPST-NO	Zero cross	10	<b>D96410ACZ1</b>
3–32 Vdc	48–480 Vac	SPST-NO	Zero cross	10	<b>D96410ACZ2</b>
90–280 Vac	48–600 Vac	SPST-NO	Random	10	<b>D96610ACR1</b>
90–280 Vac	48–600 Vac	SPST-NO	Zero cross	10	<b>D96610ACZ1</b>
3–32 Vdc	48–600 Vac	SPST-NO	Zero cross	10	<b>D96610ACZ2</b>

## Technical Data and Specifications

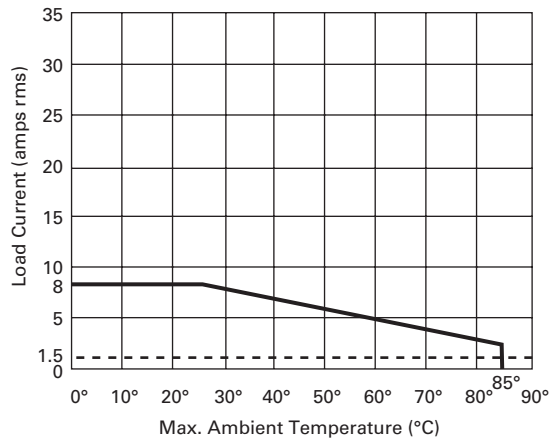
## D96 Series

3

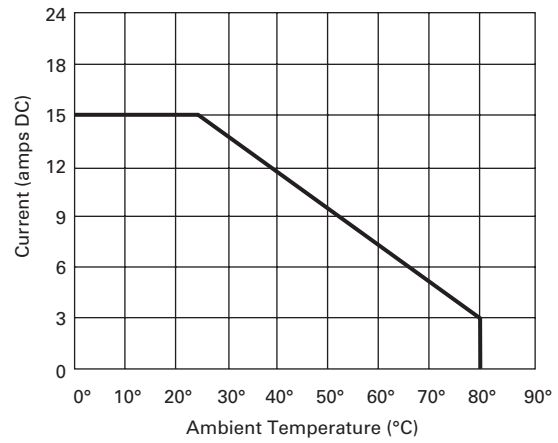
Description	Units	D96210ACZ1	D96210ACZ2	D96210ACR1	D96210ACR2	D96115ACZ3	D96208ACZ3	D96210BCR2
<b>Output Characteristics</b>								
Contact configuration		SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NC
Switching device		SCR	SCR	SCR	SCR	MOSFET	MOSFET	SCR
Current rating	A	10	10	10	10	15	8	10
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 <sup>2</sup> t for fusing (A <sup>2</sup> )		1250	1250	1250	1250	NA	NA	1250
<b>Input Characteristics</b>								
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
<b>Performance Characteristics</b>								
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
<b>Environment</b>								
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
<b>Miscellaneous Characteristics</b>								
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 <sup>2</sup> )	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**

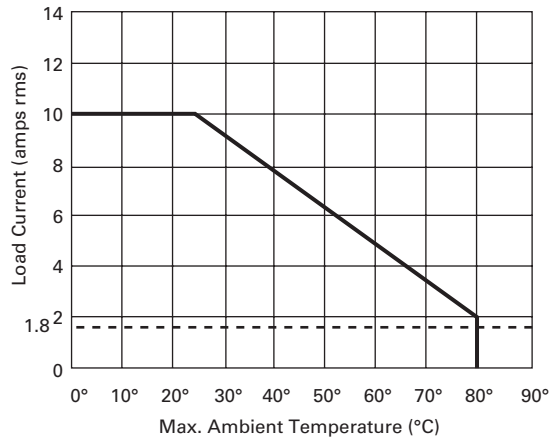
**8 Amp Style**



**15 Amp Style**



**10 Amp Style**



# 3.6

## Control Relays and Timers

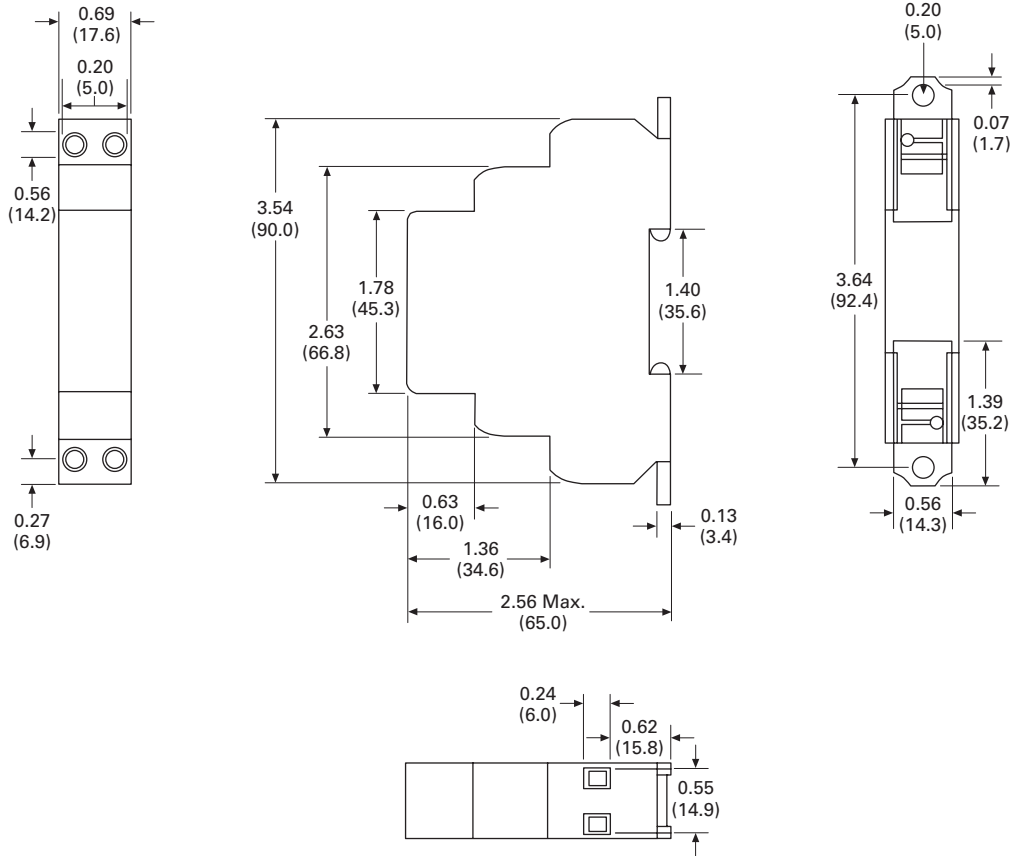
### Solid-State Relays

#### Dimensions

Approximate Dimensions in Inches (mm)

#### D96 Series

3



## D99 Series—Solid-State Relays



## 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.

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## 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
- CSA certified
- CE marked
- RoHS compliant





# 3.6

## Control Relays and Timers

### Solid-State Relays

#### Product Selection

D99210ACZ1

#### D99 Series

3



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
<b>Output Characteristics</b>							
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 <sup>2</sup> t for fusing (A <sup>2</sup> )		83	83	3700	3700	3700	83
<b>Input Characteristics</b>							
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
<b>Performance Characteristics</b>							
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
<b>Environment</b>							
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
<b>Miscellaneous Characteristics</b>							
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 <sup>2</sup> )	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)

# 3.6

## Control Relays and Timers

### Solid-State Relays

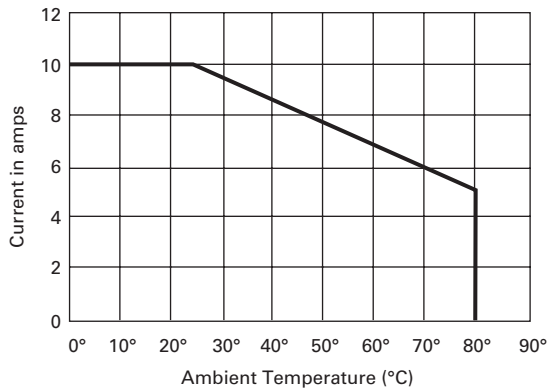
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#### D99 Series, continued

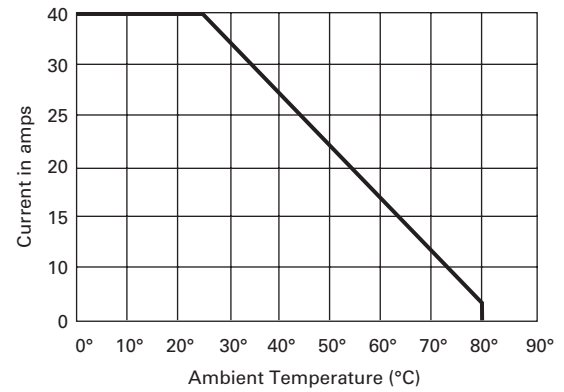
Description	Units	D99610ACZ1	D99610ACZ2	D99625ACZ1	D99625ACZ2	D99640ACZ1	D99640ACZ2
<b>Output Characteristics</b>							
Contact configuration		SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO	SPST-NO
Switching device		SCR	SCR	SCR	SCR	SCR	SCR
Current rating	A	10	10	25	10	40	40
Switching type		Zero cross	Zero cross	Zero cross	Zero cross	Zero cross	Zero cross
Maximum zero turn-on voltage (V <sub>pk</sub> )	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 <sup>2</sup> t for fusing (A <sup>2</sup> )		83	83	1700	1700	3700	3700
<b>Input Characteristics</b>							
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
<b>Performance Characteristics</b>							
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
<b>Environment</b>							
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
<b>Miscellaneous Characteristics</b>							
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 <sup>2</sup> )	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**

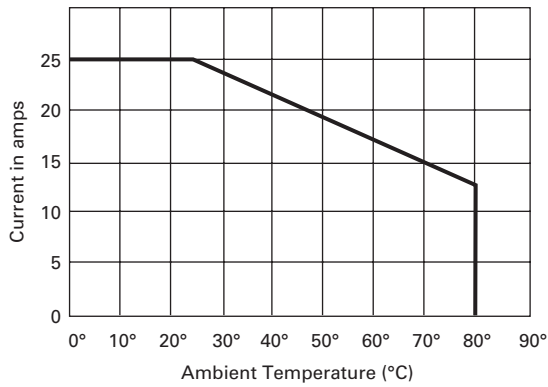
**10 Amp Styles**



**40 Amp Styles**



**25 Amp Styles**



# 3.6

## Control Relays and Timers

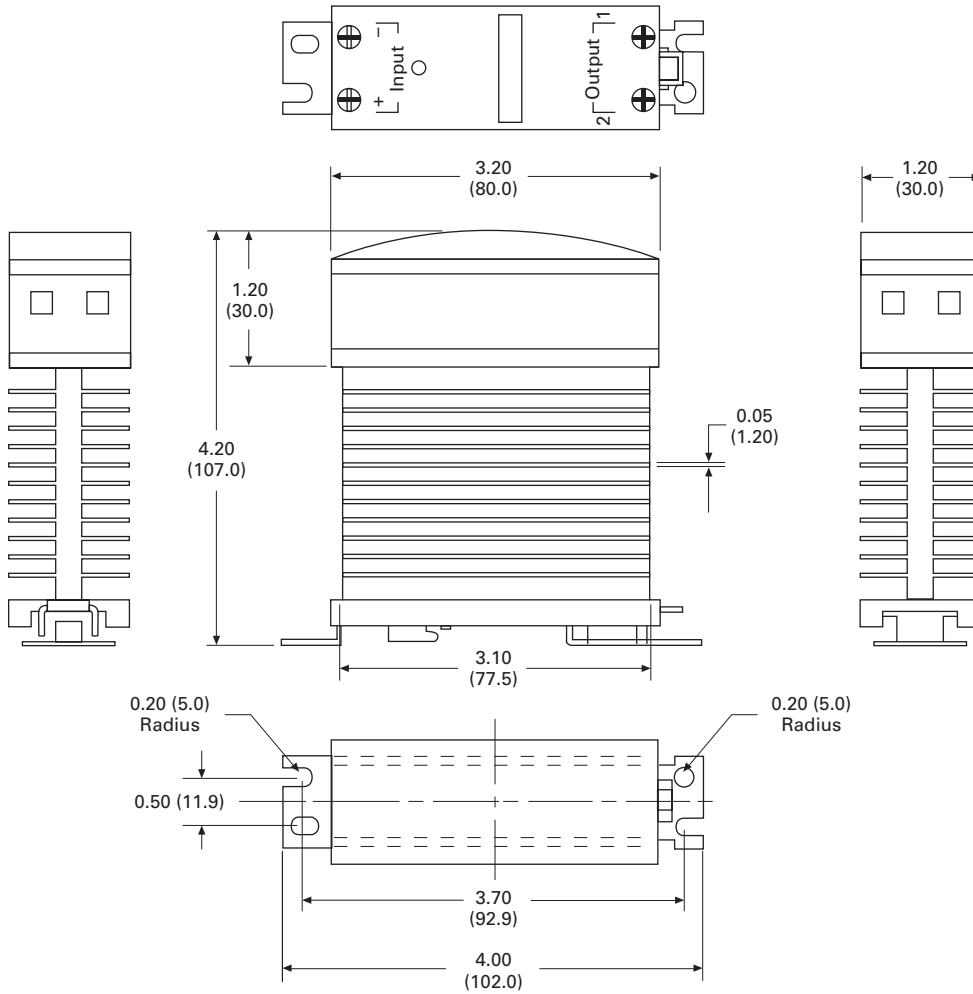
### Solid-State Relays

#### Dimensions

Approximate Dimensions in Inches (mm)

#### D99 Series

3



### Machine Tool Relays



### 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.

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D15 Series—Freedom 600 V Multipole



### 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.

### Contents

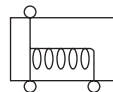
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with Convertible Contacts . . . . .	V7-T3-163

#### 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


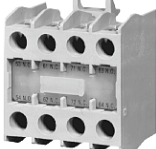



## Product Selection

### 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**AB**.

### Factory-Assembled Multipole Relays

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

### Additional Contact Poles

Description	Catalog Number
<b>Front Contact Pole Deck</b>	
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
<b>Side-Mounted Contact Blocks</b>	
1NO-1NC	C320KGS3
2NO	C320KGS4
2NC	C320KGS5
1NO (early closing)–1NC (late opening)	C320KGS7

### 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.

### Magnet Coil Selection

AC Coils Volts and Hertz	Code Suffix	DC Coils Volts	Code Suffix
120/60 or 110/50	<b>A</b>	12	<b>R1</b>
240/60 or 220/50	<b>B</b>	24	<b>T1</b>
480/60 or 440/50	<b>C</b>	48	<b>W1</b>
600/60 or 550/50	<b>D</b>	120	<b>A1</b>
208/60	<b>E</b>		
277/60	<b>H</b>		
208–240/60	<b>J</b>		
24/60	<b>T</b>		



#### Accessories

##### C320 Pneumatic Timer Attachment



##### Pneumatic Timer Attachment

Timing Range	Catalog Number
0.1 to 30 seconds	<b>C320TP1</b>
10 to 180 seconds	<b>C320TP2</b>

Description	Maximum Ampere Ratings			
	Volts AC			
	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	<b>C320LS1</b>

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	<b>C320DSTCVR</b>

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 <sup>①</sup>

Timing Range	Catalog Number <sup>②③④</sup>
0.1 to 1.0 seconds	<b>C320TDN1_</b>
1 to 30 seconds	<b>C320TDN30_</b>
30 to 300 seconds	<b>C320TDN300_</b>
5 to 30 minutes	<b>C320TDN3000_</b>

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.

##### C321MP1



##### Metal Mounting Plate

Description	Catalog Number
Metal mounting plate	<b>C321MP1</b>

Fits all D15 multipole relays.

##### DIN Rail



##### Mounting Channel (DIN Rail)

Description	Catalog Number
1 meter length	<b>XBANS3575P</b>

Designed for DIN rail mounting of Freedom Series relays.

##### C320TS2



##### Transient Suppressor Kits

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

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

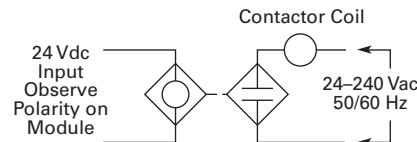
provisions for DIN rail mounting.

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

#### Design Characteristics

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

### Typical Application—Solid-State Switch



## 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

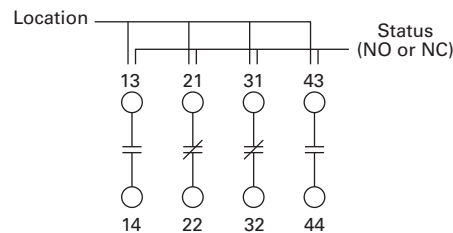
DC Volts	Make/Break Amperes
125	1.1
250	0.55

### Magnet Coil Data

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

DC Voltage	Pickup Amps	Watts	Sealed VA	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

### 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 Electrotechnical 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.

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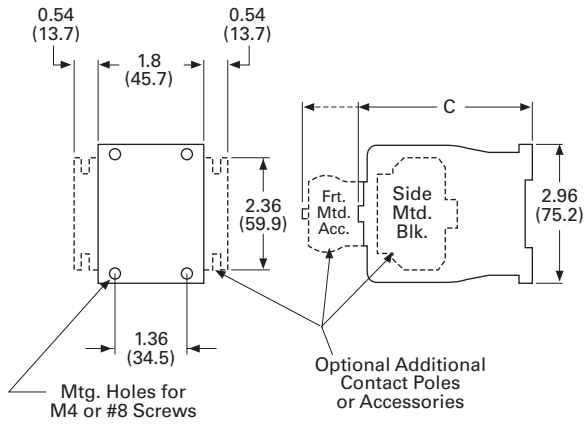
## Control Relays and Timers

### Machine Tool Relays

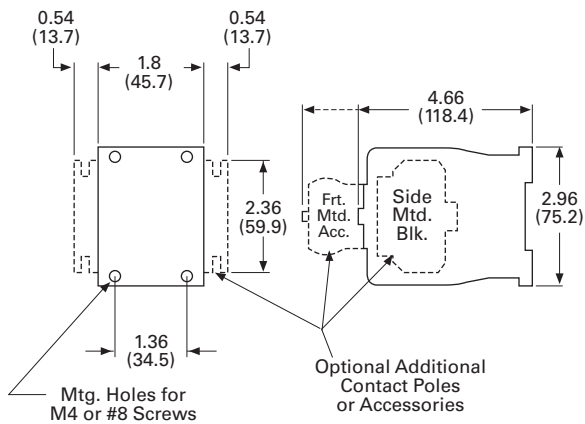
#### Dimensions

Approximate Dimensions in Inches (mm)

#### D15 Four-Pole Relay



#### D15 Six- and Eight-Pole Relays



#### Dimensions and Shipping Weights

Description	Dimension C	Shipping Weights Lbs (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)

**BF/BFD Series—Fixed Contact Industrial Control****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

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D26 Series—Type M, 600 Vac Multipole with Convertible Contacts . . . . .	<b>V7-T3-158</b>
D26 Series—Type M, DC Multipole with Convertible Contacts . . . . .	<b>V7-T3-163</b>

**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

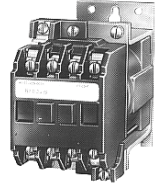
- Catalog number of basic relay
- If a coil voltage other than listed is required, select the suffix code from the Coil Voltage table and substitute it for the last letter in the catalog number. Example: BF80**V** for a 110/60 AC coil

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##### Type BF



##### Type BFD



#### Complete Relay—Type BF and BFD, Two-, Three-, Four- and Six-Pole <sup>①</sup>

Number of Poles	Type of Contact		BF 300 Vac Basic Relays 120/60, 110/50 AC Coil	BFD 250 Vdc Basic Relays 120 DC Coil
	NO (Form A)	NC (Form B)	Catalog Number	Catalog Number
2	2	0	BF20F	BFD20S
	1	1	BF11F	BFD11S
	0	2	BF02F	BFD02S
3	3	0	BF30F	BFD30S
	2	1	BF21F	BFD21S <sup>②</sup>
	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

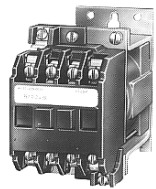
BFD Coils	
Volts DC	Suffix Code
6	C
12	D
24	L
38	N
48	M
72	E
95	B
120	S
130	U
240	T

#### Notes

- <sup>①</sup> 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.
- <sup>②</sup> Consult Customer Support Center for availability.

**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, Eight-, 10- and 12-Pole** <sup>①</sup>

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

**Coil Voltage**

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

BFD Coils	
Volts DC	Suffix Code
6	<b>C</b>
12	<b>D</b>
24	<b>L</b>
38	<b>N</b>
48	<b>M</b>
72	<b>E</b>
95	<b>B</b>
120	<b>S</b>
130	<b>U</b>
240	<b>T</b>

**Notes**

- <sup>①</sup> 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.
- <sup>②</sup> Consult Customer Support Center for availability.

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## Control Relays and Timers

### Machine Tool Relays

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#### Permanent Magnet Latch, Relay Mounted



#### Permanent Magnet Latch

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

#### Options

##### FASTON Push-On Terminals

Description	Code Letter	Catalog Number
Insert letter <b>F</b> after relay type designation in listed catalog number. Example: BFF20F or BFDF20S	<b>F</b>	—

##### Overlapping Contacts

Description	Code Letter	Catalog Number
NO contact closes before corresponding NC contact opens—supplied as NO/NC set(s). Insert letter <b>A</b> after relay type designation in listed catalog number. Example: BFA22F or BFDAF22S	<b>A</b>	—

##### NEMA 1 Enclosure for Relay Types

Description	Code Letter	Catalog Number
BF, AR—all poles	—	<b>4977D40G04</b>
BFD—4–8 poles	—	<b>4977D40G04</b>
ARD—4–8 poles	—	<b>4977D40G04</b>

#### Notes

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

## Technical Data and Specifications

### General Specifications

#### BF Relay Electrical Ratings—NEMA A300

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

#### Horsepower Ratings (UL Recognized)

Phase	AC Volts		DC Rating—NEMA P300				Max. Make or Break (VA)
	115	230	Volts	Maximum Current Cont.	Make	Break	
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)



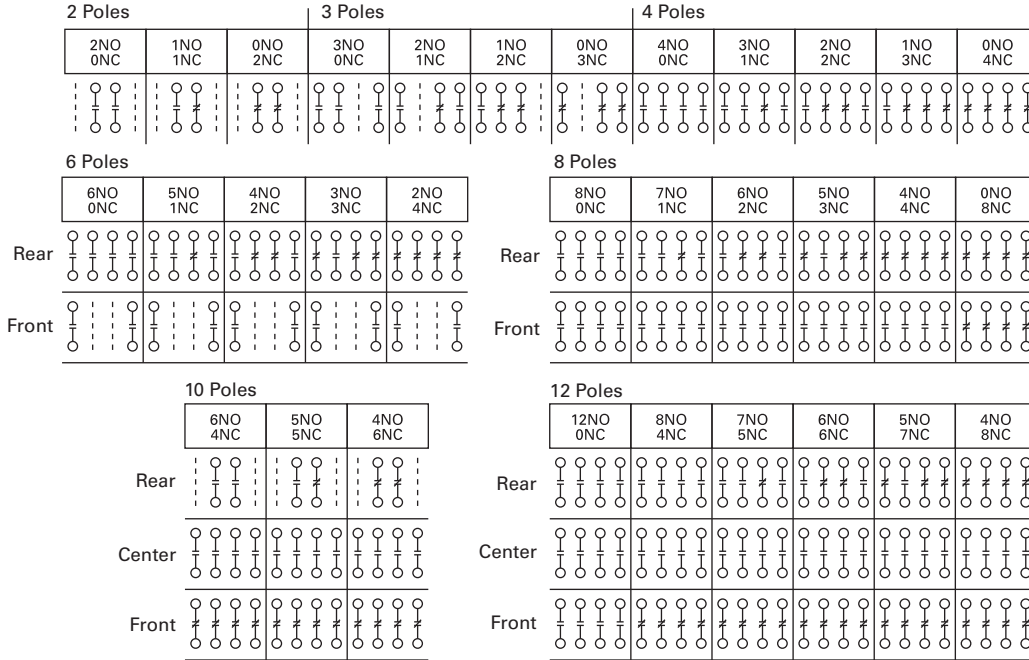
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## Control Relays and Timers

### Machine Tool Relays

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#### Contact Arrangements—BF and BFD Relays

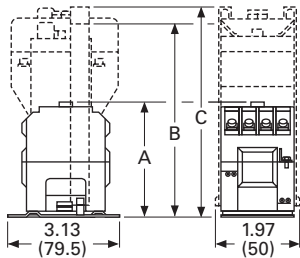


**Note:** NO = Normally Open NC = Normally Closed

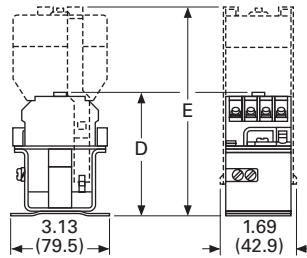
#### Dimensions

Approximate Dimensions in Inches (mm)

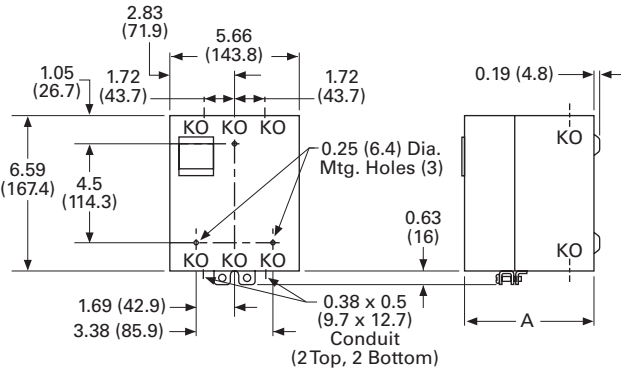
#### BF Relay with Permanent Magnet Latch and Solid-State Timer



#### 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
<b>Relays without Attachments</b>		
All	<b>BF, AR, ARD</b>	5.34 (135.6)
4 – 8	<b>BFD</b>	5.34 (135.6)
10, 12	<b>BFD</b>	7.97 (202.4)
<b>Relays with Attachments</b>		
All	<b>BF, AR, ARD</b>	7.97 (202.4)

## AR/ARD Series—Convertible Contact Industrial Control



## 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

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D26 Series—Type M, DC Multipole with Convertible Contacts . . . . .	V7-T3-163

## 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.

3

#### AR/ARD Relays



#### AR/ARD Relays

Number of Poles	Contact			AR 600 Vac Relays 120/60, 110/50 AC Coil	ARD 600 Vdc Relays 120 DC Coil
	NO	NC	Blank Cavities	Catalog Number	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 <sup>①</sup>	6	0	2	AR860A	ARD860S <sup>②</sup>
	8	0	0	AR880A	ARD880S
10 <sup>①</sup>	10	0	0	AR10100A	ARD10100S

#### Coil Voltage

AR Coils			ARD Coils	
Volts AC	Hz	Suffix Code	Volts DC	Suffix Code
12	60	F	12	D
24	60	I	24	L
48	60	G	48	M
110	60	V	95	B
110/120	50/60	A	120	S
208	60	B	130	U
220/240	50/60	W	240	T
277	60	C		
380/440	50/60	H		
440/480	50/60	X		
550	60	D		
550/600	50/60	E		

#### Contact Cartridges—600 V

Terminal Type	Standard Contact Cartridge Catalog Number <sup>③</sup>	Overlap Contact Cartridge Catalog Number <sup>④</sup>
<b>AC Cartridges</b>		
With clamp terminals	ARC	AROC
With screw terminals	ARCR	AROCR
<b>DC Cartridges</b>		
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
<b>For AC Control Circuits</b>		
24	60	<b>ARMLI</b>
48	60	<b>ARMLG</b>
120	60/50	<b>ARMLA</b>
240	60/50	<b>ARMLW</b>
<b>For DC Control Circuits</b>		
24	—	<b>ARMLL</b>
48	—	<b>ARMLM</b>
120	—	<b>ARMLS</b>
240	—	<b>ARMLT</b>

### 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		Blank Cavities	Catalog Number
	NO	NC		
<b>With 600 Vac Cartridges</b>				
4	2	0	2	<b>ARA20</b>
	4	0	0	<b>ARA40</b>
<b>With 600 Vdc Cartridges</b>				
4	2	0	2	<b>ARDA20</b>
	4	0	0	<b>ARDA40</b>

### 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 AR413A.	①	—

#### Screw Terminals

Description	Code Letter	Catalog Number
For ring-type connectors, add suffix <b>R</b> to the catalog number. Example: AR420 <b>AR</b> .	<b>R</b>	—

### Surge Suppressor

**ARSS Surge Suppressor for AR Relays**



	Catalog Number
Surge Suppressor	<b>ARSS</b>

#### 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 <b>S</b> after relay type designation in listed catalog number. Example: AR402 <b>AS</b> . Specify the number of sets required: <b>S</b> for one set and <b>S2</b> for two sets.	<b>S</b> or <b>S2</b> ①	—

#### Note

① Consult Customer Support Center for availability.

## Technical Data and Specifications

### General

#### Contact Ratings—600 Vac Cartridge NEMA A600

Volts	Maximum Current			Maximum VA	
	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

Volts	Maximum Current		Maximum VA
	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

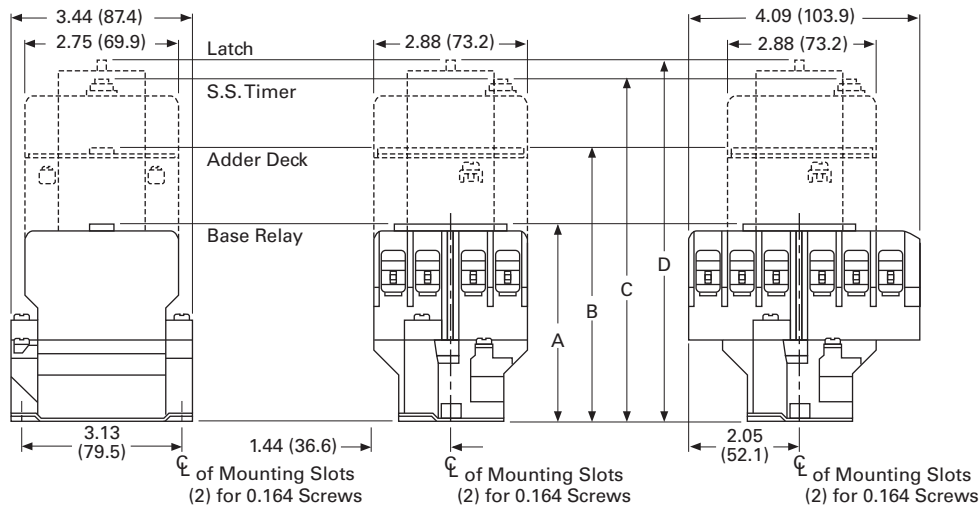
AC	96 VA open, 14 VA closed
DC	14 watts open, 250 V max.

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)

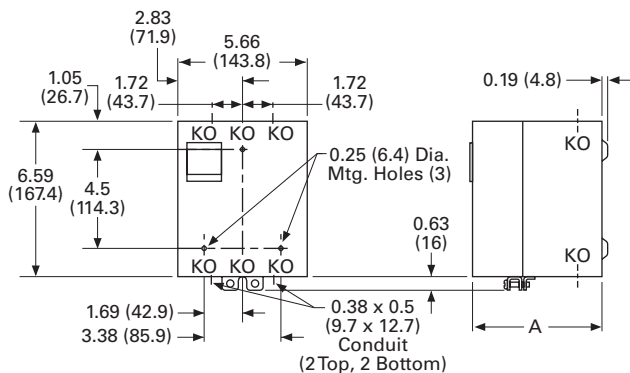
#### Four- and Six-Pole with Four-Pole Adder, Solid-State Timer and Mechanical Latch



#### 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
<b>Relays without Attachments</b>		
All	BF, AR, ARD	5.34 (135.6)
4-8	BFD	5.34 (135.6)
10, 12	BFD	7.97 (202.4)
<b>Relays with Attachments</b>		
All	BF, AR, ARD	7.97 (202.4)

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



### Contents

<i>Description</i>	<i>Page</i>
D15 Series—Freedom 600 V Multipole . . . . .	<b>V7-T3-142</b>
BF/BFD Series—Fixed Contact Industrial Control . . . . .	<b>V7-T3-147</b>
AR/ARD Series—Convertible Contact Industrial Control . . . . .	<b>V7-T3-153</b>
D26 Series—Type M, 600 Vac Multipole with Convertible Contacts	
Product Selection . . . . .	<b>V7-T3-159</b>
Technical Data and Specifications . . . . .	<b>V7-T3-161</b>
Dimensions . . . . .	<b>V7-T3-162</b>
D26 Series—Type M, DC Multipole with Convertible Contacts . . . . .	<b>V7-T3-163</b>

### 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-T3-160**.

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.

#### Standards and Certifications

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



**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.

**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 Complete AC Relays—Open Type**

Number of Contacts	Type of Contact		Relay Only Catalog Number	Relay with Mechanical Latch Catalog Number
	NO (Form A)	NC (Form B)		
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 <sup>①</sup>	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 <sup>①</sup>	8	0	D26MR80
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



4-Pole with Latch



4-Pole with Pneumatic Timer Attachment

**Magnet Coil Selection**

Volts/Hertz	Suffix Code	Volts/Hertz	Suffix Code
120/60–110/50	<b>A</b>	32/60 <sup>②</sup>	<b>V</b>
240/60–220/50	<b>B</b>	12/60 <sup>②</sup>	<b>R</b>
208/60 <sup>②</sup>	<b>E</b>	6/60	<b>P</b>
24/60	<b>T</b>	380/50 <sup>②</sup>	<b>L</b>
277/60	<b>H</b>	480/60 or 440/50	<b>C</b>
		600/60 or 550/50 <sup>②</sup>	<b>D</b>

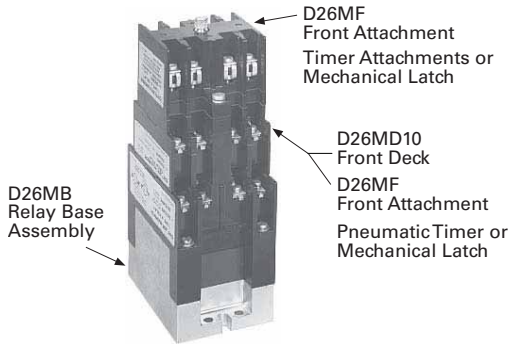
**Notes**

<sup>①</sup> **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 **D26MR804A**.

<sup>②</sup> Consult Customer Support Center for availability.



#### Relay Component Parts Location



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

Contact Positions <sup>①</sup>	Timer Operation	Catalog Number <sup>②</sup>
4	ON delay	<b>D26MR005</b>
4	OFF delay	<b>D26MR006</b>

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-T3-161**.

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

#### Rear Pole



#### Front Pole



#### Separate Contacts

Description	Catalog Number
<b>Convertible Contacts</b>	
Rear pole—NO	<b>D26MPR</b>
Rear pole—NC	<b>D26MPR02</b>
Front pole—NO	<b>D26MPF</b>
Front pole—NC	<b>D26MPF02</b>
Gold plated (for low power circuits)	
Rear pole—NO	<b>D26MPR03</b>
Front pole—NO	<b>D26MPF03</b>
<b>Non-Convertible Contacts</b>	
Rear pole NO early closing <sup>③</sup>	<b>D26MPS</b>
Rear pole NC late opening <sup>③</sup>	<b>D26MPL</b>

#### Relay Base Assembly



#### Relay Base Assembly (without Poles)

Description	Catalog Number
Relay base assembly	<b>D26MB</b> <sup>④</sup>

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
<b>Front Deck with ...</b>	
1NO contact pole	<b>D26MD10</b>
2NO contact poles	<b>D26MD20</b>
4NO contact poles	<b>D26MD40</b>

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	<b>D26MF</b>

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 To obtain overlapping contacts, these two special poles must be used in related circuits.
- ④ Add magnet coil suffix letter, see **Page V7-T3-159**. Example: D26MBA.

### 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  $\pm 10\%$ . 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. (10 per box, order in multiples of 10.)

### 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 <sup>①</sup>	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		VA		Operating Time
	Inrush	Sealed	Inrush	Sealed	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

<sup>①</sup> For DC contact ratings, see **Page V7-T3-165**.

# 3.7

## Control Relays and Timers

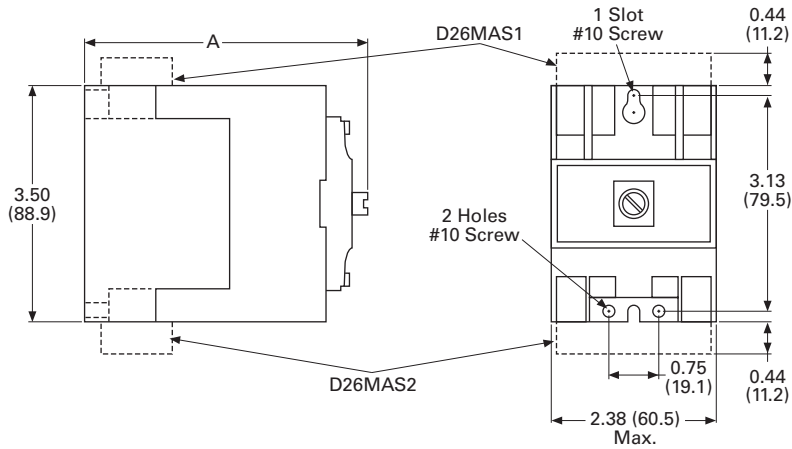
### Machine Tool Relays

#### Dimensions

Approximate Dimensions in Inches (mm)

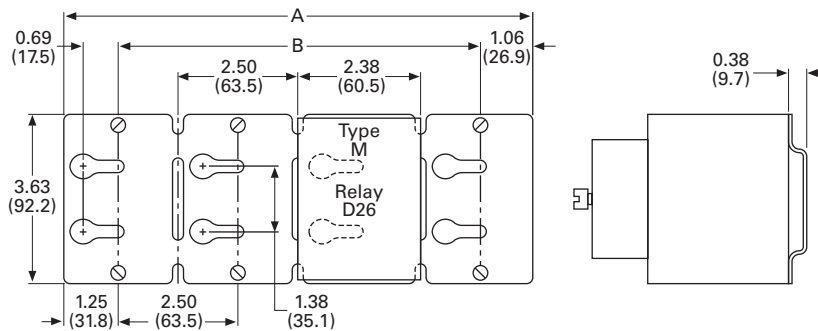
#### AC and DC D26 Relays

3



AC Relay D26	DC Relay D26	Dimension A	Ship. Wt. Lbs (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

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BF/BFD Series—Fixed Contact Industrial Control . . . . .	V7-T3-147
AR/ARD Series—Convertible Contact Industrial Control . . . . .	V7-T3-153
D26 Series—Type M, 600 Vac Multipole with Convertible Contacts . . . . .	V7-T3-158
D26 Series—Type M, DC Multipole with Convertible Contacts	
Product Selection . . . . .	V7-T3-164
Technical Data and Specifications . . . . .	V7-T3-165
Dimensions . . . . .	V7-T3-166

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-T3-159. 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.

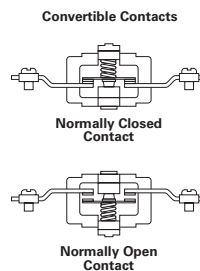
The mechanically latched relay has one extra contact, normally open early closing, factory wired in series with the winding of the intermittent rated latch coil. (Contact is shown as S in figure to the right.)

**Component parts for these relays** are the same as those listed for the (D26) Type M AC relays on Page V7-T3-159, except for the Indicating Light, which is not applicable to a DC relay.

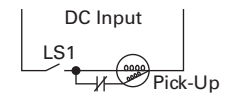
Contact poles D26MPR and D26MPF in 2- to 7-pole relays are convertible NO to NC or vice versa. Simply reverse the terminal screws and rotate the unit pole 180° (in either direction).

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.

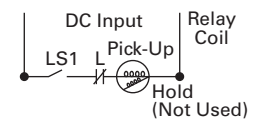


DC Type M Relay

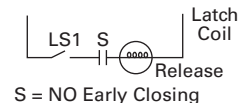


L = NC Late Opening

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

#### 3-Pole



#### 3-Pole with Latch



#### Complete DC Relays—Open Type

Number of Contacts	Type of Contact <sup>①</sup>		Relay Only Catalog Number	Relay with Mechanical Latch Catalog Number
	NO (Form A)	NC (Form B)		
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
4	0	3	D26MRD03	D26MRD032
	4	0	D26MRD40	D26MRD402
	3	1	D26MRD31	D26MRD312
6 <sup>②</sup>	2	2	D26MRD22	D26MRD222
	1	3	D26MRD13	D26MRD132
	0	4	D26MRD04	D26MRD042
	6	0	D26MRD60	D26MRD602
7 <sup>②</sup>	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	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

- <sup>①</sup> Relay has additional factory wired normally closed coil clearing contact (see diagram).
- <sup>②</sup> **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 <sup>①</sup>	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-T3-161**.

**Technical Data and Specifications****General****Contact Ratings (Amperes) <sup>②</sup>**

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

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

**Notes**

- <sup>①</sup> Number of available instantaneous contact positions (order contacts separately—Catalog Number D26MPR).
- <sup>②</sup> Contact ratings do not apply to contacts D26MPL and D26MPS. For AC contact ratings, see **Page V7-T3-161**.

# 3.7

## Control Relays and Timers

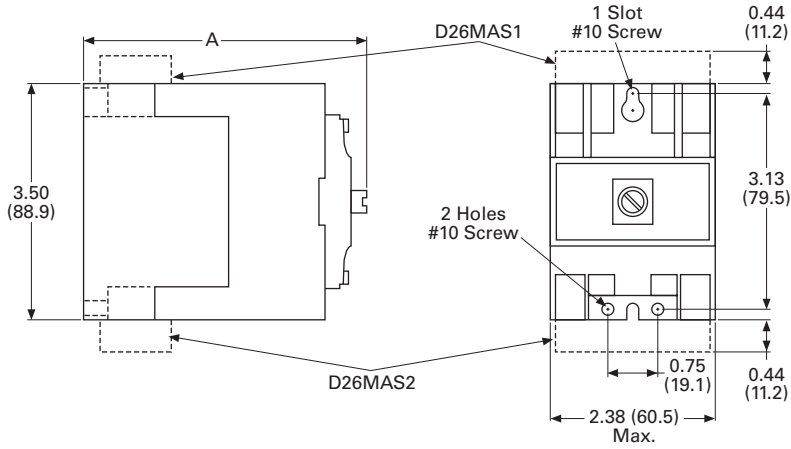
### Machine Tool Relays

#### Dimensions

Approximate Dimensions in Inches (mm)

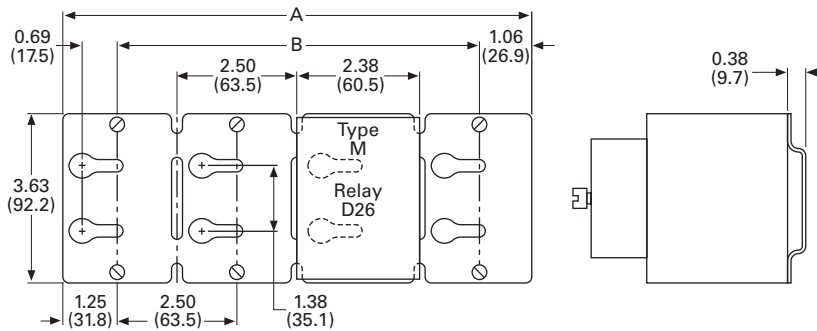
#### AC and DC D26 Relays

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AC Relay D26	DC Relay D26	Dimension A	Ship. Wt. Lbs (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



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TMRP Series	V7-T3-185

## Product Selection Guide

## Function Code Cross-Reference Guide

Function	Description	Timer Series					E5-248 ③
		Universal TR	TR	TMR5	TMR6	TMRP	
1	Asymmetrical flasher, pause first	lp	—	R/P	—	—	RC DLY
2	Asymmetrical flasher, pulse first	li	—	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	—	—	—	X	—	—

## 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

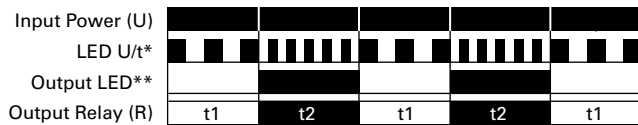
#### Timer Function Descriptions

#### 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.

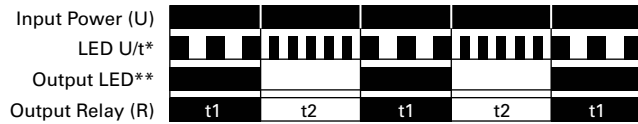


#### Function #2—Universal TR, TMR5, E5-248

##### 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.

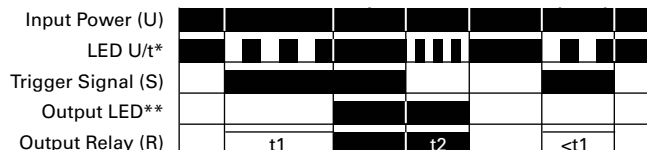


#### Function #3—Universal TR

##### 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.

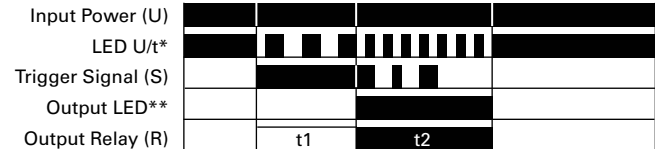


#### Function #5—Universal TR

##### 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 control has been completed.

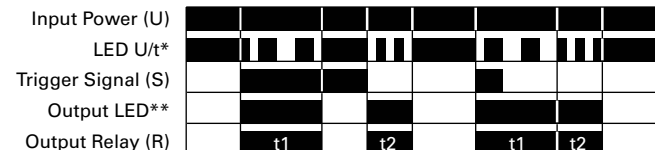


#### Function #6—Universal TR

##### 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

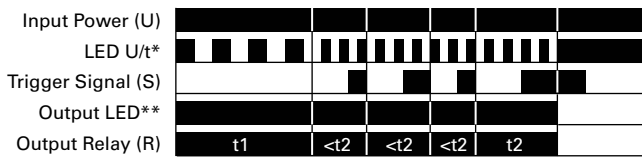
output relay again switches to the ON position and the set interval t2 begins. After the interval t2 has expired, the output relay R switches into OFF position. During the interval, the control contact is ignored. During the interval, the control contact can be operated any number of times.



### 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

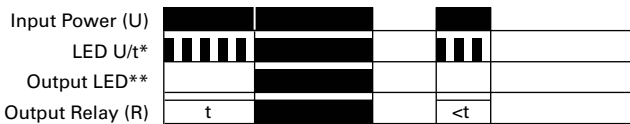
interval t2, the relay will remain in the ON position. If the control switch is not closed and opened within the interval t2, the relay will change to the OFF position until supply voltage U is interrupted and reapplied.



### 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.

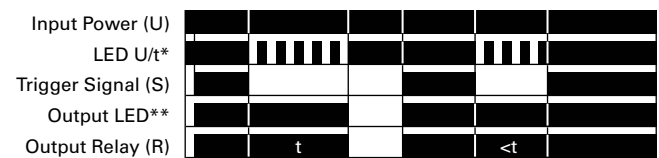
The relay will remain in that position until supply voltage U is interrupted. If the supply voltage is interrupted prior to interval t timing out, the relay will immediately switch to the OFF position.



### 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

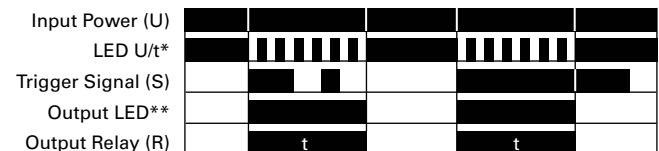
output relay R switches to the OFF position. If the control contact S is closed before interval t expires, the output relay will remain in the ON position until the control switch opens, at which time the interval t will begin again.



### 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

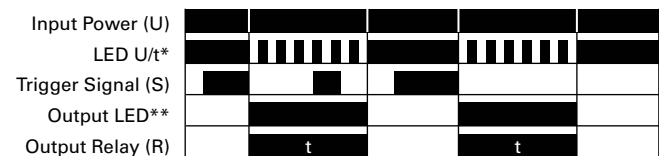
interval t has expired, the output relay R switches to the OFF position. The control contact is ignored during the interval t, and a new cycle cannot be started until the set interval t has timed out.



### 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.



# 3.8

## Control Relays and Timers

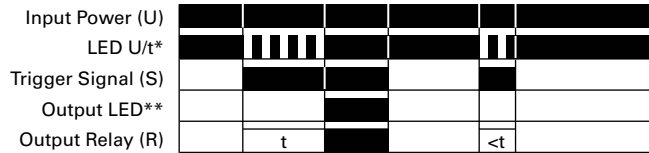
### Timing Relays

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#### 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

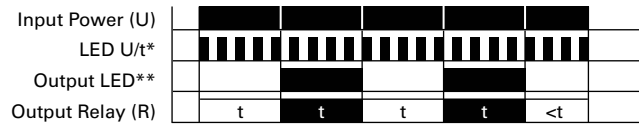
will remain in that position until the control switch opens. If the control switch is opened prior to interval t timing out, the relay will remain in the OFF position and any elapsed time will be erased.



#### 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.

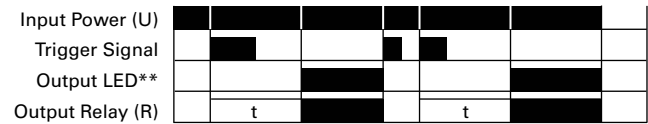
After interval t has expired, the relay will again switch to the ON position for the set interval t. This cycle will repeat at a 1:1 ratio until supply voltage U is interrupted.



#### 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

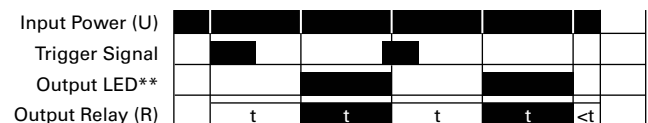
until the control switch has opened and closed. If the control switch is opened and closed prior to interval t timing out, the relay will remain in the OFF position and any elapsed time will be erased.



#### 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.

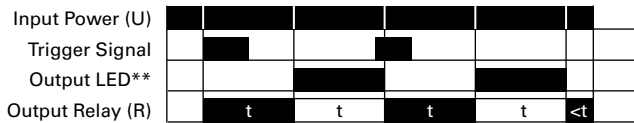


### Function #19—TRF, E5-248

#### 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.

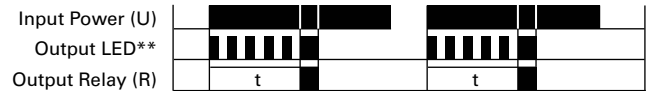


### Function #22—TMRP, E5-248

#### 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.

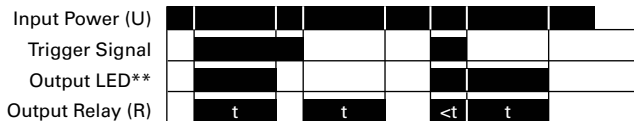


### Function #20—TRF

#### 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.

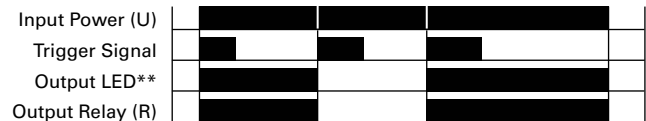


### Function #23—N/A

#### 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).

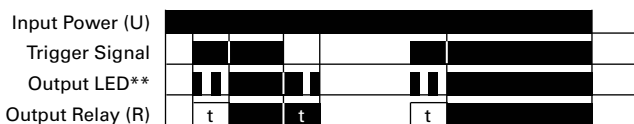


### Function #21—TMRP

#### 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 #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.



#### Universal TR Series



### 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.

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#### Description

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#### 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
- CE marked
- RoHS compliant
- IEC/EN 61812



## Product Selection

## Single-Pole Model

## Universal TR Timing Relays



Supply Voltage	Description	Catalog Number
<b>4-Function</b>		
24–240 Vac/Vdc	Compact DIN rail mount, SPDT	<b>TRL04</b>
<b>7-Function</b>		
24–240 Vac/Vdc	Compact DIN rail mount, SPDT	<b>TRL07</b>
12–240 Vac/Vdc	Compact DIN rail mount, DPDT	<b>TRL27</b>
	Asymmetrical pulse generator, DPDT	<b>TRW27</b>

## Technical Data and Specifications

## Universal TR Timing Relays

Description	TRL04	TRL07	TRL27	TRW27
Functions <sup>①</sup>	E, R, Wu, Bp	E, R, Wu, Bp, Ws, Wa, Es	E, R, Wu, Bp, Ws, Wa, Es	li, lp, 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
<b>Input</b>				
Supply voltage	24–240 Vac/Vdc	24–240 Vac/Vdc	12–240 Vac/Vdc	12–240 Vac/Vdc
Rated supply frequency	+10% /–15%	+10% /–15%	±10%	±10%
Rated consumption	4 VA (1.5 W)	4 VA (1.5 W)	6 VA (2 W)	6 VA (2 W)
Duty cycle	100%	100%	100%	100%
Reset time	100 ms	100 ms	100 ms	100 ms
Residual ripple for DC	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
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)
Rated surge voltage	4 kV	4 kV	4 kV	4 kV
<b>Output</b>				
Contact configuration	SPDT (one changeover contact)	SPDT (one changeover contact)	DPDT (two changeover contacts)	DPDT (two changeover contacts)
Rated voltage	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)
Fusing	8 A fast acting	8 A fast acting	8 A fast acting	8 A fast acting
Mechanical life	20 x 10 <sup>6</sup> operations	20 x 10 <sup>6</sup> operations	20 x 10 <sup>6</sup> operations	20 x 10 <sup>6</sup> operations
Electrical life	2 x 10 <sup>5</sup> operations at 1000 VA load, resistive	2 x 10 <sup>5</sup> operations at 1000 VA load, resistive	2 x 10 <sup>5</sup> operations at 1000 VA load, resistive	2 x 10 <sup>5</sup> 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)
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)
Rated surge voltage	4 kV	4 kV	4 kV	4 kV
<b>Control Signal</b>				
Loadable	Yes	Yes	Yes	Yes
Maximum cable length	10m	10m	10m	10m
Trigger level (sensitivity)	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

**Note**

<sup>①</sup> Refer to Function Code Cross-Reference Guide on **Page V7-T3-167** for function details.

#### Universal TR Timing Relays, continued

Description	TRL04	TRL07	TRL27	TRW27
<b>Accuracy</b>				
Base accuracy	±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
Repetition accuracy	<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
<b>Physical</b>				
Ambient temperature	-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
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)
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)
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
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
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
Tightening torque	Max. 1 Nm	Max. 1 Nm	Max. 1 Nm	Max. 1 Nm

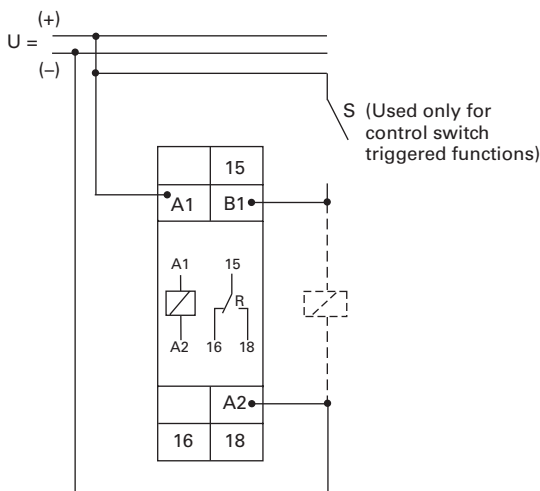
#### Terminal Capacity

##### Description

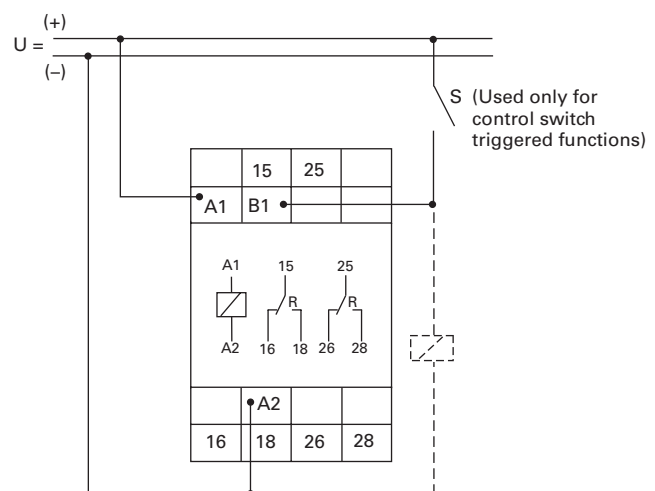
- 1 x 0.5 to 2.5 mm<sup>2</sup> with/without multicore cable end
- 1 x 4 mm<sup>2</sup> without multicore cable end
- 2 x 0.5 to 1.5 mm<sup>2</sup> with/without multicore cable end
- 2 x 2.5 mm<sup>2</sup> flexible without multicore cable end

#### Wiring Diagrams

##### Single-Pole, Double-Throw Units (SPDT)—TRL04 and TRL07



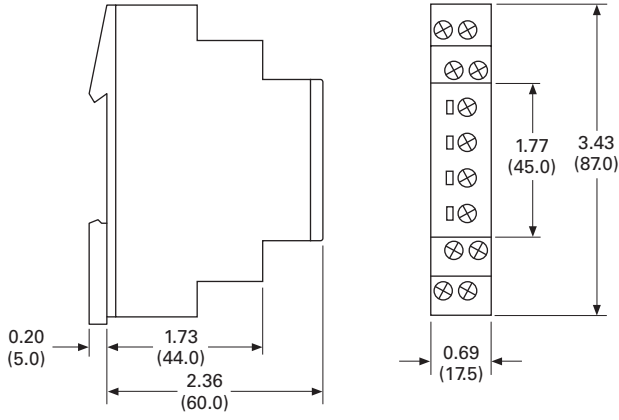
##### Double-Pole, Double-Throw Units (DPDT)—TRL27 and TRW27



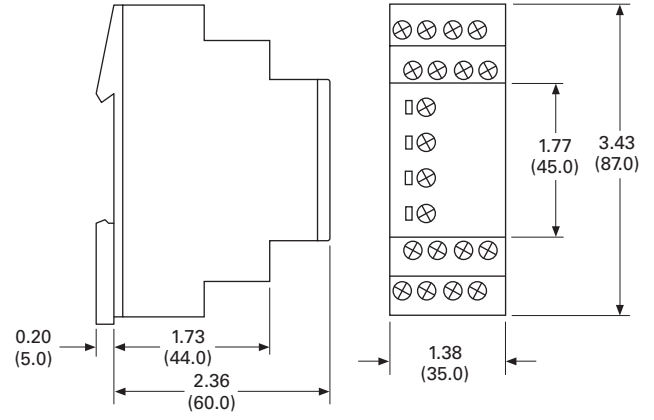
### Dimensions

Approximate Dimensions in Inches (mm)

#### 17.5 mm (TRL04 and TRL07)



#### 35 mm (TRL27 and TRW27)





#### TR Series

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  $\pm 0.2\%$
- LED indication
- Standard 8- or 11-pin and 11-blade termination
- 2 Form C DPDT delayed output contacts
- 10 A contact rating

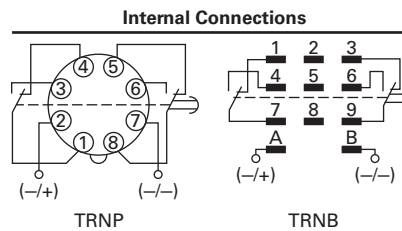
### Contents

#### Description

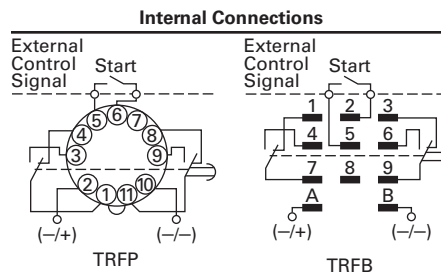
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TMR5 Series . . . . .	<b>V7-T3-179</b>
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TMRP Series . . . . .	<b>V7-T3-185</b>

### Operation

#### TRNP and TRNB



#### TRFP and TRFB

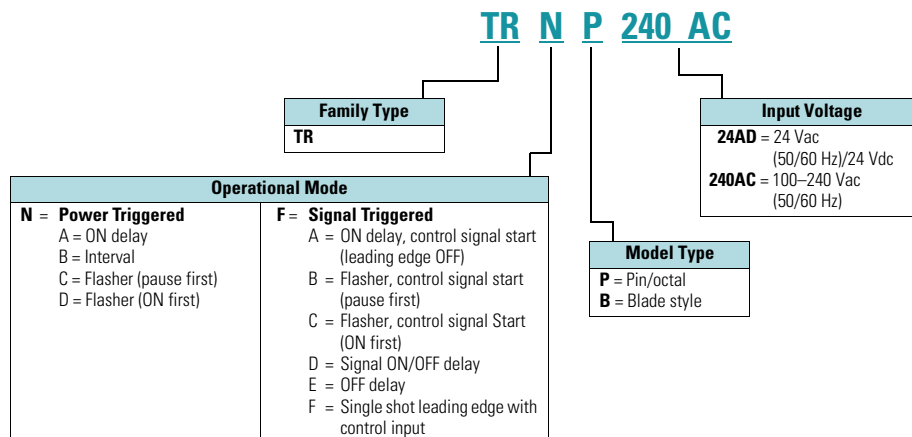


### Standards and Certifications

- cULus listed
- CSA
- CE marked
- TUV



### Catalog Number Selection



### Product Selection

#### TR Plug-In Timing Relays—Power Triggered

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

#### TR Plug-In Timing Relays—Signal Triggered

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

### Accessories

#### Sockets for Use with TR Timers—Standard Pack of 10

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

### 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 <sup>①</sup>
Voltage error	± 0.2%, ± 20 ms <sup>①</sup>
Temperature error	± 0.5%, ± 20 ms <sup>①</sup>
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

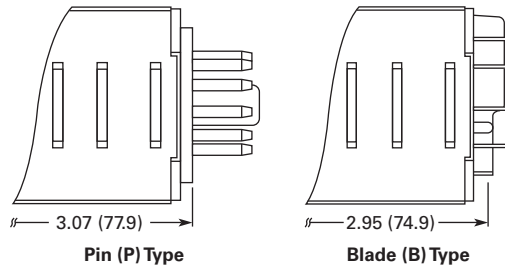
Description	Specification
Contact configuration	2 Form C, DPDT (delayed output)
Allowable voltage/current	240 Vac, 30 Vdc/10 A
Max. permissible operating frequency	1800 cycles per hour
Rated load	
Resistive	10 A, 240 Vac/30 Vdc
Inductive	7 A, 240 Vac/30 Vdc
Horsepower rating	1/6 hp 120 Vac, 1/3 hp 240 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
<b>Dimensions</b>	
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)
<b>Weights</b>	
TRNP	87g
TRFP	89g
TRNB, TRFB	85g



#### Note

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

## TMR5 Series



## 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

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## Standards and Certifications

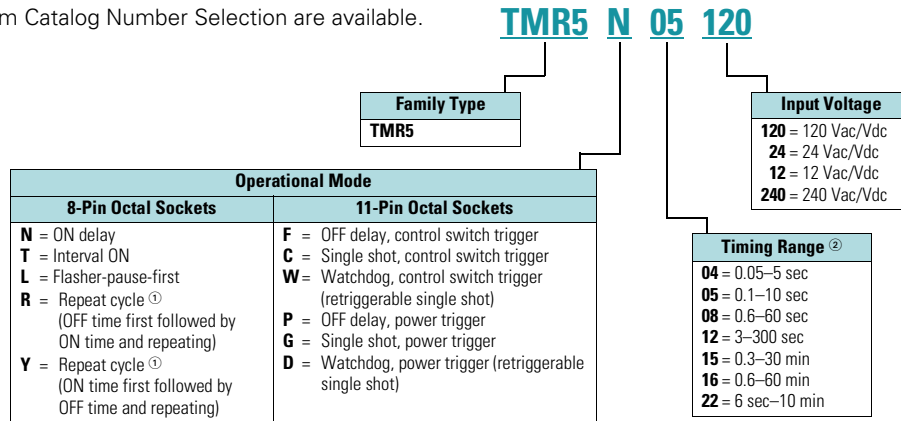
- cRUus
- UL listed (with Eaton socket)
- RoHS compliant
- CE marked

cRUUS

ROHS  
COMPLIANT

#### Catalog Number Selection

All configurations from Catalog Number Selection are available.



#### Product Selection

##### TMR5 Time Delay Relays

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

#### Accessories

##### Accessories for Use with TMR5 Time Delay Relays

Description	Standard Pack	Catalog Number
8-pin socket	10	<b>D3PA2</b>
11-pin socket	10	<b>D3PA3-A2</b>
Hold-down spring	10	<b>D65CHDS</b>

#### Notes

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

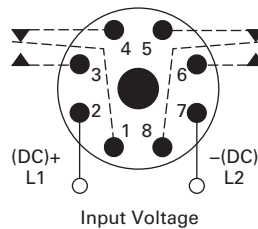
### Technical Data and Specifications

#### TMR5 Time Delay Relays

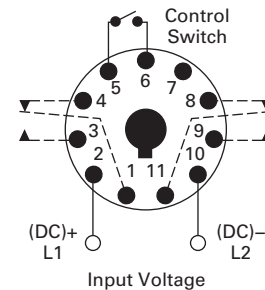
Description	Specification
Voltage tolerance	
AC operation	+10/−15% of nominal at 50/60 Hz
DC operation	+10/−15% of nominal
Load burden	2 VA
Setting accuracy	
Maximum setting (adjustable)	+5%, −0%
Minimum setting (adjustable)	+0%, −50%
Fixed time delay	
< 2 seconds	+1%
0.1–2 seconds	±5%
Repeat accuracy (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

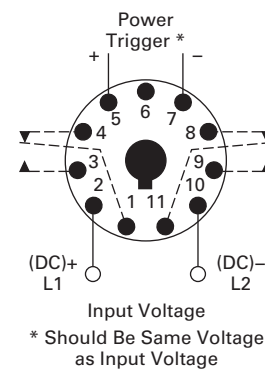
#### Wiring for 8-Pin Units



#### Wiring for 11-Pin Control Switch Trigger Units



#### Wiring for 11-Pin Power Trigger Units



# 3.8

## Control Relays and Timers

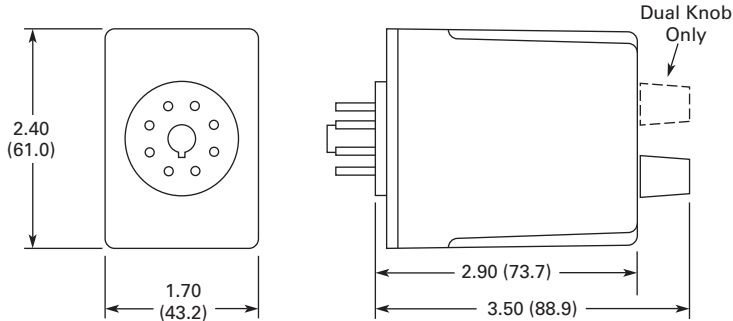
### Timing Relays

#### Dimensions

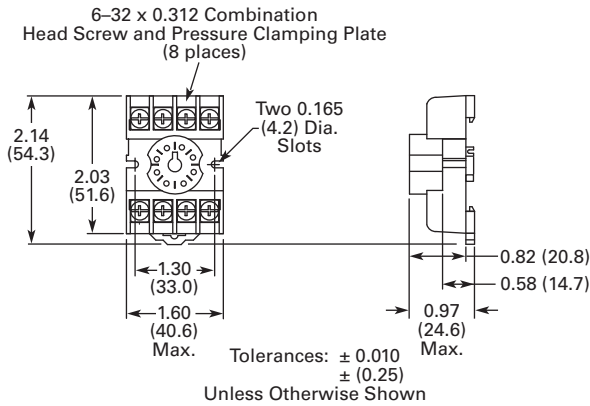
Approximate Dimensions in Inches (mm)

#### TMR5

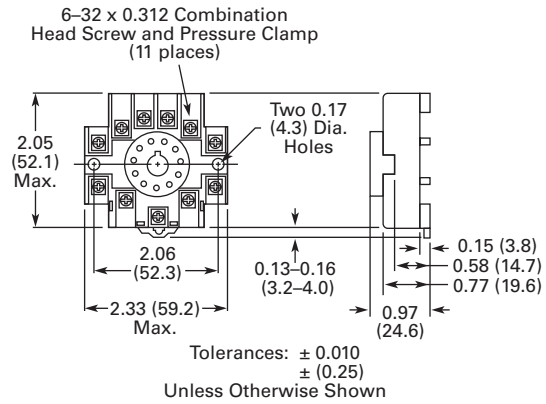
3



#### D3PA2 Socket



#### D3PA3 Socket



### TMR6 Series



## 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.

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### Operation

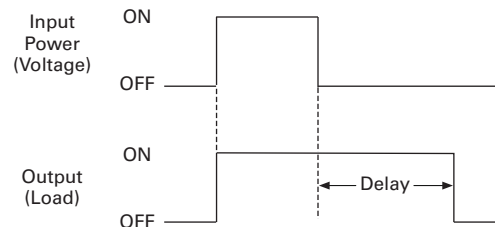
#### True OFF Delay

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





# 3.8

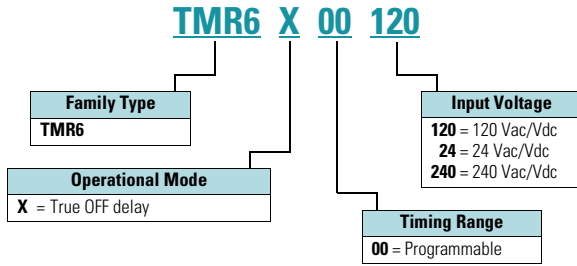
## Control Relays and Timers

### Timing Relays

3

#### Catalog Number Selection

All configurations from Catalog Number Selection are available.



#### Product Selection

##### TMR6 True OFF Delay Relays

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

#### Accessories

##### Accessories for Use with TMR6 Time Delay Relays

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

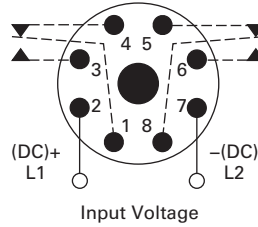
#### Technical Data and Specifications

##### TMR6 Time Delay Relays

Description	Specification
<b>Voltage tolerance</b>	
AC operation	+10/–15% of nominal at 50/60 Hz
DC operation	+10/–15% of nominal
Load burden	2 VA
<b>Setting accuracy</b>	
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
<b>Life</b>	
Mechanical	2,000,000 operations
Full load	100,000 operations

#### Wiring Diagram

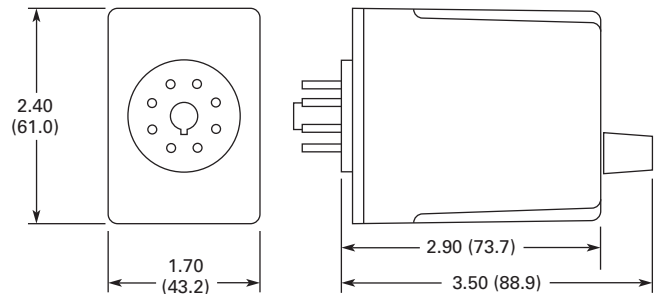
##### Wiring for 8-Pin Units



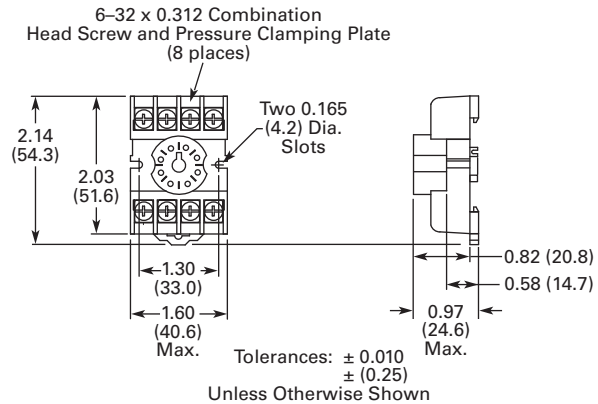
#### Dimensions

Approximate Dimensions in Inches (mm)

##### TMR6



##### D3PA2 Socket



## TMRP Series



## 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.

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## 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
<b>10-Function</b>		
12–240 Vac/Vdc	Control switch trigger, DPDT	<b>TMRP5100</b>
	Control switch trigger, SPDT	<b>TMRP5101</b>
	Power trigger, DPDT	<b>TMRP5102</b>

## Technical Data and Specifications

## TMRP Timing Relays

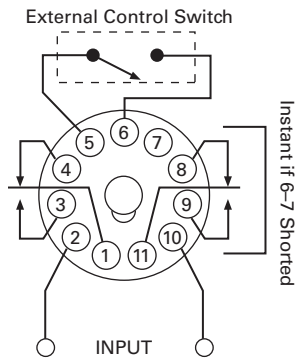
Description	TMRP5100	TMRP5101	TMRP5102
Functions <sup>①</sup>	A, B, C, D, E, F, G, H, I, J	A, B, C, D, E, F, G, H, I, J	A, B, C
Time range	0.1 sec to 9,990 hours	0.1 sec to 9,990 hours	0.1 sec to 9,990 hours
<b>Input</b>			
Supply voltage	12–240 Vac/Vdc	12–240 Vac/Vdc	12–240 Vac/Vdc
Supply voltage tolerance	±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
<b>Output</b>			
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
<b>Control Signal</b>			
Minimum control pulse length	50 ms minimum	50 ms minimum	50 ms minimum
<b>Accuracy</b>			
Repetition accuracy	0.10% at constant voltage and temperature	0.10% at constant voltage and temperature	0.10% at constant voltage and temperature
<b>Physical</b>			
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**

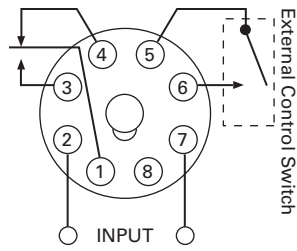
<sup>①</sup> Refer to Function Code Cross-Reference Guide on **Page V7-T3-167** for function details.

### Wiring Diagrams

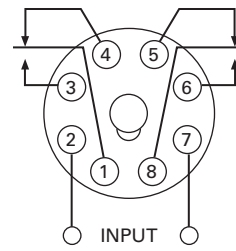
**TMRP5100**



**TMRP5101**



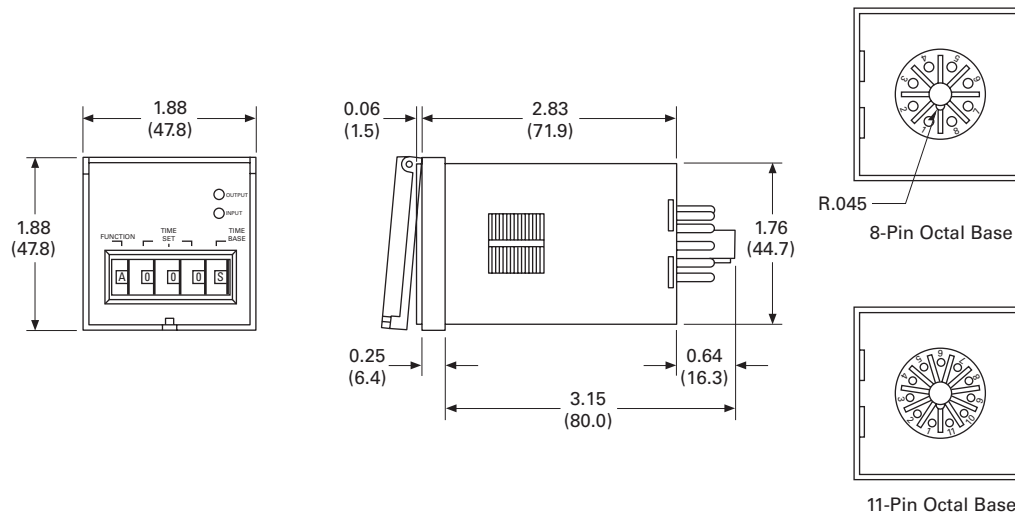
**TMRP5102**



### Dimensions

Approximate Dimensions in Inches (mm)

**TMRP Series**



#### D85 Series—Alternating Relays



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.

### Contents

#### Description

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D85 Series—Alternating Relays	
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Technical Data and Specifications . . . . .	<b>V7-T3-190</b>
Wiring Diagrams . . . . .	<b>V7-T3-190</b>
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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



#### Note

① When used with appropriate Eaton socket.

## Product Selection

### D85 Series—Alternating Relays <sup>①</sup>

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

## Accessories

### D85 Series—Alternating Relays

Description	Standard Pack	Catalog Number
8-pin socket	10	<b>D3PA2</b>
11-pin socket	10	<b>D3PA3-A2</b>
Hold-down spring	10	<b>D65CHDS</b>

#### Note

<sup>①</sup> Contact Eaton for relays for 3-switch applications (Lead-Lag-Stop).

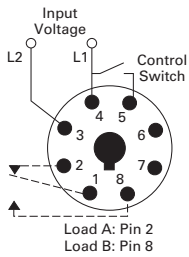
#### Technical Data and Specifications

##### D85 Series—Alternating Relays

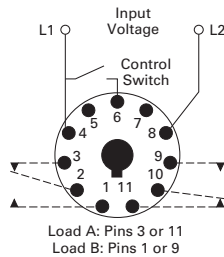
Description	Specification
Voltage tolerance	+10%/-15% of control voltage at 50/60 Hz
Load (burden)	Less than 3 VA
Output contacts	10 A resistive at 240 Vac / 30 Vdc, 1/2 hp at 120/240 Vac (NO), 1/3 hp at 120/240 Vac (NC)
Mechanical life	10,000,000 operations
Electrical life	100,000 operations
Temperature	-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

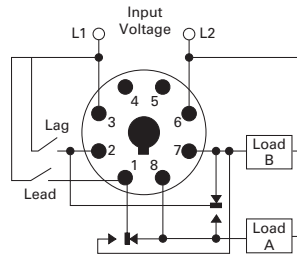
##### D851 Series Relays, SPDT



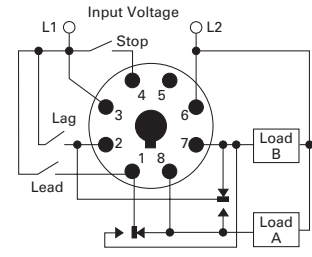
##### D852 Series Relays, DPDT



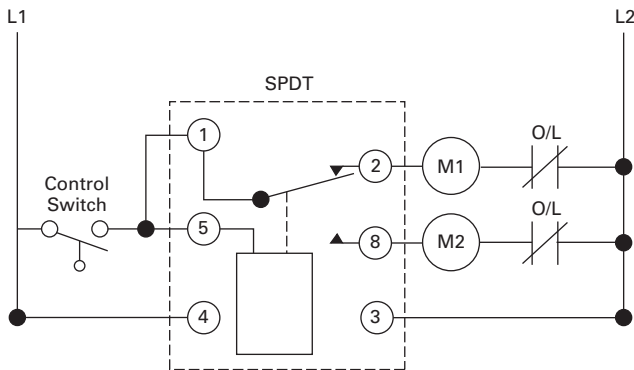
##### D852X Series Relays, DPDT Cross-Wired



##### D853 Series Relays, Three-Switch Applications



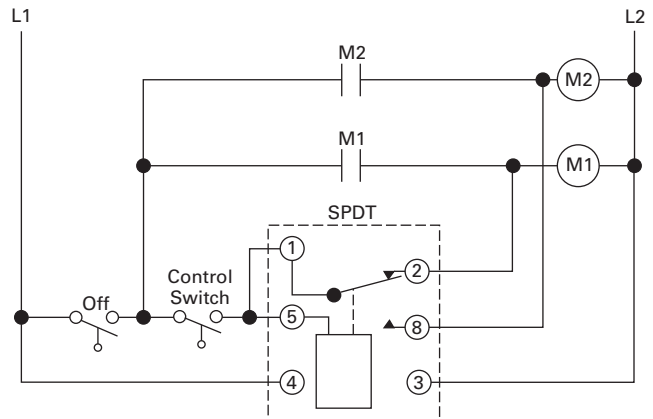
#### Typical Installations for SPDT and DPDT Alternating Relays, Standard Installation



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.

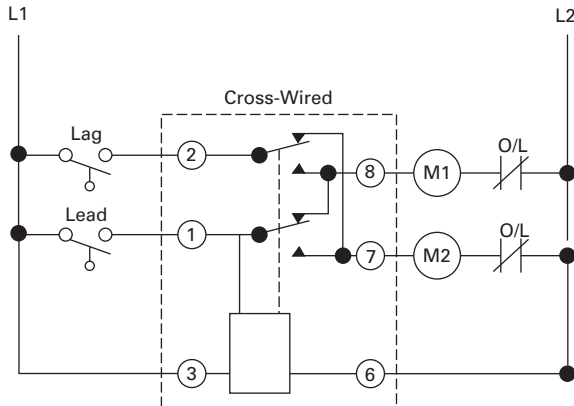
#### Typical Installations for SPDT and DPDT Alternating Relays, Anti-Bounce Installation



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.

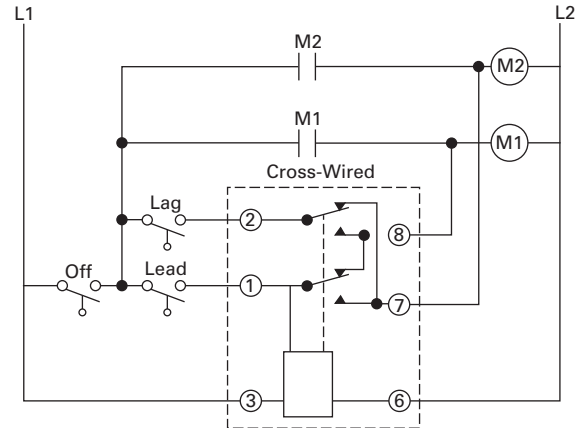
### Typical Installations for DPDT Cross-Wired Alternating Relays, Standard Installation



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.

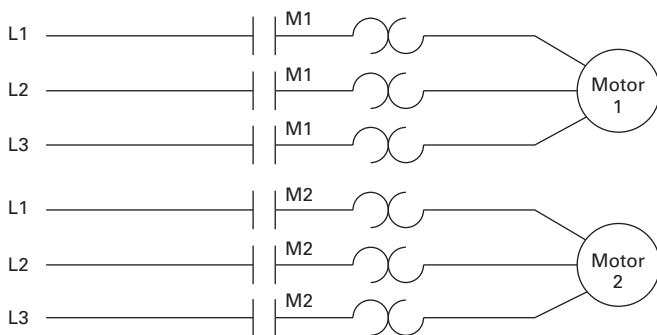
### Typical Installations for DPDT Cross-Wired Alternating Relays, Anti-Bounce Installation



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.

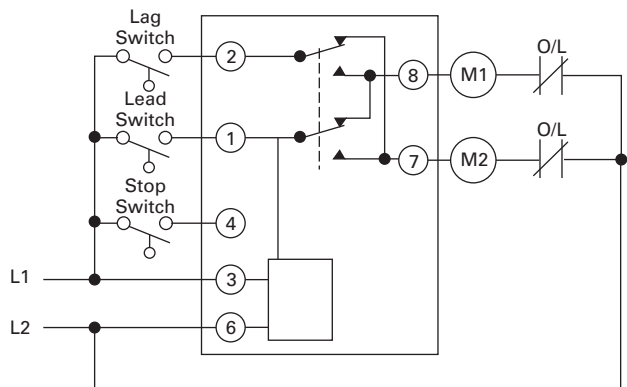
To eliminate any bounce condition of the control switch, the addition of a second switch (OFF) along with two auxiliary contacts is recommended as shown in the Anti-Bounce Installation.

### 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.



# 3.9

## Control Relays and Timers

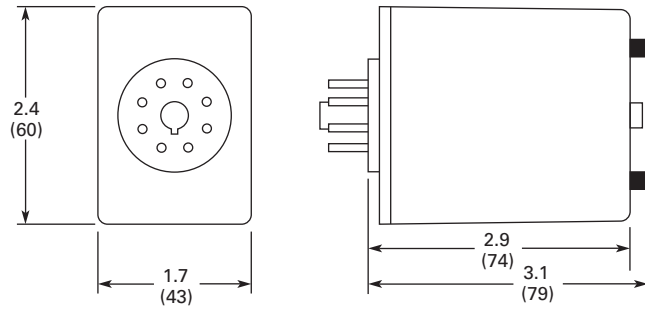
### Alternating Relays

#### Dimensions

Approximate Dimensions in Inches (mm)

#### D85 Series—Alternating Relays

3



## Safety Relays



### 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 event 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

### Contents

#### Description

#### Safety Relays

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### 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 Rheinland 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 Rheinland certified
- UL/cULus listed



#### Product Selection

##### Safety Relays

##### Technical Overview

3



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
■	—	4	—	—	1	—	24 Vac/Vdc	■	Main	ESR5-NO-41-24VAC-DC
■	■	2	—	—	1	—	24 Vac/Vdc	■	Main	ESR5-NO-21-24VAC-DC
■	■	3	—	—	1	—	24 Vac/Vdc	■	Main	ESR5-NO-31-24VAC-DC
■	■	3	—	—	1	—	230 Vac	■	Main	ESR5-NO-31-230VAC
■	■	3	—	—	1	—	24–230 Vac/Vdc	■	Main	ESR5-NO-31-AC-DC
■	■	2	2	0.1–30s	—	—	24 Vdc	■	Main	ESR5-NV3-30
—	■	2	—	—	1	—	24 Vac/Vdc	■	Main	ESR5-NZ-21-24VAC-DC
■	—	5	—	—	1	1	24 Vac/Vdc	■	Expansion	ESR5-NE-51-24VAC-DC
■	—	—	4	0.3–3s	1	1	24 Vdc	■	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
■	■	—	—	—	—	—	—	ESR5-NO-41-24VAC-DC
■	■	—	—	—	—	■	—	ESR5-NO-21-24VAC-DC
■	■	—	—	—	—	■	—	ESR5-NO-31-24VAC-DC
■	■	—	—	—	—	■	■	ESR5-NO-31-230VAC
■	■	—	—	—	—	■	■	ESR5-NO-31-AC-DC
■	■	■	—	—	■	■	■	ESR5-NV3-30
—	■	—	■	—	—	■	—	ESR5-NZ-21-24VAC-DC
—	—	—	—	■	—	—	—	ESR5-NE-51-24VAC-DC
—	—	—	—	■	■	—	—	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
■	—	0	2	PL d	SIL 3	ESR5-NO-41-24VAC-DC
■	■	0	4	PL e	SIL 3	ESR5-NO-21-24VAC-DC
■	■	0	4	PL e	SIL 3	ESR5-NO-31-24VAC-DC
■	■	0	4	PL e	SIL 3	ESR5-NO-31-230VAC
■	■	0	4	PL e	SIL 3	ESR5-NO-31-AC-DC
■	■	0/1	4	PL e	SIL 3	ESR5-NV3-30
—	■	0	4	PL e	SIL 3	ESR5-NZ-21-24VAC-DC
■	—	0	4	PL e	SIL 3	ESR5-NE-51-24VAC-DC
■	—	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_
<b>General</b>					
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 <sup>6</sup>	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	2g, frequency: 10–150 Hz, amplitude: 0.15 mm
Shock resistance (IEC 60068-2-27)		—	—	—	—
<b>Protection type</b>					
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
<b>Terminal capacity</b>					
Solid or flexible	mm <sup>2</sup>	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 <sup>2</sup>	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
<b>Terminal screw</b>					
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
<b>Main Contacts</b>					
Rated impulse withstand voltage—U <sub>imp</sub>	Vac	6000	4000	4000	6000
<b>Overvoltage category/pollution degree</b>					
Outside		III/2	III/2	III/2	III/2
Inside		—	—	—	—
Rated insulation voltage—U <sub>i</sub>	Vac	250	250	250	250
Rated operating voltage—U <sub>e</sub>	Vac	230	230	230	230
<b>Rated operation current</b>					
<b>AC-15</b>					
230 V (360 ops./h)—I <sub>e</sub>	A	5	4	5	4
230 V (3600 ops./h)—I <sub>e</sub>	A	3	3	3	3
<b>DC-13</b>					
24 V (360 ops./h)—I <sub>e</sub>	A	6	4	6	4
24 V (3600 ops./h)—I <sub>e</sub>	A	3	2.5	3	2.5
<b>Max. summation current of all poles</b>					
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 <sup>2</sup> (6 + 6)	72 A <sup>2</sup> (4.2 + 4.2 + 4.2 + 4.2)	72 A <sup>2</sup> (4.9 + 4.9 + 4.9)	72 A <sup>2</sup> (6 + 6)
<b>Short-circuit protection</b>					
Max. fuse	A gG/gL	10	6	10	6

## Safety Relay, continued

Description	Unit	ESR5-N0-21_	ESR5-N0-41_	ESR5-N0-31-24VAC-DC	ESR5-NZ-21_
<b>Power Supply Circuit</b>					
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		—	—	—	—
<b>Control Circuit</b>					
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
<b>Electromagnetic Compatibility (EMC)</b>					
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_
<b>General</b>						
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 <sup>6</sup>	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)		—	—	—	—	—
<b>Protection type</b>						
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
<b>Terminal capacity</b>						
Solid or flexible	mm <sup>2</sup>	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 <sup>2</sup>	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
<b>Terminal screw</b>						
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
<b>Main Contacts</b>						
Rated impulse withstand voltage—U <sub>imp</sub>	Vac	6000	6000	4000	4000	4000
<b>Overvoltage category/pollution degree</b>						
Outside		III/2	III/2	III/2	III/2	III/2
Inside		—	—	—	—	—
Rated insulation voltage—U <sub>i</sub>	Vac	250	250	250	250	250
Rated operating voltage—U <sub>e</sub>	Vac	230	230	230	230	230
<b>Rated operation current</b>						
<b>AC-15</b>						
230 V (360 ops./h)—I <sub>e</sub>	A	4	4	—	5	4
230 V (3600 ops./h)—I <sub>e</sub>	A	3	3	3	3	3
<b>DC-13</b>						
24 V (360 ops./h)—I <sub>e</sub>	A	4	4	—	6	4
24 V (3600 ops./h)—I <sub>e</sub>	A	2.5	2.5	3	3	2.5
<b>Max. summation current of all poles</b>						
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 <sup>2</sup> (4 + 4 + 4)	50 A <sup>2</sup> (4 + 4 + 4)	50 A <sup>2</sup> (4 + 4 + 4)	49 A <sup>2</sup> (3.5 + 3.5 + 3.5 + 3.5)	50 A <sup>2</sup> (3.7 + 3.7 + 3.7 + 3.7)
<b>Short-circuit protection</b>						
Max. fuse	A gG/gL	6	6	10	10	6

# 3.10

## Control Relays and Timers

### Safety Relays

#### Safety Relay, continued

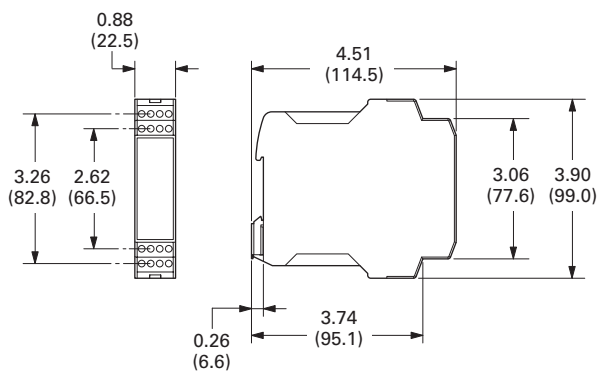
Description	Unit	ESR5-NO-31-230VAC	ESR5-NO-31-24V-230 VAC-DC	ESR5-NV3_	ESR5-VE3_	ESR5-NE-51_
<b>Power Supply Circuit</b>						
Actuating voltage 50/60 Hz	Vac	230	24–230	—	—	24
Actuating voltage— $U_s$	Vdc	—	230	24	24	24
Voltage tolerance pick-up voltage	$x_e$	0.85–1.1	0.85–1.1	0.85–1.1	0.85–1.1	0.8–1.1
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	—	—	—
<b>Control Circuit</b>						
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	—	—	—	—	—
<b>Electromagnetic Compatibility (EMC)</b>						
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

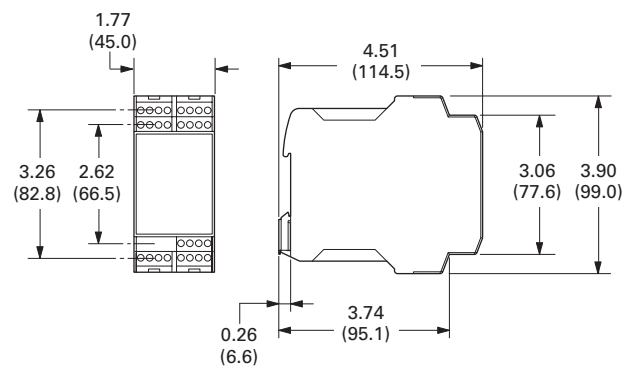
Approximate Dimensions in Inches (mm)

#### Safety Relays, Contact Expansion Modules

##### ESR5\_ 24 Vac/Vdc



##### ESR5\_ 230 Vac



easySafety



## Product Description

The easySafety control relay for safety-related applications monitors all commonly used safety devices and also takes over the required control tasks for the machine. Packed with a host of conventional safety relays in the form of safety function blocks, easySafety not only features integrated safety functions but also standard functions in a single device—all in one.

In addition to the safety circuit diagram containing the safety configuration, the safety control relay also contains a standard circuit diagram. This circuit diagram can be used for standard tasks, such as the processing of diagnostics signals or general control tasks of a machine.

## Application Description

Because of the large number of safety function blocks, the user can tackle a large number of application options with only one device. The user can also respond directly to future and changing application requirements. This saves financial resources and offers future investment security. Last but not least, it reduces the stock-keeping required for special safety relays. The easySafety meets the requirements of Category 4 to EN 954-1, PL e to EN ISO 13849-1, SILCL 3 to EN IEC 62061 and SIL 3 to EN IEC 61508. With easySafety, it is possible to implement applications meeting the most stringent safety requirements.

## Contents

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easySafety	
Product Selection	V7-T3-200
Accessories	V7-T3-200
Technical Data and Specifications	V7-T3-201
Dimensions	V7-T3-204

## Features

Safety function blocks:

- Emergency stop
- Guard door monitoring with and without interlock/guard locking
- Two-hand control (EN 574)
- Electro-sensitive protective devices (light curtains)
- Light curtain muting
- Enable switch
- Start device
- Operating mode selector
- Safety timing relay
- Overspeed monitoring
- Feedback loop monitoring (EDM)
- Zero speed monitoring

- All-in-one: Safety and control functions combined in one device
- Simple configuration through prefabricated and tested safety components
- Direct state display and increased machine availability due to fast error diagnosis through integrated display
- Multistep password concept prevents unwanted manipulation

## Standards and Certifications

- Product standards: CE marked; UL 508; CSA C22.20.4-04; CSA 22.2 No. 142-M11987
- UL CCN: NRAQ
- CSA File No. 012528
- CSA Class No. 2252-81 and 2252-01
- TÜV Rhineland certified
- Degree of Protection IEC: IP20





### Product Selection

easySafety

#### easySafety Relays <sup>①</sup>



Inputs (Safety) Digital	Outputs (Safety) 6 A Relay	Outputs (Safety) Transistor	Outputs (Safety) Test Signal	Display + Keypad	Catalog Number
14	1 (redundant)	4	4	—	<b>ES4P-221-DMXX1</b>
14	1 (redundant)	4	4	Yes	<b>ES4P-221-DMXD1</b>
14	4	—	4	—	<b>ES4P-221-DRXX1</b>
14	4	—	4	Yes	<b>ES4P-221-DRXD1</b>

### Accessories

easySoft



#### Programming Software

Description	Catalog Number
easySoft-Safety (including easySoftPro) <sup>②</sup>	<b>ESP-SOFT</b>

Memory Card



#### Memory Card

Description	Catalog Number
256 kB module	<b>ES4A-MEM-CARD1</b>

#### Programming Cables

Description	Catalog Number
SUB-D, nine-pole, serial, 2m	<b>EASY800-PC-CAB</b>

SUB-D Cable

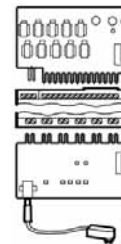


Description	Catalog Number
USB, 2m	<b>EASY800-USB-CAB</b>

USB Cable



Input/Output Simulator



#### Input/Output Simulator

Description	Catalog Number
With plug-in power supply unit 100–240 Vac/24 Vdc	<b>ES4A-221-DMX-SIM</b>

#### Notes

- ① EN 954-1: 1996, Category 4.  
EN ISO 13849-1: 2006, PL e (Performance Level).  
IEC 61508: 1998, SIL 3 (Safety Integrity Level).  
IEC 62061: 2005, SILCL 3 (Safety Integrity Level Claim Limit).  
Expandable: standard inputs/outputs and standard bus systems.  
24 Vdc supply voltage.
- ② Operating systems:  
Windows® 2000 SP4, Windows XP SP1, Windows Vista (32 bit).

## Technical Data and Specifications

### easySafety Relay

Description	Unit	ES4P_
<b>General</b>		
Standards		EN 55011, EN 55022, IEC/EN 61000-4, IEC 60068-2-6, IEC 60068-2-27, EN 954-1: Category 4, EN ISO 13849-1: PL e, EN IEC 62061: SILCL 3, EN IEC 61508: SIL 3
Dimensions (W x H x D)	mm	107.5 (6 space units) x 90 x 72
Mounting		Top-hat rail IEC/EN 60715, 35 mm or screw fixing using fixing brackets ZB4-101-GF1 (accessories)
<b>Times</b>		
Inputs		
Maximum duration of external test pulse	ms	1
Semi-conductor output		
Off test pulse	ms	<1
Switch-off delay	ms	<0.15
<b>Terminal Capacity</b>		
Solid	mm <sup>2</sup>	0.2–4 (AWG 22–12)
Flexible with ferrule	mm <sup>2</sup>	0.2–2.5 (AWG 22–12)
Standard screwdriver	mm	3.5 x 0.8
Maximum tightening torque	Nm	0.6
<b>Ambient Climatic Conditions</b>		
Operating ambient temperature	°C	–25 to +55, low temperatures to IEC 60068-2-1, high temperatures to IEC 60068-2-2
Condensation		Prevent condensation by means of suitable measures
LCD display (clearly legible)	°C	0 to +55
Storage	°C	–40 to +70
Relative humidity, noncondensing (IEC/EN 60068-2-30)	%	5 to 95
Air pressure (in operation)	hPa	795 to 1080
<b>Ambient Mechanical Conditions</b>		
Protection type, IEC/EN 60529		IP20
Vibrations (IEC/EN 60068-2-6)		
Constant amplitude 0.15 mm	Hz	10 to 57
Constant acceleration, 2g	Hz	57 to 150
Mechanical shock resistance (IEC/EN 60068-2-27) semi-sinusoidal 15g/11 ms	Shocks	18
Drop to IEC/EN 60068-2-31	Drop	mm
Mounting position		Horizontal/vertical
<b>Electromagnetic Compatibility (EMC) According to IEC/EN 61000-6-2</b>		
Electrostatic discharge (IEC/EN 61000-4-2, Level 3, ESD)		
Air discharge	kV	8
Contact discharge	kV	6
Radio interference suppression (EN 55011)		EN 55011 Class B, EN 55022 Class B
Power pulses (surge) (IEC/EN 61000-4-5, Level 2)	kV	1 (supply cables, symmetrical)
<b>Insulation Resistance</b>		
Overvoltage category/pollution degree		III/2
Clearance in air and creepage distances		EN 50178, UL 508, CSA C22.2, No. 142, EN 60664-1:2003
Insulation resistance		EN 50178
<b>Backup/Accuracy of the Real-Time Clock</b>		
Accuracy of the real-time clock	s/day	Normally ±5 (±0.5 h/year)
<b>Repetition Accuracy of Timing Relays in Standard Circuit</b>		
Accuracy of timing relay (of value)	%	±0.02
Resolution		
Range "S"	ms	5
Range "M:S"	s	1
<b>Retentive Memory</b>		
Write cycles of the retentive memory (minimum)		10,000,000,000 (1010) (read/write cycles)

## easySafety Relay, continued

Description	Unit	ES4P_	
<b>Power Supply</b>			
Rated operational voltage	$U_e$	V	24 Vdc (-15/+20%)
Permissible range		Vdc	20.4 to 28.8
Ripple		%	≤ 5
<b>Interfaces</b>			
EASYN <sub>et</sub> (CAN-based)			
Bus termination (first and last station)			Yes
Control operating mode EASYN <sub>et</sub>			
Number of users			Maximum 8
<b>NET Network</b>			
Stations	Number		Maximum 8
Data transfer rate/distance			1000 Kbit/s, 6m 500 Kbit/s, 25m 250 Kbit/s, 60m 125 Kbit/s, 125m 50 Kbit/s, 300m 20 Kbit/s, 700m 10 Kbit/s, 1000m Bus lengths greater than 40m can only be achieved with enhanced cross-section conductors and terminal adapters
Potential isolation			
From power supply			Yes
From the inputs			Yes
From the outputs			Yes
From the PC interface, memory card, NET network, EASYLink			Yes
Bus termination (first and last station)			Yes
Terminal type			RJ45
<b>Digital Inputs 24 Vdc</b>			
Number			14
Inputs can be used as analog inputs			—
Status display			LCD display (if provided)
Potential isolation			
From power supply			No
Between digital inputs			No
From the outputs			Yes
From PC interface, memory card, EASYLink			No
From network EASYN <sub>et</sub>			Yes
Rated operational voltage	$U_e$	Vdc	24
At signal "0"	$U_e$	Vdc	<5
At signal "1"	$U_e$	Vdc	>15
<b>Clock Outputs</b>			
Number			4
Voltage		Vdc	24
Electrical isolation			No

## easySafety Relay, continued

Description	Unit	ES4P_
<b>Relay Outputs</b>		
Number		4 for ES4P-...-DR_, 1 redundant for ES4P-...-DM_
Outputs in groups of		1
Parallel switching of outputs to increase power		Not permissible
Protection of an output relay		Fuse: 6 A gG, circuit breaker with characteristic C: 24 Vdc 4 A, Short-circuit current <250 A
Potential isolation		
From power supply		Yes
From the inputs		Yes
From PC interface, memory card, EASYNet, EASYLink		Yes
Safe isolation according to EN 50178	Vac	300
Basic insulation	Vac	600
Lifespan, mechanical	Operations	$\times 10^6$ 10
<b>Contacts</b>		
Conventional thermal current	A	6
Rated impulse withstand voltage $U_{imp}$ contact coil	kV	6
Rated operational voltage	$U_e$	Vac 250
Rated insulation voltage	$U_i$	Vac 250
Safe isolation to EN 50178 between coil and contact	Vac	300
<b>Making capacity</b>		
AC-15, 230 Vac, 3 A	Operations	80,000
DC-13, 24 Vdc, 5 A, 0.1 Hz	Operations	40,000
<b>Switching frequency</b>		
Mechanical operations	$\times 10^6$	10
Switching frequency	Hz	10
<b>UL/CSA</b>		
UL 508		B300/R300
<b>Transistor Outputs</b>		
Number		4
Rated operational voltage	$U_e$	Vdc 24
Permissible range	$U_e$	Vdc 20.4–28.8
Ripple	%	$\leq 5$
Protection against polarity reversal		Yes (Caution: A short-circuit will result if 0 V or GND is applied to the outputs in the event that the supply voltage is connected to the wrong poles.)
Potential isolation		
From power supply		Yes
From the inputs		Yes
From PC interface, memory card, network, EASYNet, EASYLink		Yes
Rated operational current at signal "1" DC	$I_e$	A Maximum 0.5
At signal "1" with $I_e = 0.5$ A		V $U = U_e - 1$ V
Short-circuit protection		Yes, thermal
Short-circuit tripping current for $R_A \leq 10$ m ohms	A	$0.7 \leq I_e \leq 2$ per output
Total short-circuit current	A	8
Peak short-circuit current	A	16
Thermal cutout		Yes
Maximum operating frequency at constant resistive load $R_L < 100$ k $\Omega$ (dependant on program and load)	Ops/h	40,000
Parallel connection of outputs		No
Status indication of the outputs		LCD display (if provided)
<b>Inductive load</b>		
Without external suppressor circuit		
Duty factor		$T_{0.95} = 3 \times T_{0.65} = 3 \times L/R$ $T_{0.95}$ = Time in ms, until 95% of the steady-state current has been reached
<b>With external suppressor circuit</b>		
Utilization factor	g	1
Duty factor	% DF	100
Maximum switching frequency, maximum duty factor	Operations	Depending on the suppressor circuit

# 3.11

## Control Relays and Timers

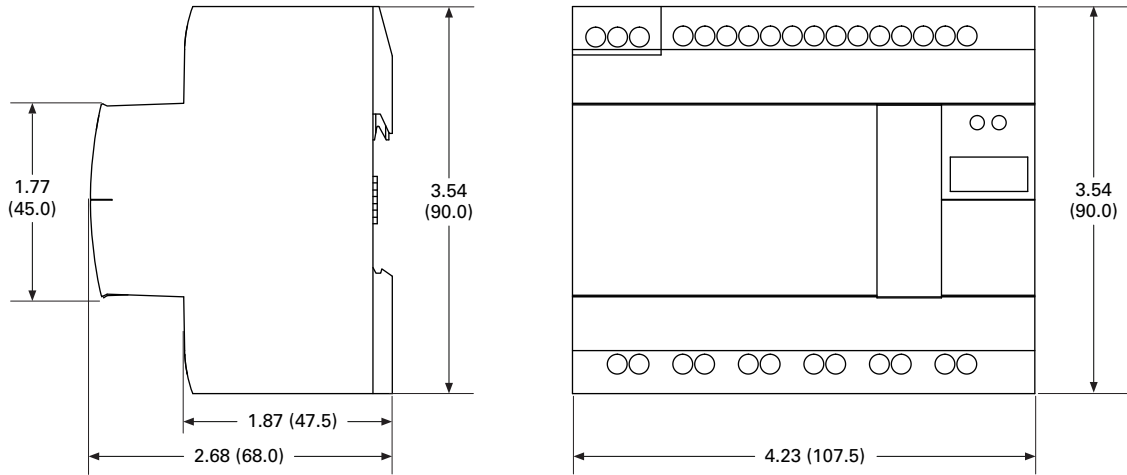
easySafety

### Dimensions

Approximate Dimensions in Inches (mm)

ESR5\_

3



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