

# Control Relays & Timers

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*Control Relays*

## Control Relays &amp; Timers Comparison

Table 49-1. Selection Guide by Catalog Number Prefix

Relays	Type	Mounting	Contacts	Maximum Amperage (AC)		UL	CSA	CE	Page Number
9575H3	General Purpose	Panel Mount	Fixed	40A		X	X	X	49-73
AR/ARD	Machine Tool	Panel Mount	Convertible	10A		X	X		49-83
BF/BFD	Machine Tool	Panel Mount	Fixed	10A	X		X		49-79
D2PF	Full Featured Plug-In	DIN Rail/Panel Mount	Fixed	10A	X	X	X	X	49-35
D2PR	Standard Plug-In	DIN Rail/Panel Mount/Flange	Fixed	5A	X		X	X	49-39
D3PF	Full Featured Plug-In	DIN Rail/Panel Mount	Fixed	12A	X	X	X	X	49-43
D3PR	Standard Plug-In	DIN Rail/Panel Mount	Fixed	12A	X		X	X	49-43
D4PR	Standard Plug-In	DIN Rail/Panel Mount	Fixed	10A	X		X	X	49-49
D5PF	Full Featured Plug-In	DIN Rail/Panel Mount	Fixed	12A	X	X	X	X	49-52
D5PR	Standard Plug-In	DIN Rail/Panel Mount/PC Board	Fixed	15A	X		X	X	49-52
D7PF	Full Featured Plug-In	DIN Rail/Panel Mount	Fixed	20A	X	X	X	X	49-62
D7PR	Standard Plug-In	DIN Rail/Panel Mount/Flange	Fixed	15A	X		X	X	49-56
D8PR	Standard Plug-In	DIN Rail/Panel Mount/Flange	Fixed	30A	X		X	X	49-67
D9PR	Standard Plug-In	Panel Mounting	Fixed	25A	X		X		49-71
D15	Machine Tool	DIN Rail/Panel Mount	Fixed	10A		X	X	X	49-75
D26	Machine Tool	Panel or Channel Mount	Convertible	10A		X	X		49-87
D64	Ground Fault Relays	Panel Mount	Fixed	N/A		X	X	X	49-135
D65	Phase Monitoring	DIN Rail/Panel Mount	Fixed	10A	X	X		X	49-104
D65C	Current Monitoring	DIN Rail/Panel Mount	Fixed	10A	X	X		X	49-115
D65V	Voltage Monitoring	DIN Rail/Panel Mount	Fixed	10A	X	X		X	49-122
D80	Timer (Pneumatic)	Panel Mount/Enclosure	Fixed	N/A		X	X		49-103
D85	Alternating Relays	DIN Rail/Panel Mount	Fixed	10A	X	X		X	49-130
EZ	Intelligent Relay	DIN Rail	Fixed	8A	X		X	X	49-14
TMR5	Timing Relay (Non-programmable)	DIN Rail/Panel Mount	Fixed	10A	X	X		X	49-94
TR	Timing Relay (Programmable)	DIN Rail/Panel Mount	Fixed	10A		X	X		49-98
VSR	Voltage Sensing	Panel Mount/Enclosure	Fixed	2A					49-128
XR	Terminal Block Relay	DIN Rail	Fixed	6A, 10A	X			X	49-4

July 2008

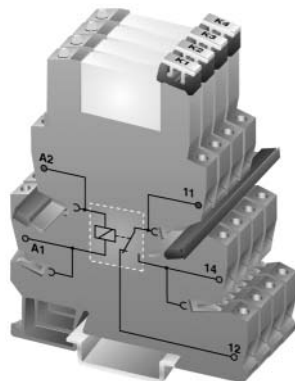
**Table 49-2. Selection Guide by Relay Type**

Type	Relays	Mounting	Contacts	Maximum Amperage (AC)	RU	UL	CSA	CE	Page Number
Alternating Relays	D85	DIN Rail/Panel Mount	Fixed	10A	X	X		X	49-130
Current Monitoring	D65C	DIN Rail/Panel Mount	Fixed	10A	X	X		X	49-115
Full Featured Plug-In	D2PF	DIN Rail/Panel Mount	Fixed	10A	X	X	X	X	49-35
Full Featured Plug-In	D3PF	DIN Rail/Panel Mount	Fixed	12A	X	X	X	X	49-43
Full Featured Plug-In	D5PF	DIN Rail/Panel Mount	Fixed	12A	X	X	X	X	49-52
Full Featured Plug-In	D7PF	DIN Rail/Panel Mount	Fixed	20A	X	X	X	X	49-62
General Purpose	9575H3	Panel Mount	Fixed	40A		X	X	X	49-73
Ground Fault Relays	D64	Panel Mount	Fixed	N/A		X	X	X	49-135
Intelligent Relay	EZ	DIN Rail	Fixed	8A	X		X	X	49-14
Machine Tool	AR/ARD	Panel Mount	Convertible	10A		X	X		49-83
Machine Tool	BF/BFD	Panel Mount	Fixed	10A	X		X		49-79
Machine Tool	D15	DIN Rail/Panel Mount	Fixed	10A		X	X	X	49-75
Machine Tool	D26	Panel or Channel Mount	Convertible	10A		X	X	X	49-87
Phase Monitoring	D65	DIN Rail/Panel Mount	Fixed	10A	X	X		X	49-104
Standard Plug-In	D2PR	DIN Rail/Panel Mount/Flange	Fixed	5A	X		X	X	49-39
Standard Plug-In	D3PR	DIN Rail/Panel Mount	Fixed	12A	X		X	X	49-43
Standard Plug-In	D4PR	DIN Rail/Panel Mount	Fixed	10A	X		X	X	49-49
Standard Plug-In	D5PR	DIN Rail/Panel Mount/PC Board	Fixed	13A	X		X	X	49-52
Standard Plug-In	D7PR	DIN Rail/Panel Mount/Flange	Fixed	15A	X		X	X	49-56
Standard Plug-In	D8PR	DIN Rail/Panel Mount/Flange	Fixed	30A	X		X	X	49-67
Standard Plug-In	D9PR	Panel Mounting	Fixed	25A	X		X		49-71
Terminal Block Relay	XR	DIN Rail	Fixed	6A, 10A	X			X	49-4
Timer (Pneumatic)	D80	Panel Mount/Enclosure	Fixed	N/A		X	X		49-103
Timing Relay (Non-programmable)	TMR5	DIN Rail/Panel Mount	Fixed	10A	X	X		X	49-94
Timing Relay (Programmable)	TR	DIN Rail/Panel Mount	Fixed	10A		X	X		49-98
Voltage Monitoring	D65V	DIN Rail/Panel Mount	Fixed	10A	X	X		X	49-122
Voltage Sensing	VSR	Panel Mount/Enclosure	Fixed	2A					49-128

Standard Terminal Block Relays

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Standard Terminal Block Relay

Product Description

The new **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 utilizes 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, electro-mechanical 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 12V DC to 120V AC

- 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

- cUL<sub>US</sub> Listed
- CE

Product Selection

Table 49-3. Standard Terminal Block Relays Product Selection

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

Table 49-4. Standard Replacement Relays

Gold Plated Contacts	Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. \$
<b>1PDT</b>					
No	6A	12V DC	10	XRR1D12	
No	6A	120V AC/110V DC	10	XRR1D120U	
Yes	6A	120V AC/110V DC	10	XRR1D120UG	
No	6A	24V DC	10	XRR1D24	
Yes	6A	24V DC	10	XRR1D24G	
No	6A	230V AC/220V DC	10	XRR1D230U	
<b>DPDT</b>					
No	6A	12V DC	10	XRR2D12	
No	6A	120V AC/110V DC	10	XRR2D120U	
No	6A	24V DC	10	XRR2D24	
No	6A	230V AC/220V DC	10	XRR2D230U	

Discount Symbol ..... 1CD1

**Technical Data and Specifications**

**Table 49-5. Standard 1PDT Screw Connection Terminal Block Relays Technical Data**

Catalog Number	XRU1D12	XRU1D24	XRU1D24U	XRU1D120U
Replacement Relay	XRR1D12	XRR1D24	XRR1D24	XRR1D120U
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/110V DC

**Connection Data**

Rigid Solid AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)			
Flexible Stranded AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)			

**Input Data for 1PDT Screw Connection Versions**

Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/110V DC
Permissible Range See Page 49-8	See Figure 49-5	See Figure 49-7	See Figure 49-8	See Figure 49-6
Typical Input Current	15.3 mA	9 mA	11 mA (24V AC)/ 8.5 mA (24V DC)	3.5 mA (120V AC)/ 3 mA (110V DC)
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		Bridge Rectifier	

**Output Data**

Contact Type	1PDT
Contact Material	AgSnO
Max. Switching Voltage	250V AC/DC ①
Min. Switching Voltage	12V AC/DC
Limiting Continuous Current	6A
Min. Switching Current	10 mA
Min. Switching Power	120 mW

**Miscellaneous Data**

Test Voltage I/O	4 kV, 50 Hz, 1 min	4 kV	50 Hz
Ambient Temp Range	-4° to 140°F (-20° to 60°C)		
Rated Operating Mode	100% Operating Factor		
Inflammability Class	V0, in Accordance with UL 94		
Mechanical Service Life	2 x 10 <sup>7</sup> Cycles		

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

**Table 49-6. Standard 1PDT Screw Connection Terminal Block Relays with Gold Contacts Technical Data**

Catalog Number	XRU1D24UG	XRU1D120UG
Replacement Relay	XRR1D24G	XRR1D120UG
Input Voltage	24V AC/DC	120V AC/110V DC

**Connection Data**

Rigid Solid AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)
Flexible Stranded AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)

**Input Data for 1PDT Screw Connection Versions with Gold Contacts**

Input Voltage	24V AC/DC	120V AC/110V DC
Permissible Range See Page 49-8	See Figure 49-8	See Figure 49-6
Typical Input Current	11 mA (24V AC)/ 8.5 mA (24V DC)	3.5 mA (120V AC)/ 3 mA (110V DC)
Typical Response Time	6 mS	6 mS
Typical Release Time	15 mS	15 mS
Input Protection	Bridge Rectifier	

**Output Data**

Contact Type	1PDT
Contact Material	AgSnO, Gold Plated ②
Max. Switching Voltage	30V AC/36V DC (250V AC/DC) ③
Min. Switching Voltage	100 mV (12V AC/DC) ③
Limiting Continuous Current	50 mA (6A) ③
Min. Switching Current	1 mA (10 mA) ③
Min. Switching Power	100 (120 mW) ③

**Miscellaneous Data**

Test Voltage I/O	4 kV, 50 Hz, 1 min	50 Hz
Ambient Temp Range	-4° to 140°F (-20° to 60°C)	-40° to 131°F (-20° to 55°C)
Rated Operating Mode	100% Operating Factor	
Inflammability Class	V0, in Accordance with UL 94	
Mechanical Service Life	2 x 10 <sup>7</sup> Cycles	

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

③ If the maximum values are exceeded, the gold layer is destroyed and the values in parentheses apply.

### Standard Terminal Block Relays

**Table 49-7. Standard 1PDT Spring Cage Terminal Block Relays Technical Data**

Catalog Number	XRP1D12	XRP1D24	XRP1D24U	XRP1D120U
Replacement Relay	XRR1D12	XRR1D24	XRR1D24	XRR1D120U
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC / 110V DC

#### Connection Data

Rigid Solid AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)			
Flexible Stranded AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)			

#### Input Data for 1PDT Spring Cage Versions

Input Voltage	12V DC	24V DC	24V AC/DC	120V AC / 110V DC
Permissible Range See Page 49-8	See Figure 49-5	See Figure 49-7	See Figure 49-8	See Figure 49-6
Typical Input Current	15.3 mA	9 mA	11 mA (24V AC)/ 8.5 mA (24V DC)	3.5 mA (120V AC)/ 3 mA (110V DC)
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		Bridge Rectifier	

#### Output Data

Contact Type	1PDT		
Contact Material	AgSnO		
Max. Switching Voltage	250V AC/DC ①		
Min. Switching Voltage	12V AC/DC		
Limiting Continuous Current	6A		
Min. Switching Current	10 mA		
Min. Switching Power	120 mW		

#### Miscellaneous Data

Test Voltage I/O	4 kV, 50 Hz, 1 min	4 kV	50 Hz
Ambient Temp Range	-4° to 140°F (-20° to 60°C)		-4° to 131°F (-20° to 55°C)
Rated Operating Mode	100% Operating Factor		
Inflammability Class	V0, in Accordance with UL 94		
Mechanical Service Life	2 x 10 <sup>7</sup> Cycles		

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

**Table 49-8. Standard DPDT Screw Connection Terminal Block Relays Technical Data**

Catalog Number	XRU2D12	XRU2D24	XRU2D24U	XRU2D120U
Replacement Relay	XRR2D12	XRR2D24	XRR2D24	XRR2D120U
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC / 110V DC

#### Connection Data

Rigid Solid AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)			
Flexible Stranded AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)			

#### Input Data

Input Voltage	12V DC	24V DC	24V AC/DC	120V AC / 110V DC
Permissible Range See Page 49-8	See Figure 49-9	See Figure 49-11	See Figure 49-12	See Figure 49-10
Typical Input Current	33 mA	18 mA	17.5 mA	4.5 mA (120V AC) 4.2 mA (110V DC)
Typical Response Time	8 mS	8 mS	8 mS	7 mS
Typical Release Time	10 mS			
Input Protection	Polarity Protection Diode, Free-Wheeling Diode		Bridge Rectifier	

#### Output Data:

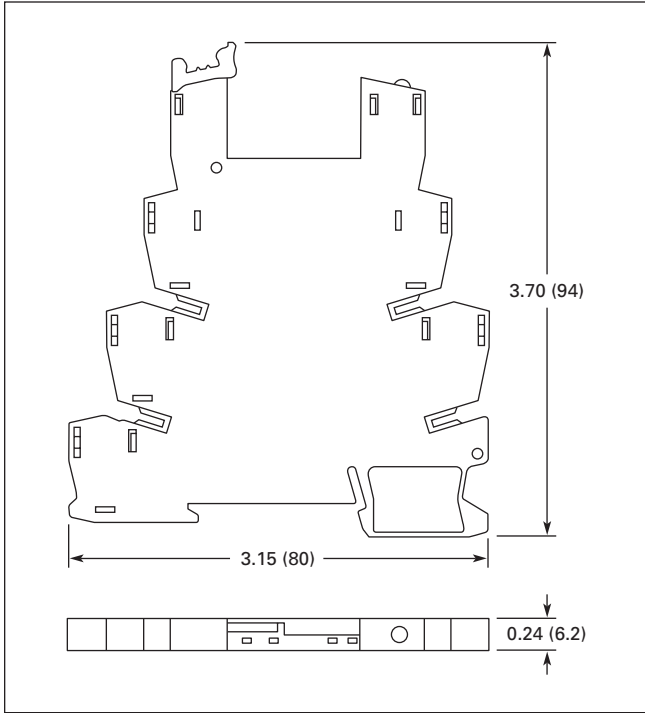
Contact Type	2PDT	Single Contact, 2PDT
Contact Material	AgNi	
Max. Switching Voltage	250V AC/DC	
Min. Switching Voltage	5V	
Limiting Continuous Current	6A	
Max. Inrush Current	15A (300 mS)	
Min. Switching Current	10 mA	
Min. Switching Power	50 mW	

#### General Data

Test Voltage I/O	4 kV, 50 Hz, 1 min / 2.5 kV, 50 Hz, 1 Min. (Between the PDTs)
Ambient Temp Range	-4° to 140°F (-20° to 60°C)
Rated Operating Mode	100% Operating Factor
Inflammability Class	V0, in Accordance with UL 94
Mechanical Service Life	3 x 10 <sup>7</sup> cycles

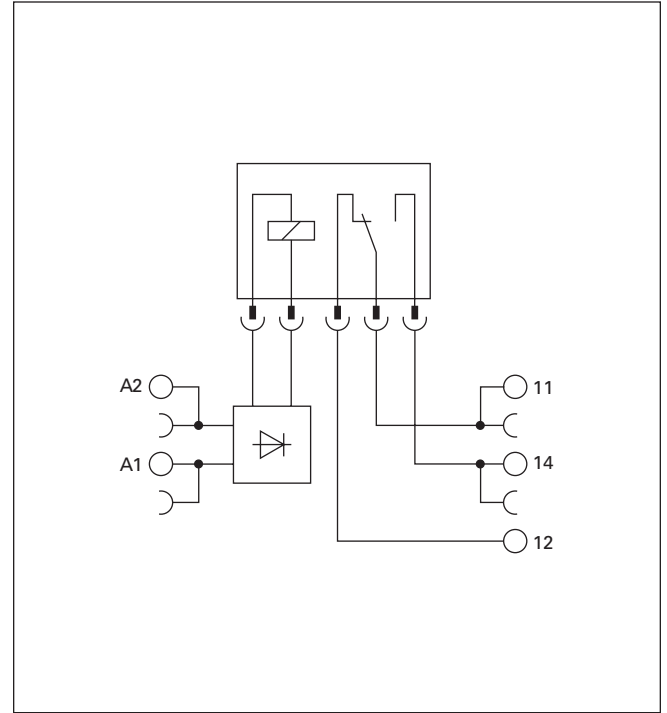
Standard Terminal Block Relays

**Dimensions**

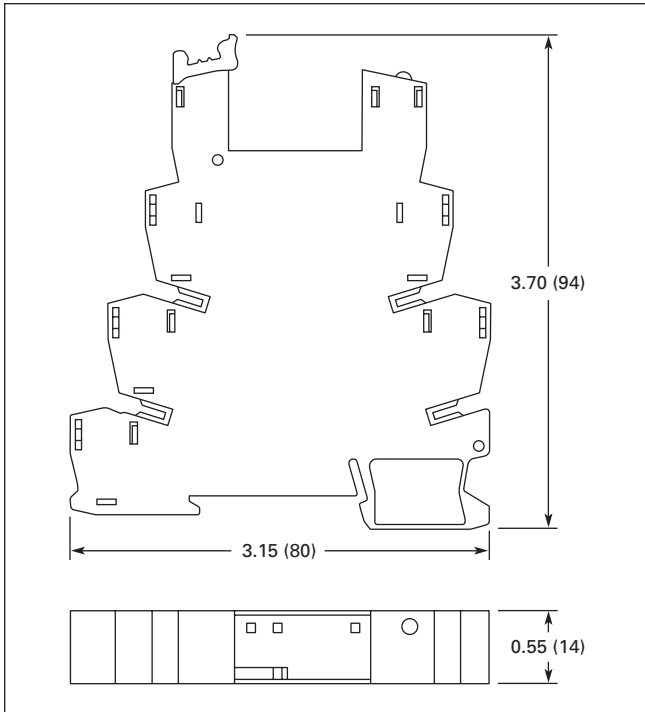


**Figure 49-1. Standard 1PDT Terminal Block Relays — Approximate Dimensions in Inches (mm)**

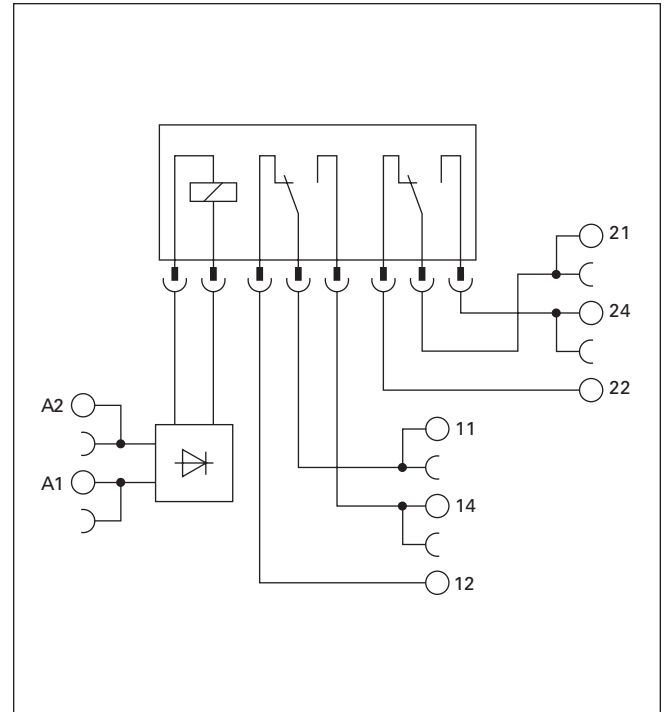
**Schematics**



**Figure 49-3. Schematics for 1PDT Terminal Block Relays**



**Figure 49-2. Standard DPDT Terminal Block Relays — Approximate Dimensions in Inches (mm)**



**Figure 49-4. Schematic for DPDT Terminal Block Relays**

Standard Terminal Block Relays

Permissible Range Diagrams

1PDT

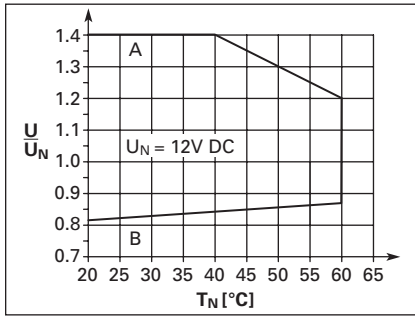


Figure 49-5. Operating Range Voltage for 12V DC 1PDT Relay Module

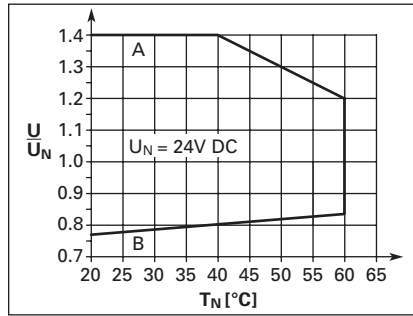


Figure 49-7. Operating Range Voltage for 24V DC 1PDT Relay Module

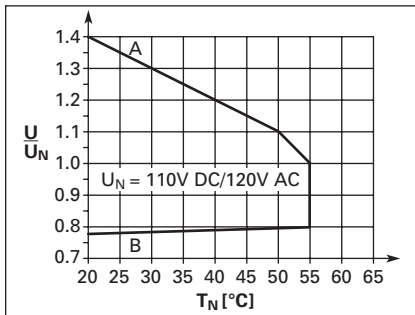


Figure 49-6. Operating Range Voltage for 120V AC/110V DC 1PDT Relay Module

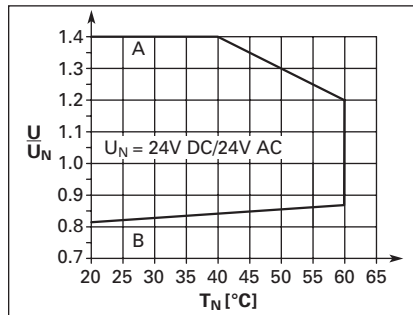


Figure 49-8. Operating Range Voltage for 24V AC/DC 1PDT Relay Module

Notes:

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

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

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

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

DPDT

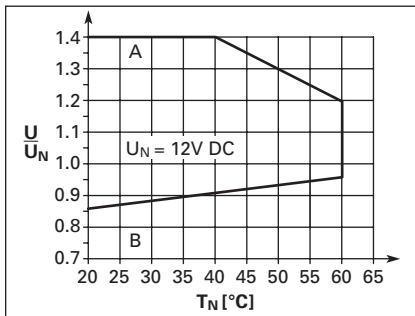


Figure 49-9. Operating Range Voltage for 12V DC DPDT Relay Module

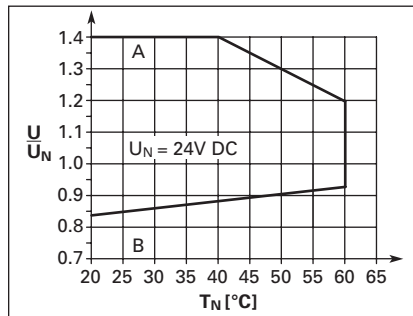


Figure 49-11. Operating Range Voltage for 24V DC DPDT Relay Module

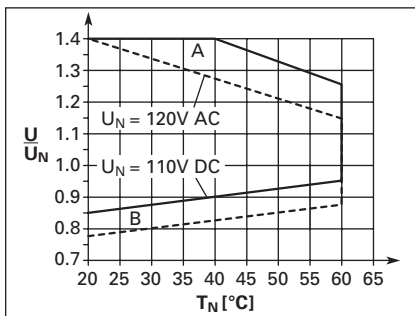


Figure 49-10. Operating Range Voltage for 120V AC/110V DC DPDT Relay Module

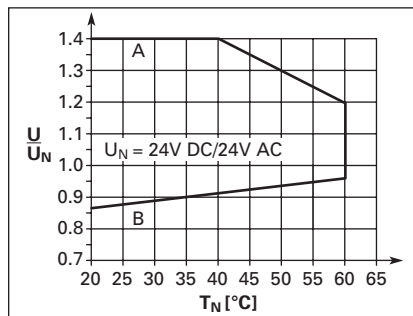
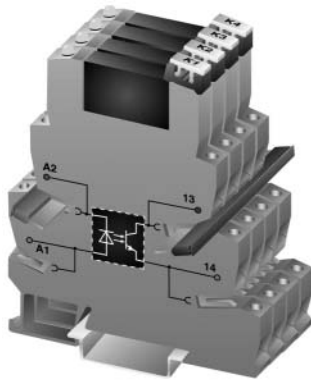


Figure 49-12. Operating Range Voltage for 24V AC/DC DPDT Relay Module



**OptoCoupler Terminal Block Relays**



*OptoCoupler Terminal Block Relay*

**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 24V DC/3A
- 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**

- cUL<sub>US</sub> Listed
- CE

**Product Selection**

**Table 49-9. OptoCoupler Terminal Block Relays Product Selection**

Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. \$
2A	120V AC/110V DC	10	XRU1S120U	
2A	24V DC	10	XRU1S24	

**Table 49-10. OptoCoupler Replacement Relays**

Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. \$
2A	24V DC	18	XRR1S24	
2A	120V AC/110V DC	10	XRR1S120U	

**Product Description**

The new **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 utilizes 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 OptoCoupplers and are especially suited for high operating frequencies.

OptoCoupler Terminal Block Relays

Technical Data and Specifications

Table 49-11. Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays Technical Data

Catalog Number	XRU1S24	XRU1S120U
Replacement Relay	XRR1S24	XRR1S120U
Input Voltage	24V DC	120V AC/110V DC

Connection Data

Rigid Solid AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)
Flexible Stranded AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)

Input Data

Input Voltage	24V DC	120V AC/110V DC
Permissible Range	0.8 – 1.2	0.8 – 1.1
Typical input current	9 mA	4 mA
Switching Level 1 signal ("H")	≥ 0.8	≥ 0.8
Switching Level 0 signal ("L")	≤ 0.4	≤ 0.25
Typical Switch-On Time	20 μS	6 mS
Typical Turn-Off Time	500 μS	10 mS
Input Protection	Polarity Protection Diode, Free-Wheeling Diode	Bridge Rectifier

Output Data

Max. Switching Voltage	33V DC	33V DC
Min. Switching Voltage	3V DC	3V DC
Limiting Continuous Current	3A (See Figure 49-13)	
Max. Inrush Current	15A (10 mS)	
Output Circuit	2-Conductor Floating	
Output Protection	Polarity Protection, Surge Protection	
Voltage Drop at Max. Limiting Continuous Current	≤ 200 mV	

General Data

Test Voltage I/O	2.5 kV, 50 Hz, 1 min
Ambient Temp Range	-4° to 140°F (-20° to 60°C)
Rated Operating Mode	100% Operating Factor
Inflammability Class	V0, in Accordance with UL 94
Mechanical Service Life	2 x 10 <sup>7</sup> cycles

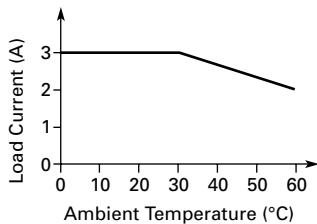


Figure 49-13. Derating Curve

Dimensions

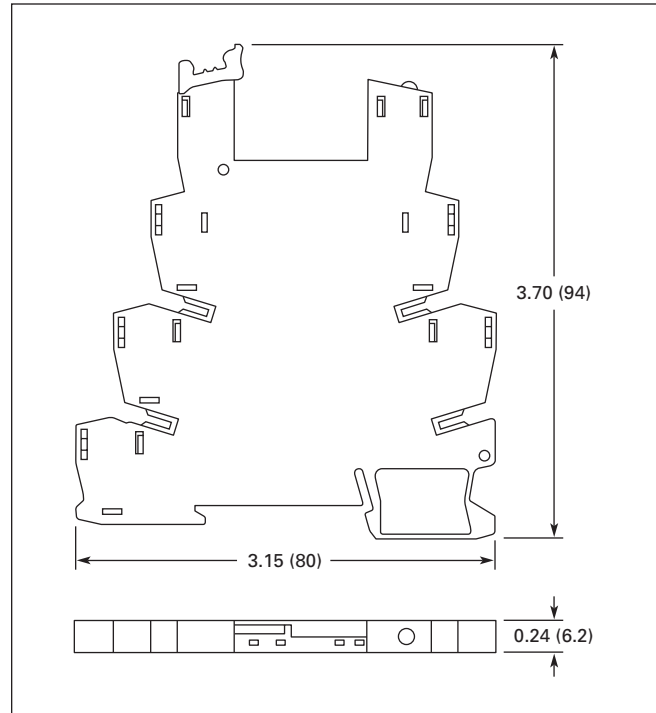


Figure 49-14. Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays — Approximate Dimensions in Inches (mm)

Schematic

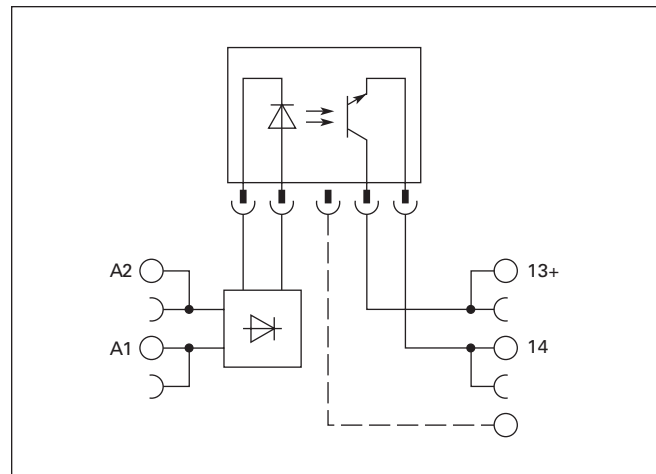
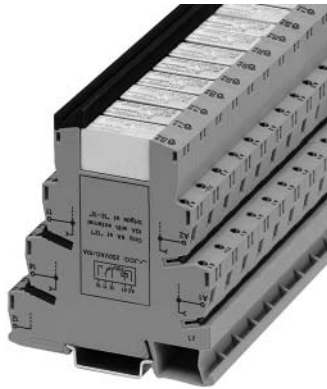


Figure 49-15. Schematic for Pluggable Power OptoCoupler (Solid-State) Terminal Block Relays

**High Current Terminal Block Relays**



*High Current Terminal Block Relay*

**Product Description**

The new **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 10A. 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**

- cUL<sub>us</sub> Listed
- CE

**Product Selection**

**Table 49-12. High Current Terminal Block Relays Product Selection**

Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. \$
10A	12V DC	10	XRU1H12	
10A	120V AC/110V DC	10	XRU1H120U	
10A	24V DC	10	XRU1H24	
10A	24V AC/DC	10	XRU1H24U	

**Table 49-13. High Current Replacement Relays**

Rated Current	Supply Voltage	Standard Pack	Catalog Number	Price U.S. \$
10A	24V DC	10	XRR1H24	
10A	24V AC/DC	10	XRR1H24U	
10A	12V DC	10	XRR1H12	
10A	120V AC/110V DC	10	XRR1H120U	

## High Current Terminal Block Relays

## Technical Data and Specifications

Table 49-14. Information for High Current Terminal Block Relays (1PDT)

Catalog Number — Assembled Unit	XRU1H12	XRU1H24	XRU1H24U	XRU1H120U
Replacement Relay	XRR1H12	XRR1H24	XRR1H24U	XRR1H120U
Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/ 110V DC

## Connection Data

Rigid Solid AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)
Flexible Stranded AWG (mm <sup>2</sup> )	26 – 14 (0.14 – 2.5)

## Input Data (Permissible Range — See Page 8)

Input Voltage	12V DC	24V DC	24V AC/DC	120V AC/ 110V DC
Permissible Range See Page 49-8	See Figure 49-9	See Figure 49-11	See Figure 49-12	See Figure 49-10
Typical Input Current	33 mA	18 mA	17.5 mA	4.5 mA (120V AC)/ 4.2 mA (110V DC)
Typical Response Time	8 mS	8 mS	8 mS	7 mS
Typical Release Time	10 mS			
Input Protection	Polarity Protection Diode, Free-Wheeling Diode		Bridge Rectifier	

## Output Data

Contact Type	Single Contact, 1PDT
Contact Material	AgNi
Max. Switching Voltage	250V AC/DC ①
Min. Switching Voltage	12V AC/DC
Limiting Continuous Current	10A (6)A ②
Max. Inrush Current	30A (300 mS)
Min. Switching Current	100 mA
Min. Switching Power	1.2W

## Miscellaneous Data

Test Voltage I/O	4 kV, 50 Hz, 1 min
Ambient Temp Range	-4° to 140°F (-20° to 60°C)
Rated Operating Mode	100% Operating Factor
Inflammability Class	V0, in Accordance with UL 94
Mechanical Service Life	3 x 10 <sup>7</sup> cycles

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

② The current rating for the normally open contact (#14) is 10A. The current rating for the normally closed contact (#12) is 6A and can be increased to 10A by bridging the two #12 contact connections.

## Dimensions

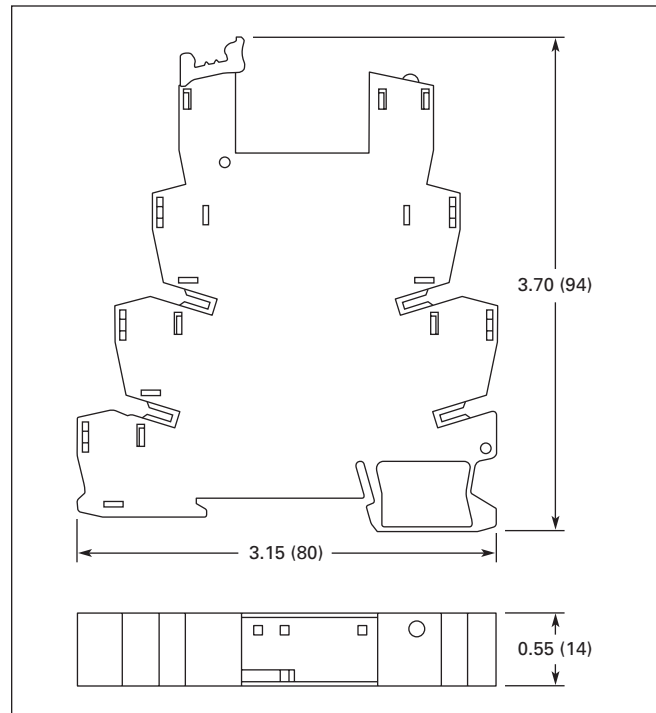


Figure 49-16. High Current Terminal Block Relays — Approximate Dimensions in Inches (mm)

## Schematic

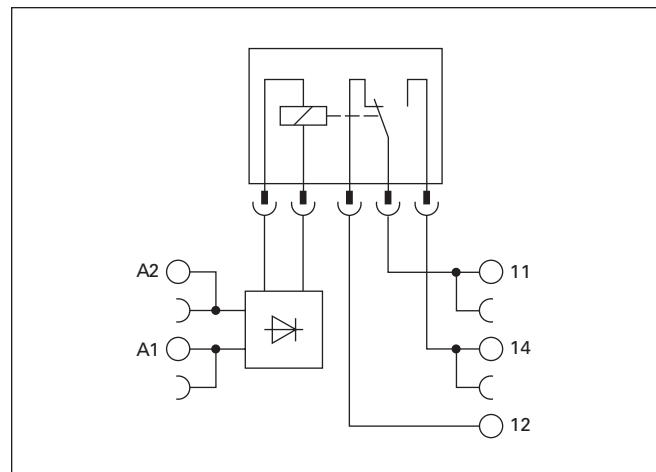
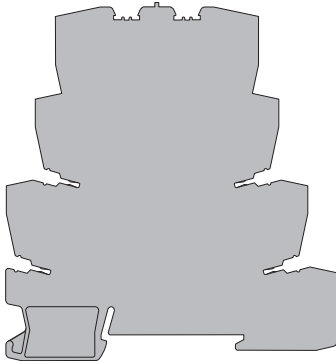


Figure 49-17. Schematic for High Current Terminal Block Relays

**Product Description**

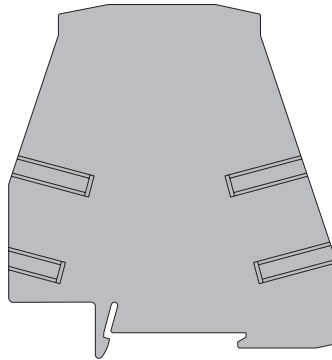
**Power Terminal Block**

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



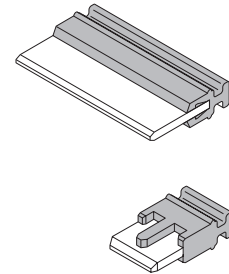
**End Cover**

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 250V and separating neighboring bridges with different potentials. It is equipped with pre-scored break out points at the bridging positions so that individual bridges can be passed through as needed. It may also be necessary to use the end cover between adjacent relays when three phases (L1, L2, L3) are used on the contact side of the relay.



**Bridges**

The XRAFBST colored, insulated plug-in bridge system reduces wiring time by up to 70% compared to conventionally wired relays. The XRAFBST2, 2-position bridges, are suited for bridging a smaller number of relays and total currents ≤ 6A. 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**

**Table 49-15. Product Selection Table for XR Series Accessories**

Description	Color	Standard Pack	Catalog Number	Price U.S. \$
2-Position Snap-In Jumper	Red	10	XRAFBST2RD	
2-Position Snap-In Jumper	Blue	10	XRAFBST2BU	
2-Position Snap-In Jumper	Gray	10	XRAFBST2GY	
80-Position Snap-In Jumper	Red	5	XRAFBST500RD	
80-Position Snap-In Jumper	Blue	5	XRAFBST500BU	
80-Position Snap-In Jumper	Gray	5	XRAFBST500GY	
Power Terminal Block	Gray	5	XRAPLCEK	
End Cover	Black	5	XRAATPBK	

**Table 49-16. Power Terminal Block Technical Specifications**

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	32A
Max. Voltage	250V AC ①
Approvals	

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

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**EZ Intelligent Relays Product Family**

## Product Family Overview

The EZ intelligent relays bring timers, relays, counters, special functions, inputs and outputs into one compact device that is easily configured. The EZ family of products provides exceptional levels of flexibility together with substantial savings in commissioning time and effort.

The EZ intelligent relays are available in more than 32 different styles that support from 12 I/O up to 320 I/O points providing the ideal solution for lighting, energy management, industrial control, watering, pump control, HVAC and home automation.

Once EZ products are installed, changes are easily accomplished through front panel programming, eliminating the need to change wiring and wiring diagrams increasing the savings realized.

Other terms often used for intelligent relay are relay replacer, control relay and smart relay.

## Application Description

Generally where multiple relays, timers and pushbuttons are used there is an opportunity to evaluate switching to the EZ Intelligent Relays. Applications span residential, commercial and industrial installations. Typical applications are:

- Car washes.
- Automatic door control.
- Commercial lighting.
- Residential lighting.
- Exterior lighting.
- Pump control, 12V DC automotive control.
- Greenhouse control.
- Crane control.
- Machinery.
- Paper/pulp.
- Elevator control.
- Livestock feed/gate control.
- Irrigation control.
- Cart chargers.
- Heating and air conditioning.

**EZ 500/700/800/EZD Intelligent Relays**



*EZ 500/700/800/EZD Intelligent Relays*

**Product Description**

Four families make up the EZ Intelligent Relay product line.

**EZ500 Series** — for controlling small applications with up to 12 input/output signals. Models are available with and without displays. DIN rail mounted.

**EZ700 Series** — for controlling medium-sized applications with up to 40 input/output signals. DIN rail mounted.

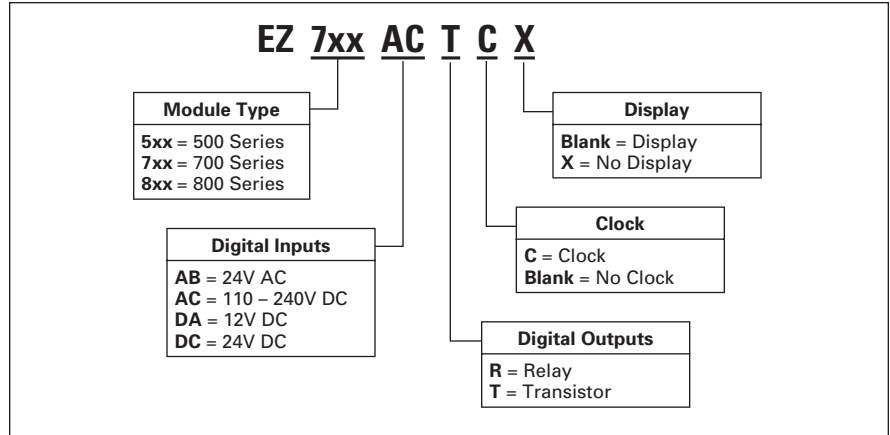
**EZ800 Series** — for controlling large-scale applications with up to 320 input/output signals. Models are available with and without displays. DIN rail mounted. Use **EZ-NET** for applications beyond 40 I/O.

**EZD Series** — for controlling large-scale applications with up to 320 input/output signals using powerful visualization functions. The EZD display can be linked to the EZ500/700/800 models to provide an enhanced operator interface. Panel mounted.

The **EZ-NET** integrated network provides easy and inexpensive linking of up to eight EZ800/EZD devices over a distance of up to 1000 meters. The EZ and EZD devices can run their own program or be used as a distributed input/output module. Connect up to 8 controllers each with 40 I/O via a signal expansion module to obtain 320 I/O.

**Catalog Number Selection**

**Table 49-17. EZ500/700/800 Module Definition Catalog Numbering System**



**Product Selection**



*EZ500 with Display*



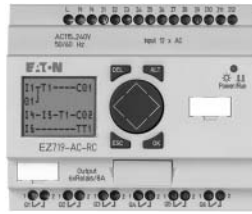
*EZ500 without Display*

**Table 49-18. EZ500 Intelligent Relays**

Description	Inputs					Outputs		Catalog Number	Price U.S. \$
	24V AC	110 – 240V AC	12V DC	24V DC	ALG	RY	TRN		
12 I/O, Clock, Display	8	—	—	—	2	4	—	EZ512-AB-RC EZ512-AB-RCX	
12 I/O, Clock, No Display	8	—	—	—	2	4	—		
12 I/O, No Clock, Display	—	8	—	—	—	4	—	EZ512-AC-R EZ512-AC-RC EZ512-AC-RCX	
12 I/O, Clock, Display	—	8	—	—	—	4	—		
12 I/O, Clock, No Display	—	8	—	—	—	4	—		
12 I/O, Clock, Display	—	—	8	—	2	4	—	EZ512-DA-RC EZ512-DA-RCX	
12 I/O, Clock, No Display	—	—	8	—	2	4	—		
12 I/O, No Clock, Display	—	—	—	8	2	4	—	EZ512-DC-R EZ512-DC-RC EZ512-DC-RCX	
12 I/O, Clock, Display	—	—	—	8	2	4	—		
12 I/O, Clock, No Display	—	—	—	8	2	4	—		
12 I/O, Clock, Display	—	—	—	8	2	—	4	EZ512-DC-TC EZ512-DC-TCX	
12 I/O, Clock, No Display	—	—	—	8	2	—	4		

**Note:** Analog inputs optional.

EZ 500/700/800/EZD Intelligent Relays



EZ700 with Display



EZ700 without Display

Table 49-19. EZ700 Intelligent Relays

Description	Inputs					Outputs		Catalog Number	Price U.S. \$
	24V AC	110 – 240V AC	12V DC	24V DC	Analog	Relay	Transistor		
18 I/O, Clock, Display	12	—	—	—	4	6	—	EZ719-AB-RC	
18 I/O, Clock, No Display	12	—	—	—	4	6	—	EZ719-AB-RCX	
18 I/O, Clock, Display	—	12	—	—	—	6	—	EZ719-AC-RC	
18 I/O, Clock, No Display	—	12	—	—	—	6	—	EZ719-AC-RCX	
18 I/O, Clock, Display	—	—	12	—	4	6	—	EZ719-DA-RC	
18 I/O, Clock, No Display	—	—	12	—	4	6	—	EZ719-DA-RCX	
18 I/O, Clock, Display	—	—	—	12	4	6	—	EZ719-DC-RC	
18 I/O, Clock, No Display	—	—	—	12	4	6	—	EZ719-DC-RCX	
20 I/O, Clock, Display	—	—	—	12	4	—	8	EZ721-DC-TC	
20 I/O, Clock, No Display	—	—	—	12	4	—	8	EZ721-DC-TCX	

Note: Analog inputs optional.



EZ800 with Display



EZ800 without Display

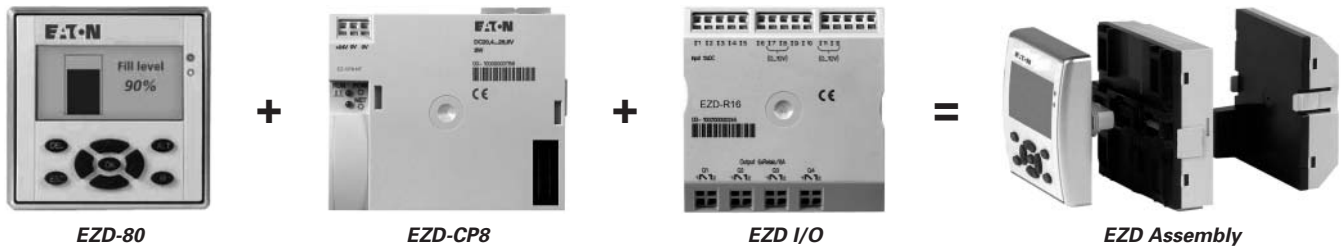
Table 49-20. EZ800 Intelligent Relays

Description	Inputs			Outputs			Catalog Number	Price U.S. \$
	110 – 240V AC	24V DC	Analog	Relay	Transistor	Analog		
18 I/O, Clock, Display	12	—	—	6	—	—	EZ819-AC-RC	
18 I/O, Clock, No Display	12	—	—	6	—	—	EZ819-AC-RCX	
18 I/O, Clock, Display	—	12	4	6	—	—	EZ819-DC-RC	
18 I/O, Clock, No Display	—	12	4	6	—	—	EZ819-DC-RCX	
19 I/O, Clock, Display	—	12	4	6	—	1	EZ820-DC-RC	
19 I/O, Clock, No Display	—	12	4	6	—	1	EZ820-DC-RCX	
20 I/O, Clock, Display	—	12	4	—	8	—	EZ821-DC-TC	
20 I/O, Clock, No Display	—	12	4	—	8	—	EZ821-DC-TCX	
21 I/O, Clock, Display	—	12	4	—	8	1	EZ822-DC-TC	
21 I/O, Clock, No Display	—	12	4	—	8	1	EZ822-DC-TCX	

Note: Analog inputs optional, analog outputs optional.



### EZ 500/700/800/EZD Intelligent Relays

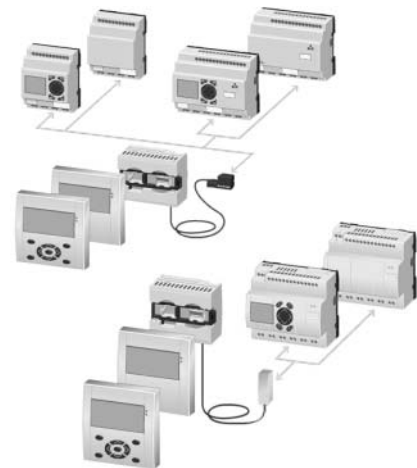


**Table 49-21. EZD Displays (EZD-80) and EZD Controllers (EZD-CP8)**

Description	Catalog Number	Price U.S. \$
EZD, No Buttons	EZD-80	
EZD, Buttons	EZD-80-B	
EZD CPU with 24V DC, Power Supply, Clock	EZD-CP8-ME	
EZD CPU with 24V DC, Power Supply, Clock, EZ-Net	EZD-CP8-NT	
EZD CPU with 100 – 240V AC, Power Supply, Clock	EZD-AC-CP8-ME	
EZD CPU with 100 – 240V AC, Power Supply, Clock, EZ-Net	EZD-AC-CP8-NT	



*EZD-CP4-800 Attached to EZ-80 Display and EZ800 Unit*



*EZ 500/700/800/EZD Intelligent Relays*

**Table 49-22. EZD Display to EZ Communication Modules (EZD-CP4)**

Description	Catalog Number	Price U.S. \$
EZD Display to EZ500/700 DC Communication Module with EZ500/700 Communication Cable (EZD-CP4-500-CAB5)	EZD-CP4-500	
EZD Display to EZ800 DC Communication Module with EZ800 Communication Cable (EZD-CP4-800-CAB5)	EZD-CP4-800	
EZD Display to EZ500/700 AC Communication Module with EZ500/700 Communication Cable (EZD-CP4-500-CAB5)	EZD-AC-CP4-500	
EZD Display to EZ800 AC Communication Module with EZ800 Communication Cable (EZD-CP4-800-CAB5)	EZD-AC-CP4-800	

## Technical Data and Specifications

**Table 49-23. EZ500 Series**

Type	EZ512-AB...	EZ512-AC...	EZ512-DA...	EZ512-DC-R...	EZ512-DC-TC.
Supply Voltage	24V AC	100 – 240V AC	12V DC	24V DC	24V DC
Heat Dissipation	5 VA	5 VA	2 W	2 W	2 W
Continuous Current Outputs (1)	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 Top-hat Rail to DIN 50022, 35 mm or Screw Mounting with EZB4-101-GF1 Fixing Brackets				

**Table 49-24. EZ700 Series**

Type	EZ719-AB...	EZ719-AC...	EZ719-DA...	EZ719-DC-RC.	EZ721-DC-TC.
Supply Voltage	24V AC	100 – 240V AC	12V DC	24V DC	24V DC
Heat Dissipation	7 VA	10 VA	3.5 W	3.5 W	3.5 W
Continuous Current Outputs (1)	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 Top-hat Rail to DIN 50022, 35 mm or Screw Mounting with EZB4-101-GF1 Fixing Brackets				

**Table 49-25. EZ800 Series**

Type	EZ819-AC...	EZ819-DC-RC.	EZ820-DC-RC.	EZ821-DC-TC.	EZ822-DC-TC.
Supply Voltage	100 – 240V AC	24V DC	24V DC	24V DC	24V DC
Heat Dissipation	10 VA	3.4 W	3.4 W	3.4 W	3.4 W
Continuous Current Outputs (1)	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 Top-hat Rail to DIN 50022, 35 mm or Screw Mounting with EZB4-101-GF1 Fixing Brackets				

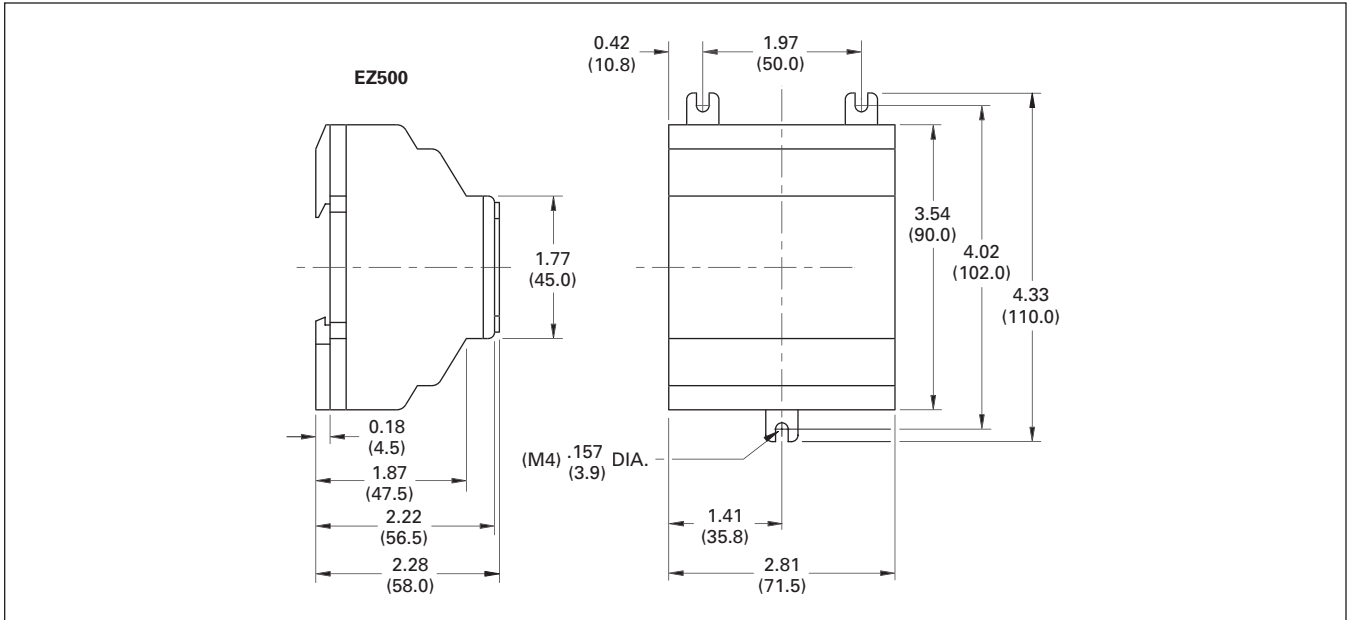
**Table 49-26. EZD CP4 and CP8 Modules**

Type	EZD-80...	EZD-CP4...	EZD-CP8...	EZD-AC-CP8...
Supply Voltage	Supply from -CP	24V DC	24V DC	100 – 240V AC
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 EZD-80	Snap Fitted to EZD-80 or on Top-hat Rail to DIN 50022, 35 mm or Screw Mounting with EZB4-101-GF1 Fixing Brackets	

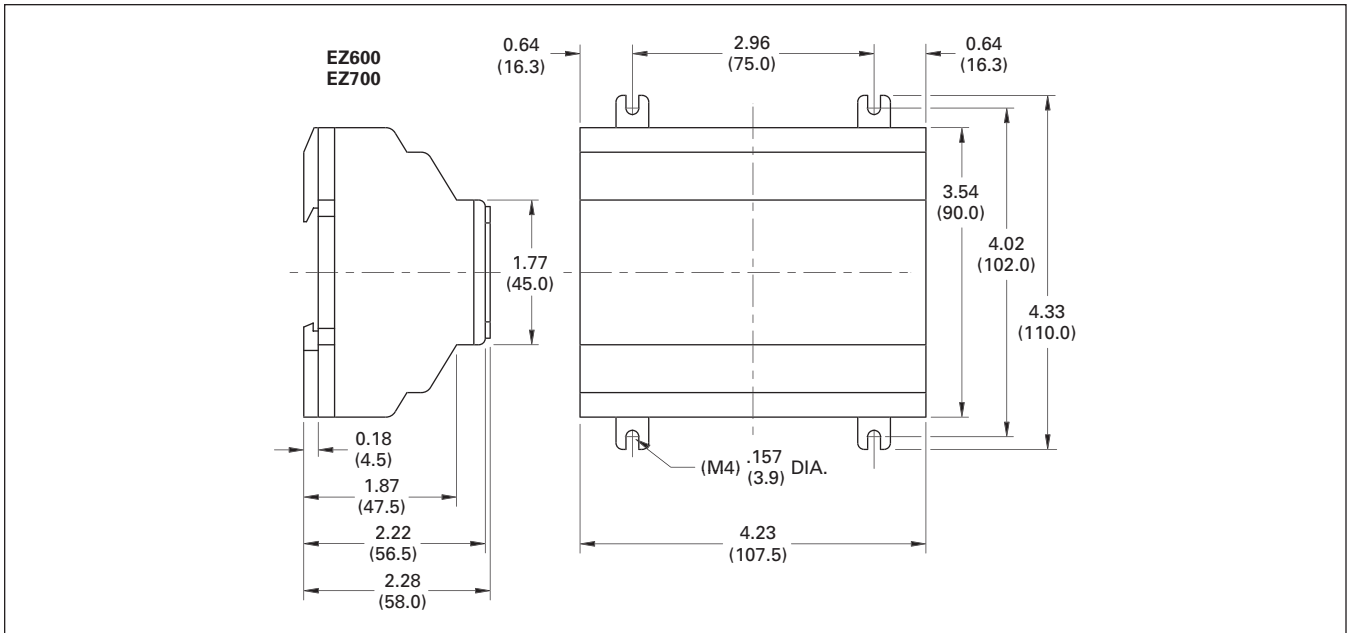
**Table 49-27. EZ500, EZ700, EZ800, EZD-80, EZD-CP4, EZD-CP8 Modules**

Type	EZD-80...	EZ500/700/800, EZD-CP4/CP8
Connection Cables	—	0.2 – 4.0 mm <sup>2</sup> (AWG 22-12), solid 0.2 - 2.5 mm <sup>2</sup> (AWG 22-12), flexible
Degree of Protections	IP65	IP 20
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 to 50°C	-25 to 55°C
Transport and Storage Temperature	-40 to 70°C	-40 to 70°C
Certification, Standards	EN 50178, IEC/EN 60947, UL®, CSA®	EN 50178, IEC/EN 60947, UL, CSA

**Dimensions**



**Figure 49-18. EZ500 Series Dimensions in Inches (mm), Drawing Number MD05013001E**



**Figure 49-19. EZ600 and EZ700 Series Dimensions in Inches (mm), Drawing Number MD05013002E**

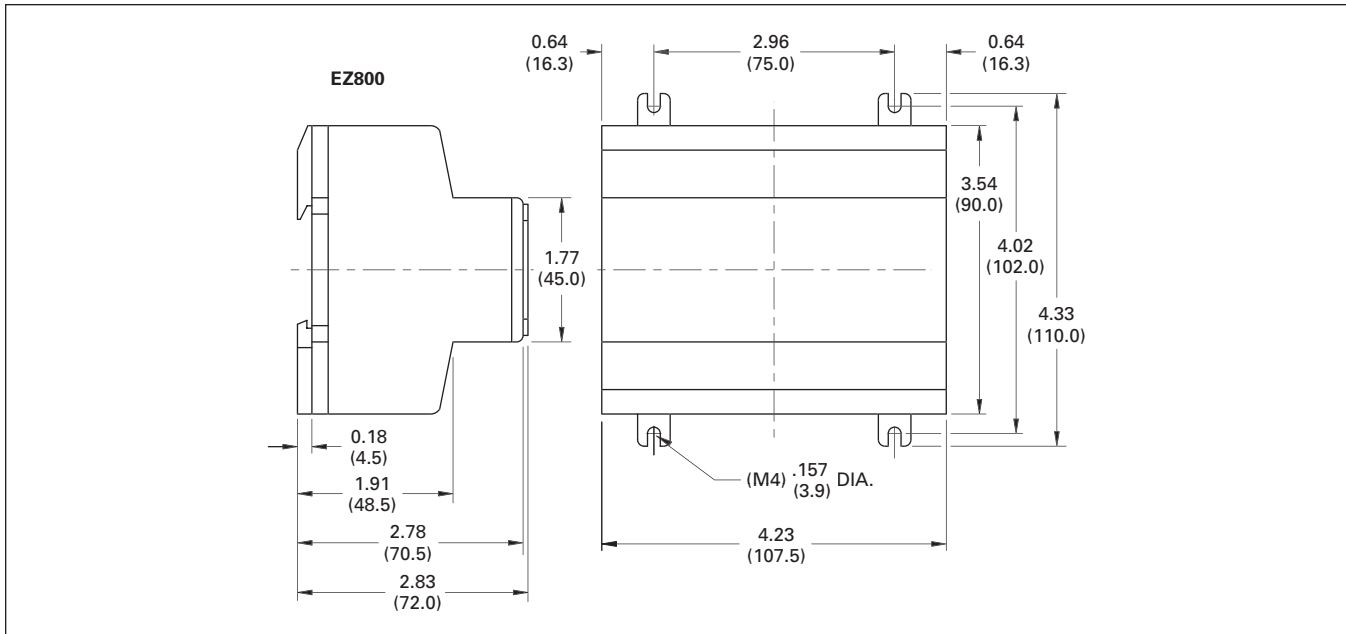


Figure 49-20. EZ800 Series Dimensions in Inches (mm), Drawing Number MD05013003E

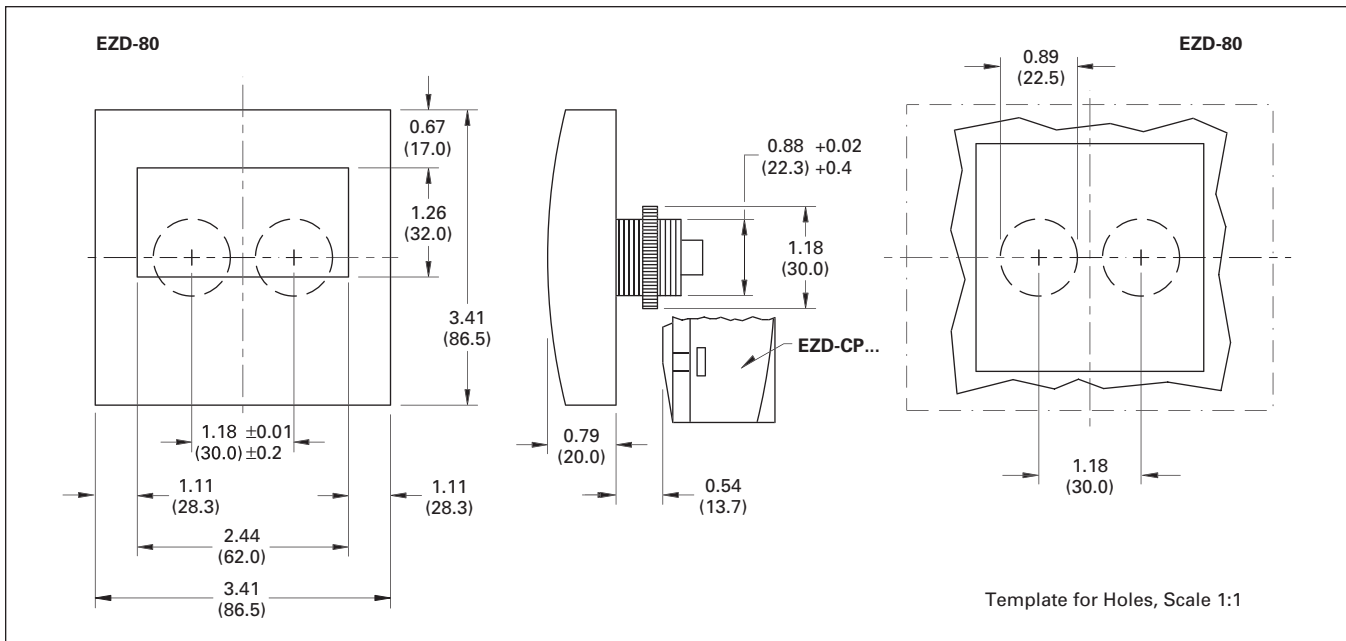
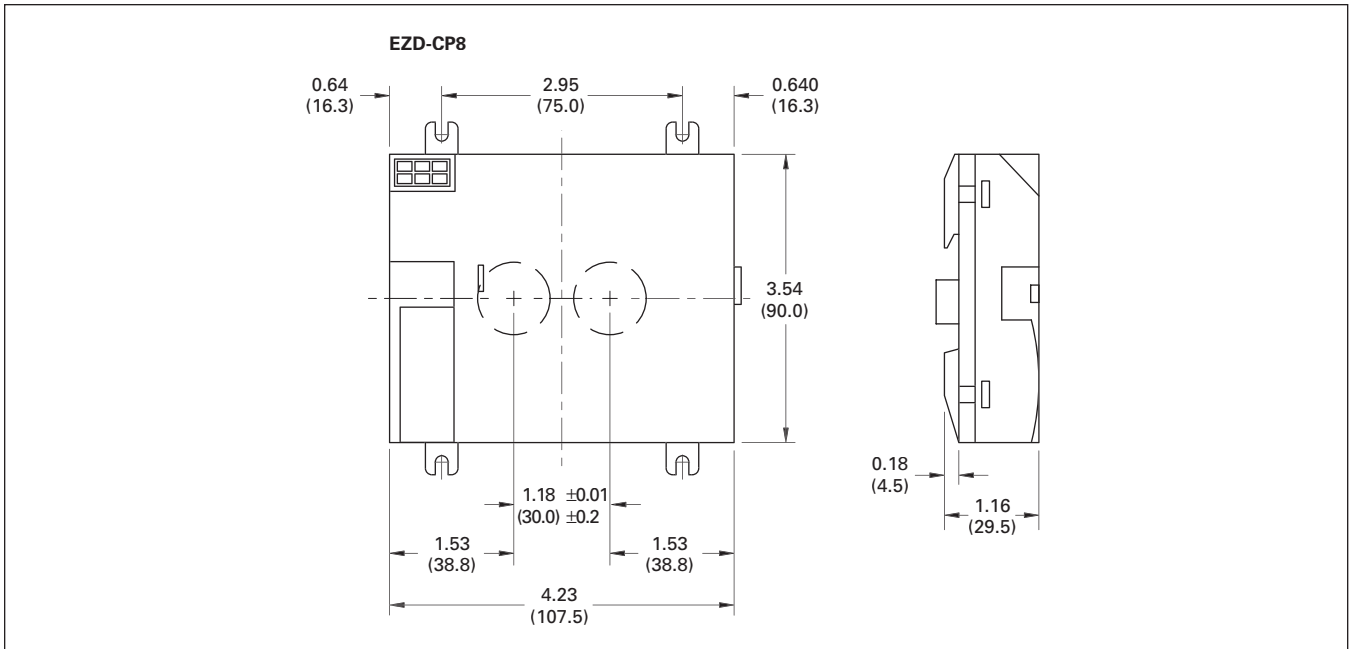
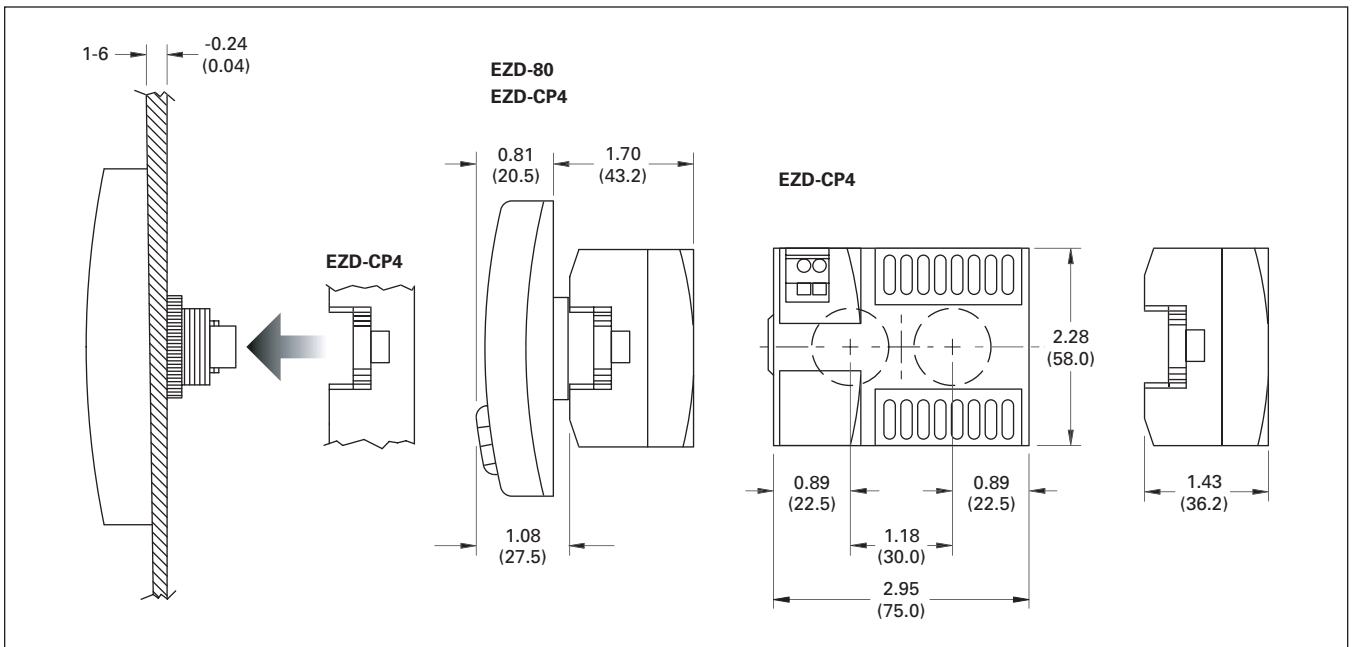


Figure 49-21. EZD-80 Series Dimensions in Inches (mm), Drawing Number MD05013005E



**Figure 49-22. EZD-CP8 Series Dimensions in Inches (mm), Drawing Number MD05013006E**



**Figure 49-23. EZD-CP4, EZD-80 and EZD-CP4 Series Combined Dimensions in Inches (mm), Drawing Number MD013013E**

## EZD Controller I/O Modules

### Product Selection

Table 49-28. EZD Controller I/O Modules

Description	Inputs			Outputs			Catalog Number	Price U.S. \$
	110 – 240V AC	24V DC	Analog	Relay	Transistor	Analog		
16 I/O	12	—	—	4	—	—	EZD-AC-R16 EZD-R16 EZD-RA17	
16 I/O	—	12	4	4	—	—		
17 I/O	—	12	4	4	—	1		
16 I/O	—	12	4	—	4	—	EZD-T16 EZD-TA17	
17 I/O	—	12	4	—	4	1		

Note: Analog inputs optional.

### Technical Data and Specifications

Table 49-29. EZD Specifications

Type	EZD-AC-R16	EZD-R16	EZD-RA17	EZD-T16	EZD-TA17
Supply Voltage	Supply via EZD-CP8 module				
Heat Dissipation	0.5 W	0.5 W	0.5 W	0.5 W	0.5 W
Continuous Current Outputs ①	8 A	8 A	8 A	0.5 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			—	—
Connection Cables	0.2 – 4.0 mm <sup>2</sup> (AWG 22-12), Solid 0.2 – 2.5 mm <sup>2</sup> (AWG 22-12), Flexible				
Degree of Protections	IP 20	IP 20	IP 20	IP 20	IP 20
RFI Suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1,2,3,4				
Ambient Operating Temperature	-25 to 55°C	-25 to 55°C	-25 to 55°C	-25 to 55°C	-25 to 55°C
Transport and Storage Temperature	-40 to 70°C	-40 to 70°C	-40 to 70°C	-40 to 70°C	-40 to 70°C
Certification, Standards	EN 50178, IEC/EN 60947, UL, CSA				
Mounting	Snap Fitted to EZD-CP8 Module				

① Relay = 8 A (10 A to UL) with resistive load, 3 A with inductive load/transistor outputs = 0.5 A/24V DC, max 4 outputs switchable in parallel.

### Dimensions

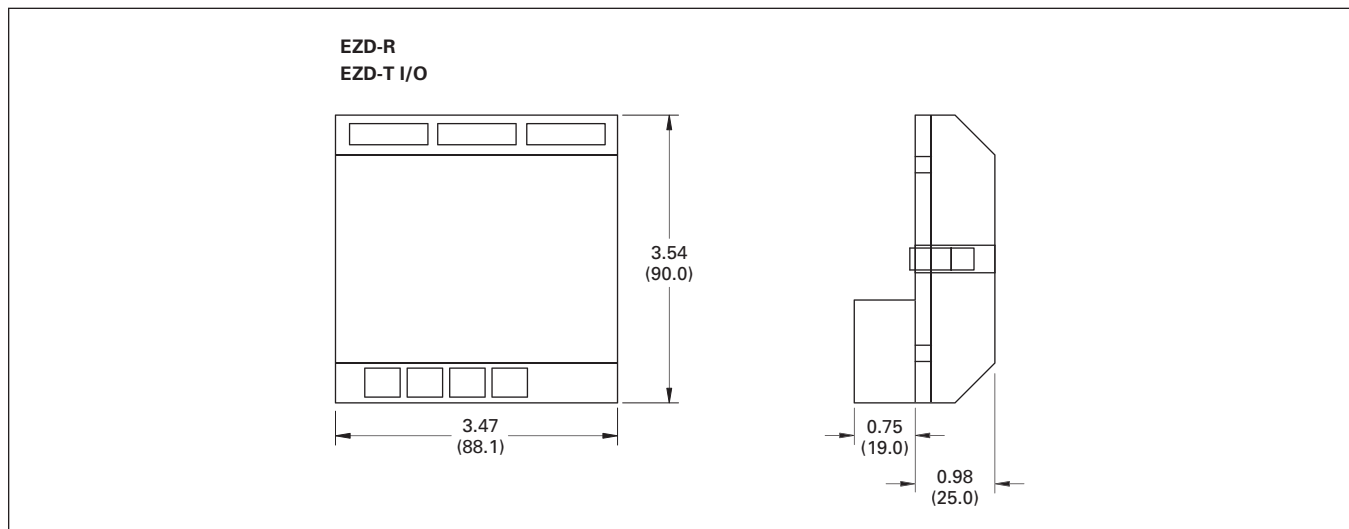
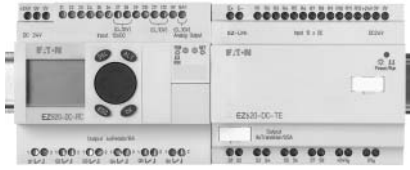


Figure 49-24. EZD-R/EZD-T I/O Module Dimensions in Inches (mm), Drawing Number MD05013007E

**EZ/EZD Expansion Modules**



*EZ/EZD Expansion Modules*

**Product Description**

Expansion modules are available for increasing the input/output of the EZ700/800 and EZD intelligent relays to 24 inputs and up to 16 outputs. Expansion modules can be mounted directly to the EZ/EZD unit or up to 98 ft. (30 m) away using coupling module EZ200-EZ.

**Product Selection**

**Table 49-30. EZ/EZD I/O Expansion Modules ①**

Description	Inputs		Outputs		Catalog Number	Price U.S. \$
	110 – 240V AC	24V DC	RY	TRN		
2 I/O Expansion	—	—	2	—	EZ202-RE	
18 I/O Expansion	12	—	6	—	EZ618-AC-RE	
18 I/O Expansion	—	12	6	—	EZ618-DC-RE	
20 I/O Expansion	—	12	—	8	EZ620-DC-TE	
Coupling Module for Remote Mounting of Expansion Modules					EZ200-EZ	

① All expansion modules include one EZ-LINK-DS.

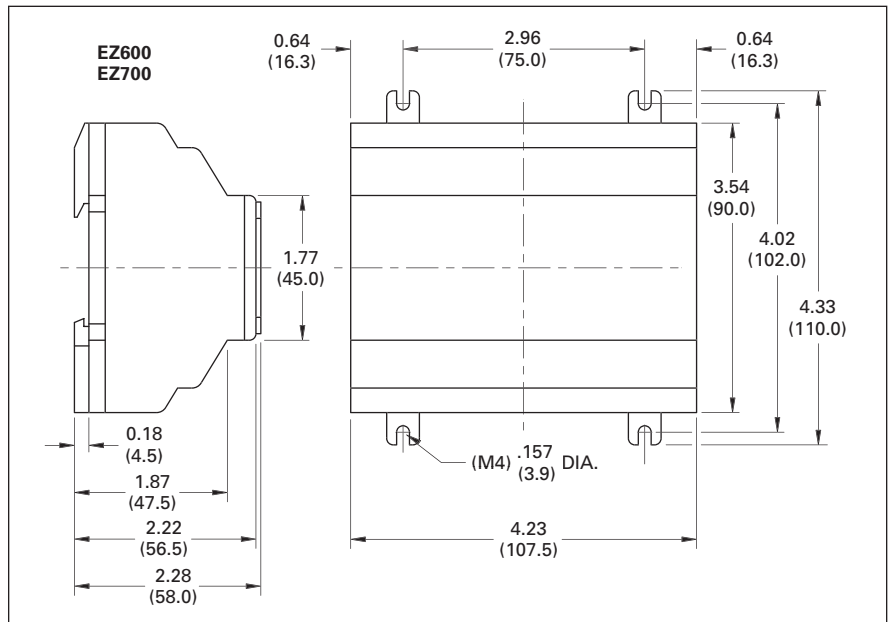
**Technical Data and Specifications**

**Table 49-31. EZ Specifications**

Type	EZ202-RE	EZ618-AC-RE	EZ618-DC-RE	EZ620-DC-TE	EZ200EZ
Supply Voltage	—	100 – 240V AC	24V AC	24V AC	—
Heat Dissipation	1 W	10 VA	4 W	4 W	1 W
Continuous Current Outputs ②	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				—
Connection Cables	0.2 – 4.0 mm <sup>2</sup> (AWG 22-12), Solid 0.2 – 2.5 mm <sup>2</sup> (AWG 22-12), Flexible				
Degree of Protections	IP 20	IP 20	IP 20	IP 20	IP 20
RFI Suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1,2,3,4				
Ambient Operating Temperature	-25 to 55°C	-25 to 55°C	-25 to 55°C	-25 to 55°C	-25 to 55°C
Transport and Storage Temperature	-40 to 70°C	-40 to 70°C	-40 to 70°C	-40 to 70°C	-40 to 70°C
Certification, Standards	EN 50178, IEC/EN 60947, UL, CSA				
Mounting	On Top-hat Rail to DIN 50022, 35 mm or Screw Mounting with EZB4-101-GF1 Fixing Brackets				

② Relay = 8A (10 A to UL) with resistive load, 3 A with inductive load/transistor outputs = 0.5 A/24V DC, max 4 outputs switchable in parallel.

**Dimensions**



**Figure 49-25. EZ600 and EZ700 Series Dimensions in Inches (mm), Drawing Number MD05013002E**

EZ/EZD Expansion Modules

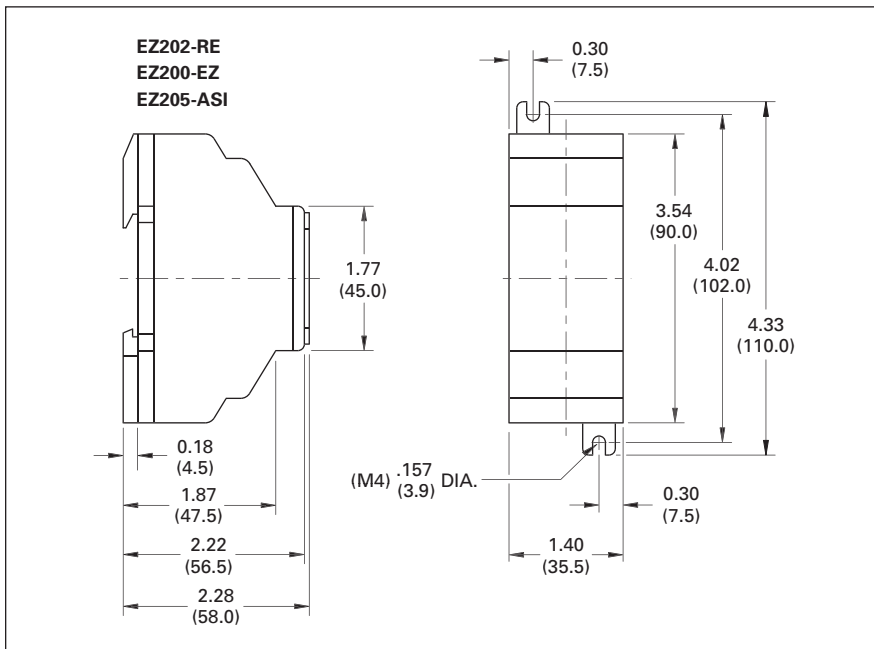


Figure 49-26. EZ202-RE/EZ200-EZ/EZ205-ASI Series Dimensions in Inches (mm), Drawing Number MD05013012E



**EZ/EZD Communication Modules**



**EZ204-DP Communication Module**

**Product Description**

Four modules are available for easily connecting to world-standard networks. The communication modules can be used with the EZ700/800 and EZD intelligent relays.

Available communication modules support:

- PROFIBUS-DP
- AS-I (Actuator Sensor Interface) networks
- CANopen
- DeviceNet
- Ethernet/IP

All modules act as a gateway and operate exclusively as a slave station on the network.

**Product Selection**

**Table 49-32. EZ/EZD Communication Interface Modules**

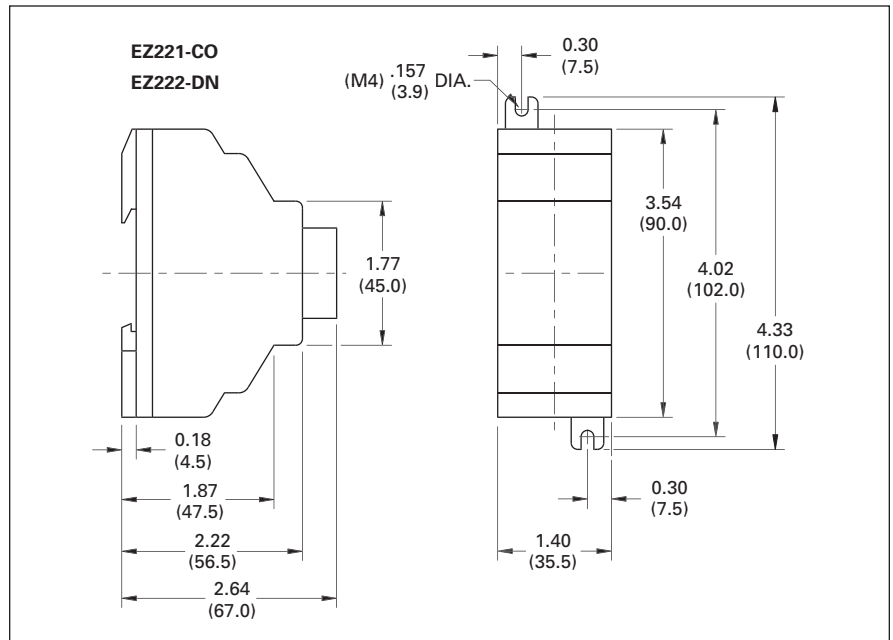
Description	Catalog Number	Price U.S. \$
PROFIBUS-DP Slave Interface Module	<b>EZ204-DP</b>	
AS-Interface Slave with 4 In and 4 Out Interface Module	<b>EZ205-ASI</b>	
CANopen Interface Module	<b>EZ221-CO</b>	
DeviceNet Slave Interface Module	<b>EZ222-DN</b>	
Ethernet/IP Gateway	<b>EZ209-SE</b>	

**Technical Data and Specifications**

**Table 49-33. EZ/EZD Specifications**

Type	EZ204-DP	EZ205-ASI	EZ221-CO	EZ222-DN
Supply Voltage	24V DC	24V DC	24V DC	24V DC
Heat Dissipation	2 W	1 W	1 W	1 W
Connection Cables	0.2 – 4.0 mm <sup>2</sup> (AWG 22-12), Solid 0.2 – 2.5 mm <sup>2</sup> (AWG 22-12), Flexible			
Degree of Protections	IP 20	IP 20	IP 20	IP 20
RFI Suppression	EN 55011, EN 55022 Class B, IEC 61000-6-1,2,3,4			
Ambient Operating Temperature	-25 to 55°C	-25 to 55°C	-25 to 55°C	-25 to 55°C
Transport and Storage Temperature	-40 to 70°C	-40 to 70°C	-40 to 70°C	-40 to 70°C
Certification, Standards	EN 50178, IEC/EN 60947, UL, CSA			
Mounting	On Top-hat Rail to DIN 50022, 35 mm or Screw Mounting with EZB4-101-GF1 Fixing Brackets			

**Dimensions**



**Figure 49-27. EZ221-CO/EZ222-DN Series Dimensions in Inches (mm), Drawing Number MD05013010E**

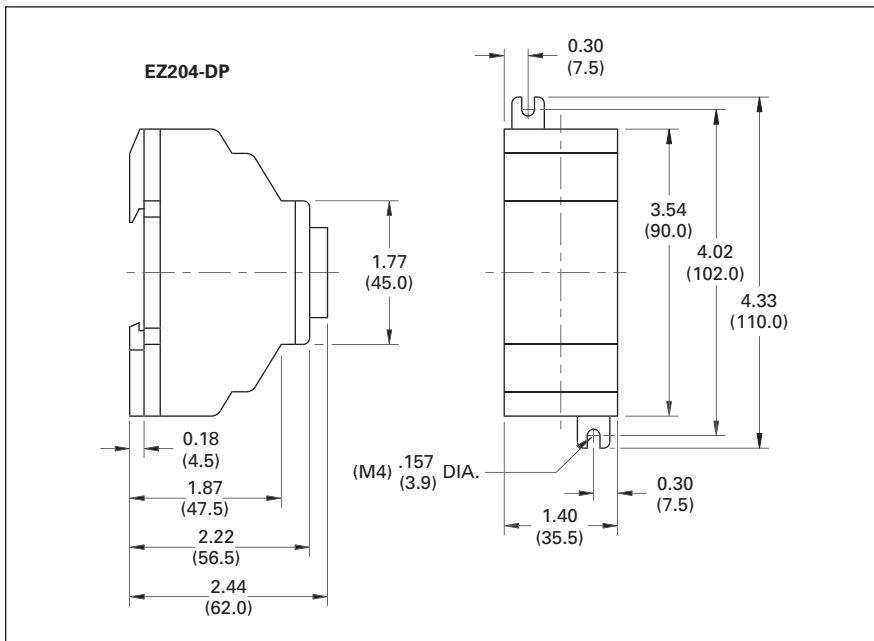


Figure 49-28. EZ204-DP Series Dimensions in Inches (mm), Drawing Number MD05013011E

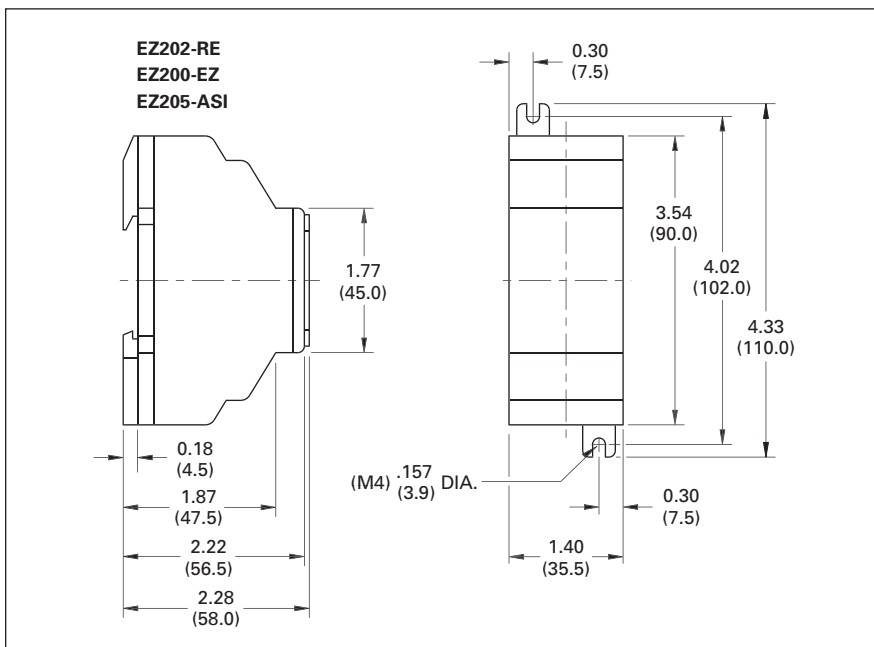


Figure 49-29. EZ202-RE/EZ200-EZ/EZ205-ASI Series Dimensions in Inches (mm), Drawing Number MD05013012E

## EZ Software



EZSoft Software

## Product Description

The EZSoft software is used to program all of the EZ and EZD controllers and displays. The Windows-based software provides straightforward circuit diagram input and editing and the diagrams can be displayed in the format desired. When EZ800 and EZD controllers are connected using EZ-NET, all connected devices can be accessed and their programs loaded from a single controller.

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

## Product Selection

Table 49-34. EZ/EZD Software

Description	Catalog Number	Price U.S. \$
Programming Software for EZ500/700/800 and EZD	EZSOFT	

**EZ/EZD Power Supplies**

**Product Selection**

**Table 49-35. EZ/EZD-CP8 Power Supplies**

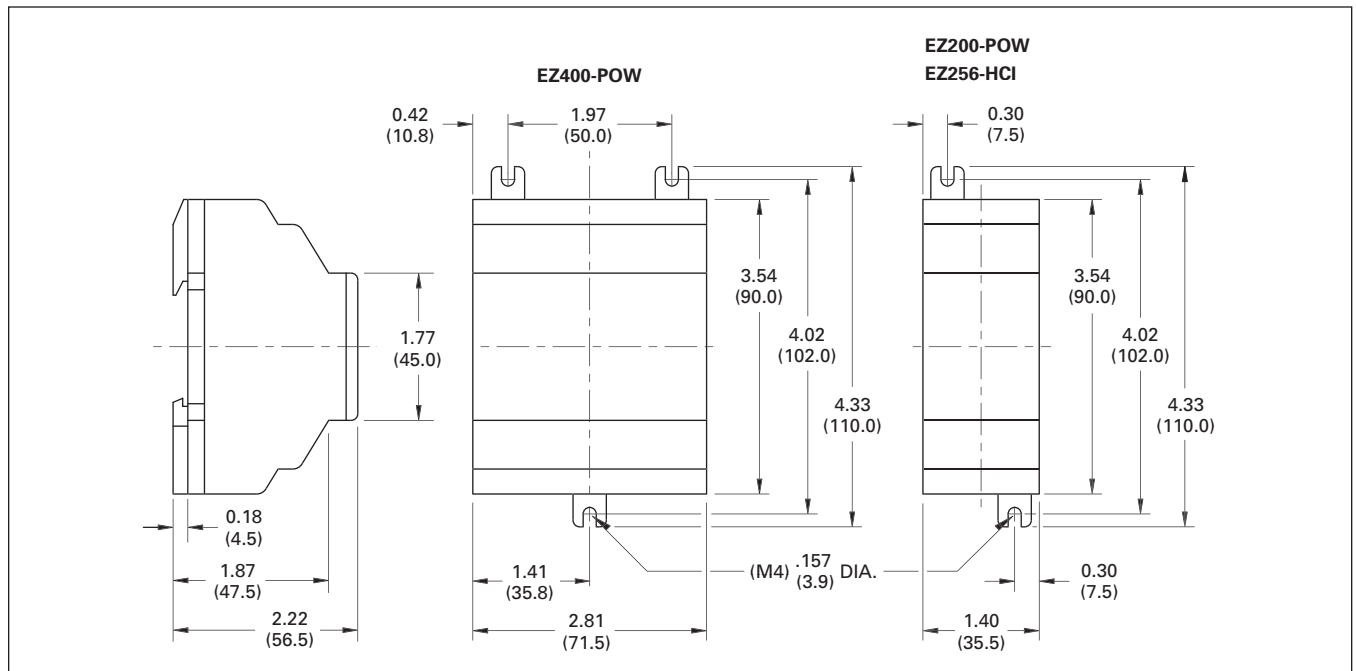
Description	Catalog Number	Price U.S. \$
100 – 240V AC Input to 12V DC at 20 mA/24V DC at 250 mA	<b>EZ200-POW</b>	
100 – 240V AC Input to 24V DC at 1.25 A	<b>EZ400-POW</b>	

**Technical Data and Specifications**

**Table 49-36. EZ Specifications**

Type	EZ200-POW	EZ400-POW
Supply Voltage	100 – 240V AC	100 – 240V AC
Maximum Range	85 – 264V AC	85 – 264V AC
Output Voltage	24V DC ( $\pm 3\%$ )	24V DC ( $\pm 3\%$ )
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	0.2 – 4.0 mm <sup>2</sup> (AWG 22-12), Solid 0.2 – 2.5 mm <sup>2</sup> (AWG 22-12), Flexible	0.2 – 4.0 mm <sup>2</sup> (AWG 22-12), Solid 0.2 – 2.5 mm <sup>2</sup> (AWG 22-12), Flexible
Degree of Protections	IP 20	IP 20
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 to 55°C	-25 to 55°C
Transport and Storage Temperature	-40 to 70°C	-40 to 70°C
Certification, Standards	EN 50178, IEC/EN 60947, UL, CSA	EN 50178, IEC/EN 60947, UL, CSA
Mounting	On Top-hat Rail to DIN 50022, 35 mm or Screw Mounting with EZB4-101-GF1 Fixing Brackets	

**Dimensions**



**Figure 49-30. EZ200-POW/EZ256-HCI and EZ400-POW Series Dimensions in Inches (mm), Drawing Number MD05013004E**

EZ/EZD Accessories

EZ/EZD Accessories



EZ700/500 Panel Window and Mounting Kit

Product Selection

Table 49-37. EZ/EZD Memory Storage Modules

Description	Catalog Number	Price U.S. \$
EZ500/700 32K Memory Storage Module	EZ-M-32K	
EZ800/EZD 256K Memory Storage Module	EZ-M-256K	

Table 49-38. EZ/EZD Programming Cables

Description	Catalog Number	Price U.S. \$
EZ500/700 to PC Cable	EZ-PC-CAB	
EZ800/EZD to PC Cable	EZ800-PC-CAB	

Table 49-39. EZ/EZD Cables and Connectors

Description	Catalog Number	Price U.S.
EZ500/700 to EZD-CP4 Communication Cable, 5 m	EZD-CP4-500-CAB5	
EZ800 to EZD-CP8 Communication Cable, 2 m	EZD-800-CAB	
EZ800 to EZD-CP8 Communication Cable, 5 m	EZD-800-CAB5	
EZ800 to EZD-CP4 Communication Cable, 5 m	EZD-CP4-800-CAB5	
EZ800/EZD EZ-NET Cable, 0.3 m	EZ-NT-30	
EZ800/EZD EZ-NET Cable, 0.8 m	EZ-NT-80	
EZ800/EZD EZ-NET Cable, 1.5 m	EZ-NT-150	
EZ800/EZD Network Termination Resistor, 2/Pack	EZ-NT-R	
EZ800/EZD EZ-NET Cable (cable only, no connectors, see EZ-NT-RJ45), 100 m	EZ-NT-CAB	
RJ45 Network Connectors for EZ-NET Cable (EZ-NT-CAB), 10/Pack	EZ-NT-RJ45	

Table 49-40. EZ/EZD Miscellaneous Parts

Description	Catalog Number	Price U.S.
EZ500 Relay Simulator	EZ412-DC-SIM-NA	
EZ500 Panel Window	EZSKF-FF4	
EZ700/800 Panel Window	EZSKF-FF6	
EZ500/700/800 Panel Window Mounting Kit to Front Mount Units	EZSKF-HA	
EZ/EZD Panel Mount Brackets, 9/Pack	EZB4-101-GF1	
EZ/EZD Grounding Kit	EZB4-102-KS1	
EZD Display DIN Rail Mount Kit	EZD-TS144	
EZD Display Protective Membrane Cover	EZD-XM-80	
EZD Display Protective Plastic Cover	EZD-XS-80	
EZ/EZD 6 Channel Noise Suppression Adapter	EZ256-HCI	
EZ/EZD Spare Interface Connector, Base to Expander	EZ-LINK-DS	
EZSoft Configuration Software	EZSOFT	
EZ Starter Kit (includes EZ512-DC-RC, EZ-PC-CAB, EZ412-DC-SIM-NA, EZSoft)	EZSTARTKIT1	

Dimensions

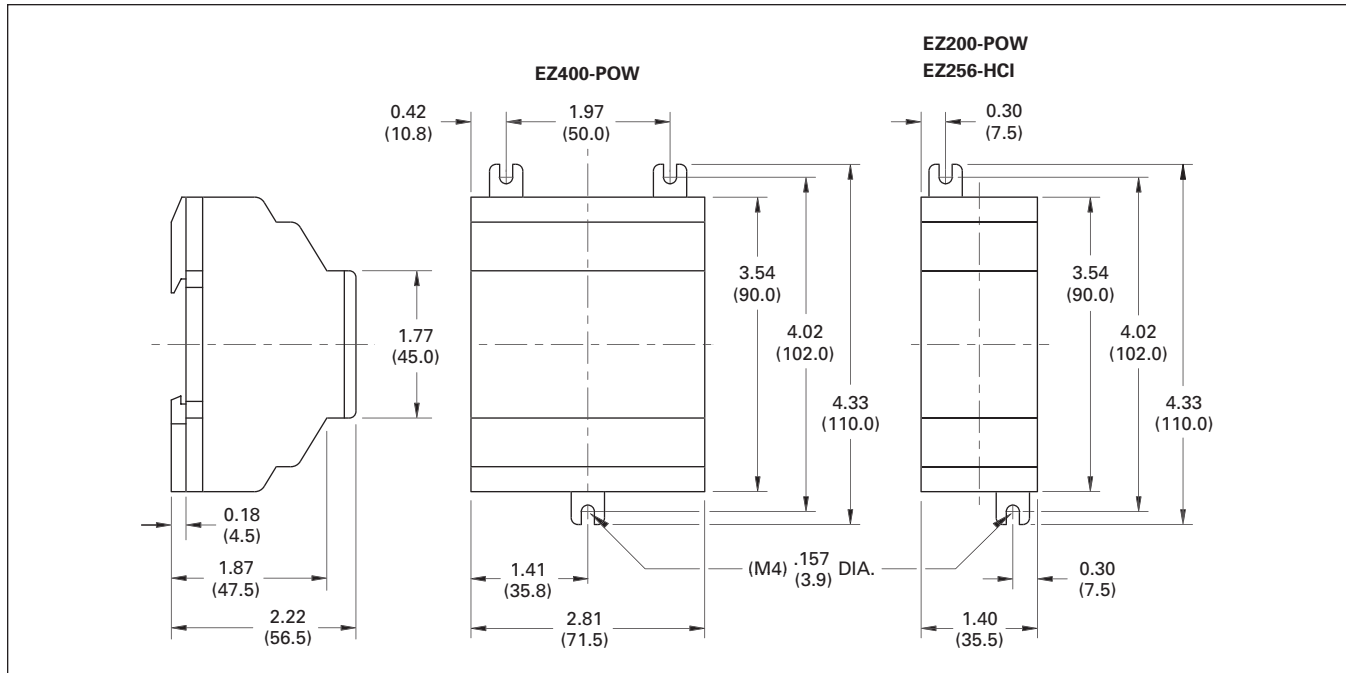
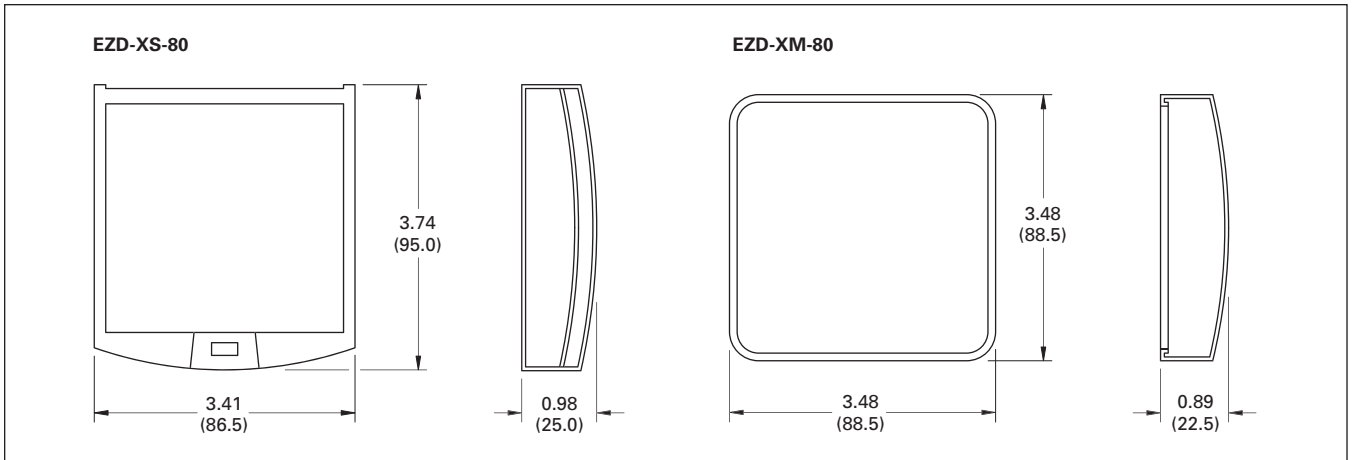
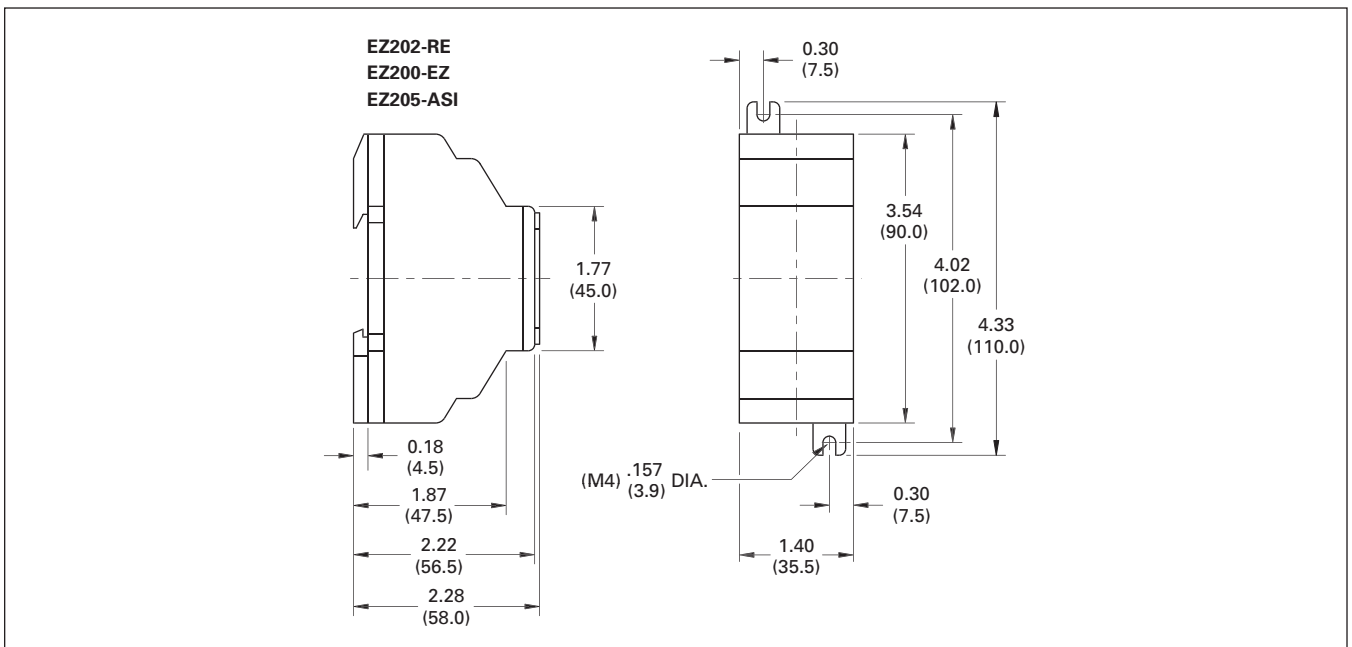


Figure 49-31. EZ200-POW/EZ256-HCI and EZ400-POW Series Dimensions in Inches (mm), Drawing Number MD05013004E



**Figure 49-32. EZD-XS-80 and EZD-XM-80 Series Dimensions in Inches (mm), Drawing Number MD05013009E**



**Figure 49-33. EZ202-RE/EZ200-EZ/EZ205-ASI Series Dimensions in Inches (mm), Drawing Number MD05013012E**

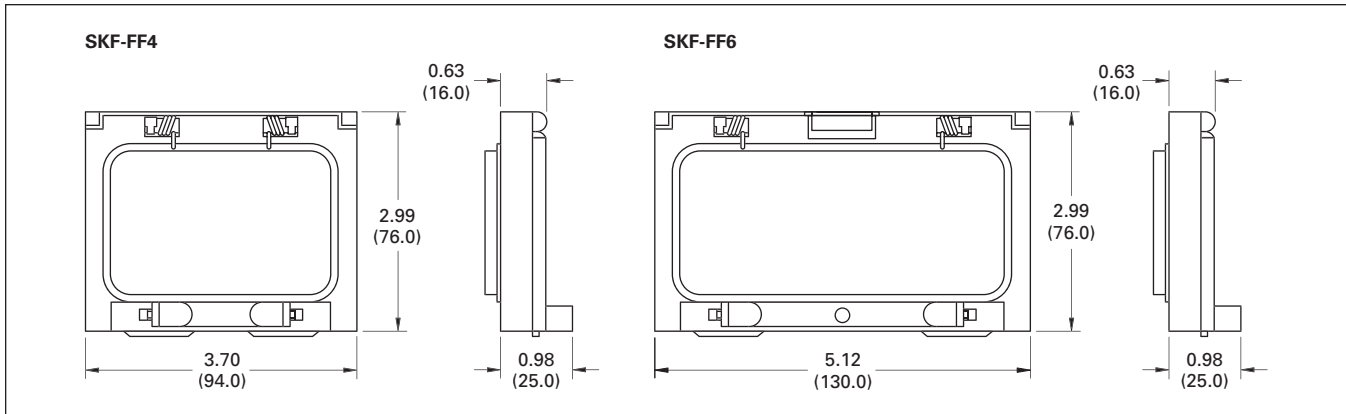


Figure 49-34. EZSKF-FF4 and EZSKF-FF6 Series Dimensions in Inches (mm), Drawing Number MD05013014E

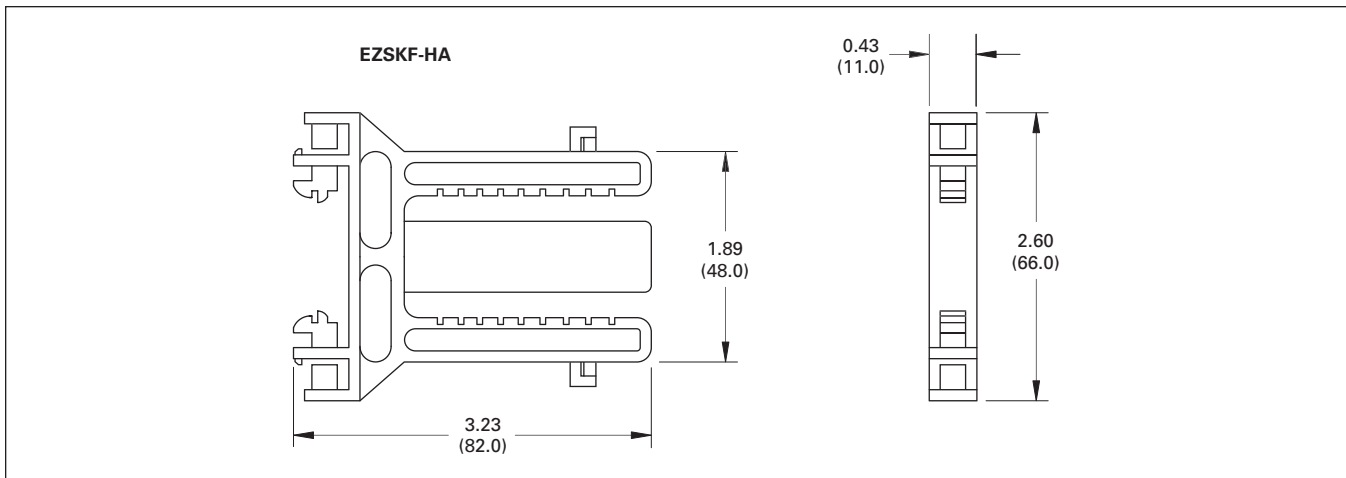


Figure 49-35. EZSKF-HA Series Dimensions in Inches (mm), Drawing Number MD05013015E

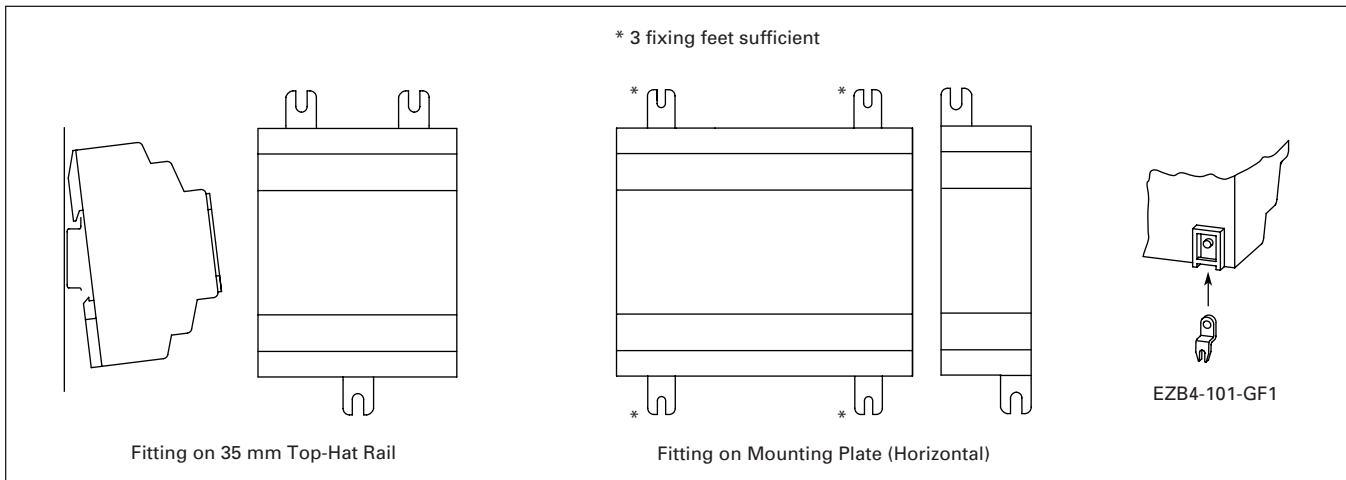
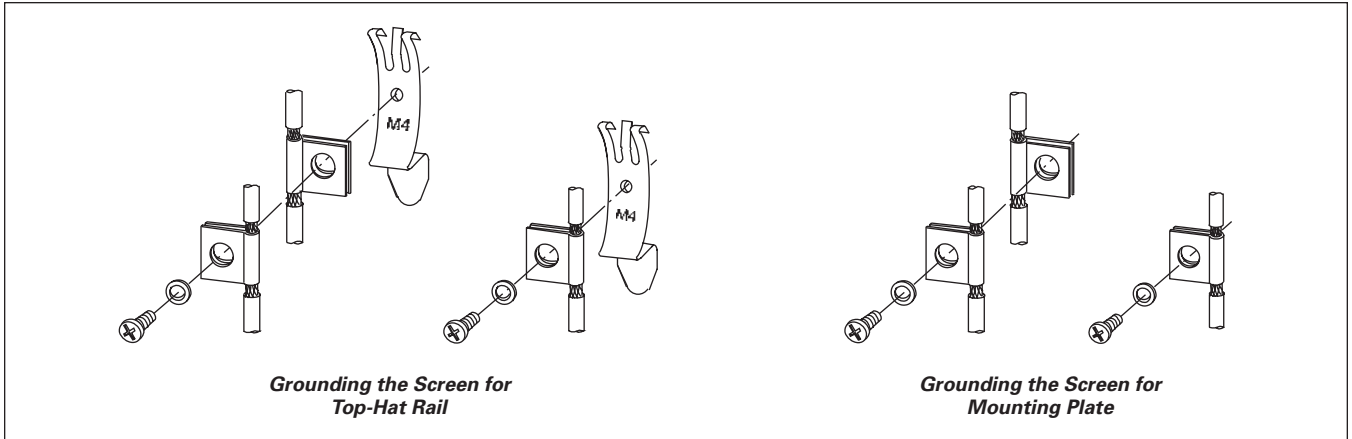
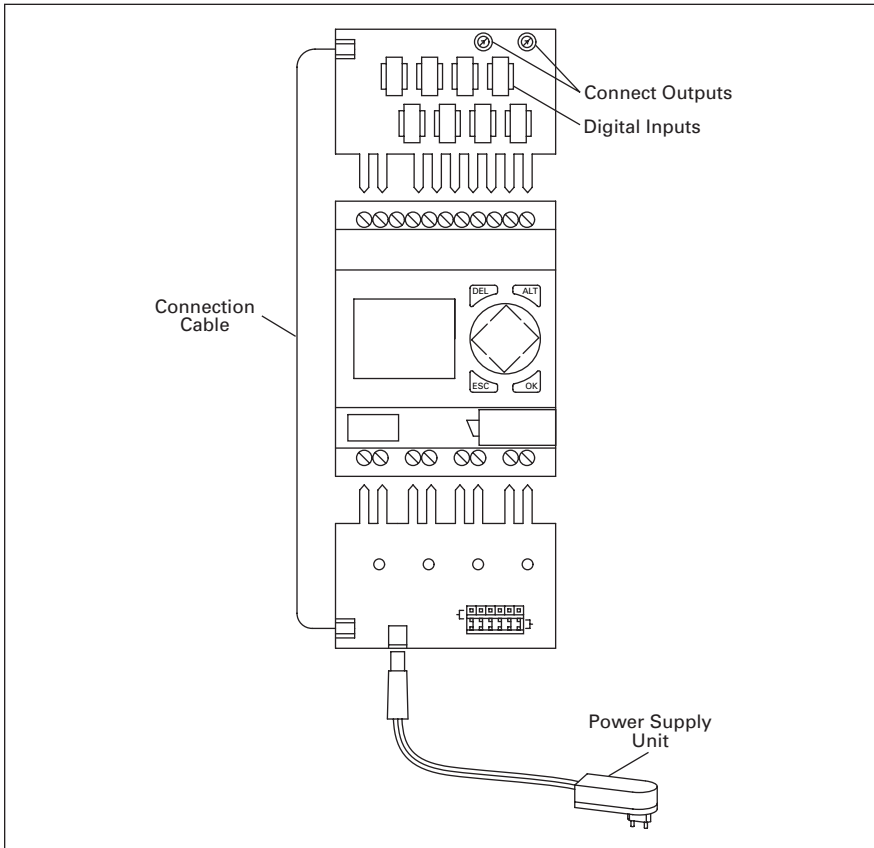


Figure 49-36. EZB4-101-GF1 Series



**Figure 49-37. EZB4-102-KS1 Series**



**Figure 49-38. EZ412-DC-SIM-NA Series**

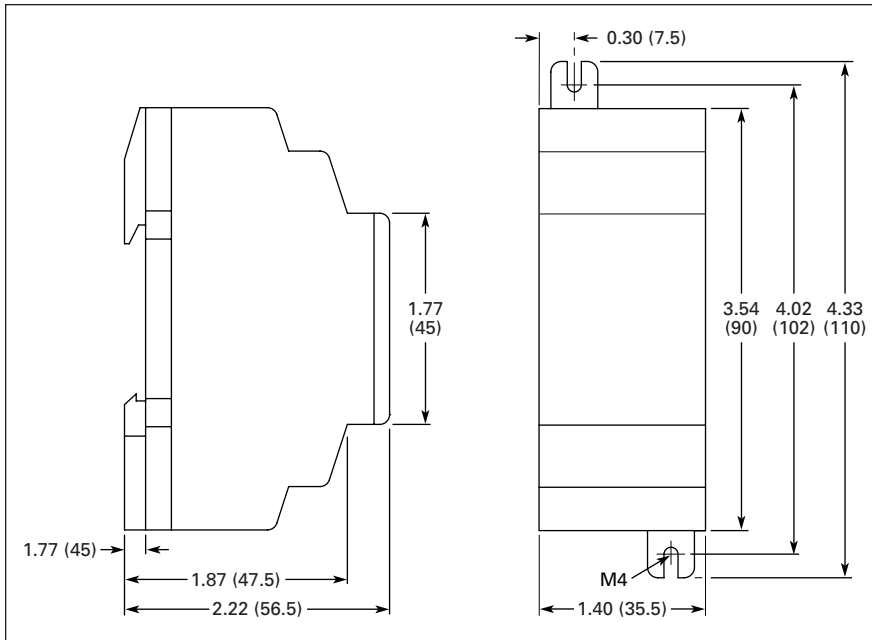


Figure 49-39. EZ256-HCI Dimensions in Inches (mm)

### Wiring Diagram

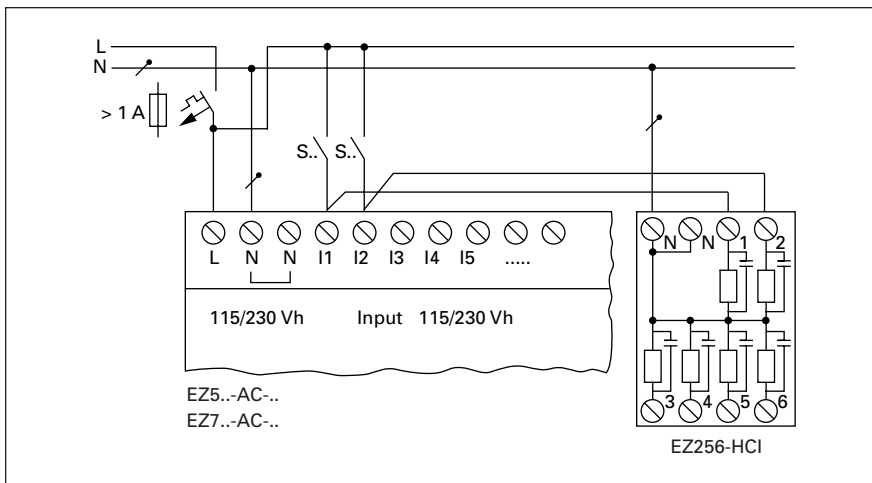


Figure 49-40. EZ256-HCI Wiring Diagram



**Selection Guide**

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*General Purpose Plug-In Relay*

**Selection Guide**

**General Purpose Relay Selection Characteristics**








- Current Rating: 1A – 30A
- Contact Arrangement: SPDT, DPDT, 3PDT, 4PDT, etc.
- Coil Voltage: 6V – 240V AC/ 6V – 110V DC
- Mounting Options: Socket, Flange, DIN Rail, Panel
- Specifications: CSA, CE, IEC, NEMA, UL, etc.
- Other: Physical Dimensions, Maximum Voltage, Mechanical/Electrical Life, etc.

**Table 49-41. General Purpose Plug-In Relays Selection Guide**

Relay Series	D2PF/D2PR		D3PF/D3PR		D4PR			
Approvals	RU CE SP		C RU US CE SP		RU CE SP			
Features	Polycarbonate Cover		Polycarbonate Cover		Polycarbonate Cover			
	Indicator Lamp and Pushbutton Available		Indicator Lamp and Pushbutton Available		Indicator Lamp Available			
	Panel, DIN and Flange Mounting		Panel and DIN Mounting		Panel and DIN Mounting			
	Latching		8 or 11 Pin Octal Plug-In		Socket Has Built-In Hold Down Spring			
		Latching (D3PR version)						
<b>Contact Data</b>								
Configuration	DPDT	DPDT Latching	4PDT	SPDT	DPDT	3PDT	SPDT	DPDT
Max. Allowable Load	D2PF: 10A at 120V AC D2PR: 5A at 240V AC	3A at 220V AC	3A at 240V AC	12A at 120V AC	12A at 120V AC	10A at 240V AC	10A at 250V AC	5A at 240V AC
Material	Ag (Au Flashed)			AgCdO (Au Flashed)		AgCdO		AgCdO
Resistance	50 Milliohms (Initial)			50 Milliohms (Initial)		100 Milliohms (Initial)		
Dielectric Strength	1500V			1500V		1500V		5000V
<b>Coil Data</b>								
AC	6 – 240V AC		24 – 240V AC (D3PF) / 6 – 240V AC (D3PR)		6 – 240V AC			
DC	6 – 110V DC		12 – 110V DC (D3PF) / 6 – 110V DC (D3PR)		6 – 110V DC			
Power VA (V AC) Watts (V DC)	1.2 VA 1.1 Watts		2.75 VA 1.2 Watts		0.9 VA 0.5 Watts			
<b>General Data</b>								
Ambient Temperature	-40 – 158°F (-40° – 70°C)		-49 – 131°F (-45° – 55°C)		-40 – 158°F (-40° – 70°C)		-40 – 158°F (-40° – 70°C)	
Operational Storage	-40 – 221°F (-40° – 105°C)		-40 – 221°F (-40° – 105°C)		-40 – 158°F (-40° – 70°C)		-40 – 158°F (-40° – 70°C)	
Maximum Pick-Up	20 / 25 Milliseconds		15 Milliseconds		15 Milliseconds			
Maximum Release	20 / 25 Milliseconds		10 Milliseconds		10 (AC)/5 (DC) Milliseconds			
Life Mechanical Operations Electrical Operations	10 Million 200,000		5 Million (D3PF) / 10 Million (D3PR) 200,000 (D3PF) / 100,000 (D3PR)		10 Million 100,000			
Page Number	Pages 49-35 – 49-42		Pages 49-43 – 49-48		Pages 49-49 – 49-51			

### Selection Guide

**Table 49-41. General Purpose Plug-In Relays Selection Guide (Continued)**

Relay Series												
	<b>D5PF/D5PR</b>	<b>D7PF/D7PR</b>	<b>D8PR</b>	<b>D9PR</b>								
<b>Approvals</b>												
<b>Features</b>	Polycarbonate Cover	Polycarbonate Cover	Dust Cover	Dust Cover								
	Indicator Lamp and Pushbutton Available	Indicator Lamp and Pushbutton Available	Panel, DIN and Flange Mounting	Pushbutton Available								
	Panel, DIN and PC Board Mounting	Panel, DIN and Flange Mounting	Quick-Connect and Screw Terminals	Panel Mounting Screw Terminals								
<b>Contact Data</b>												
Configuration	<b>SPDT</b>	<b>DPDT</b>	<b>3PDT</b>	<b>SPDT</b>	<b>DPDT</b>	<b>3PDT</b>	<b>4PDT</b>	<b>SPST-NO</b>	<b>DPST-NO</b>	<b>4PST</b>		
										<b>NO</b>	<b>NC</b>	
Max. Allowable Load	15A at 240V AC	15A at 240V AC	15A at 240V AC	20A at 277V AC	15A at 120V AC	15A at 120V AC	15A at 120V AC	30A at 220V AC	25A at 220V AC	25A at 220V AC	8A at 220V AC	
Material	AgCdO (Au Flashed)			AgCdO				AgCdO		AgCdO		
Resistance	50 Milliohms (Initial)			50 Milliohms (Initial)				50 Milliohms (Initial)		50 Milliohms (Initial)		
Dielectric Strength	1500V (D5PF) / 2000V (D5PR)			1000V(D7PF1, D7PF2, D7PF3) / 1500V				4000V		4000V		
<b>Coil Data</b>												
AC	24 – 110V AC (D5PF) 6 – 240V AC (D5PR)			6 – 240V AC				6 – 240V AC		24 – 240V AC		
DC	24 – 110V DC (D5PF) 6 – 110V DC (D5PR)			6 – 110V DC				12 – 24V DC		12 – 110V DC		
Power VA (V AC) Watts (V DC)	2.75 VA 1.2 Watts			3.0 VA (D7PF3, D7PF4) / 2.55 VA 2.3 Watts (D7PF1, D7PF2, D7PF4); 3.4 Watts (D7PF3) / 1.5 Watts				2.5 VA 1.9 Watts		2.6 VA 2.0 Watts		
<b>General Data</b>												
Ambient Temperature Operational Storage	-22 – 122°F (-30° – 50°C) -22 – 212°F (-30° – 100°C)			-40 – 158°F (-40° – 70°C) -40 – 212°F (-40° – 100°C)				-4 – 185°F (-20° – 85°C) -4 – 185°F (-20° – 85°C)		-13 – 140°F (-25° – 60°C) -13 – 140°F (-25° – 60°C)		
Maximum Pick-Up	24 Milliseconds			20 Milliseconds (D7PF1, D7PF4) 25 Milliseconds (All Others)				30 Milliseconds		50 Milliseconds		
Maximum Release	26 Milliseconds			20 Milliseconds / 25 Milliseconds				30 Milliseconds		50 Milliseconds		
Life Mechanical Operations Electrical Operations	5 Million  200,000 (D5PF) / 100,000 (D5PR)			10 Million  100,000 (D7PR3, D7PR4, D7PF1) 150,000 (D7PF3, D7PF4) 200,000 (D7PF2, D7PR1, D7PR2)				5 Million  100,000		1 Million  100,000		
<b>Page Number</b>	<b>49-52 – 49-55</b>			<b>Pages 49-56 – 49-66</b>				<b>Pages 49-67 – 49-70</b>		<b>Pages 49-71, 49-72</b>		

**D2PF Series**

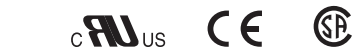


**D2PF Series Relay**

**Features**

- Flag indicator shows relay status in manual or powered condition
- Bi-polar 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 I.D. tag/write label used for identification of relays in multi-relay circuits

**Standards and Certifications**



When used with accompanying Cutler-Hammer® screw terminal socket.

**Technical Data and Specifications**

**Table 49-42. D2PF Coil Resistance**

Coil Voltage	Ohms	mA <sup>①</sup>
		50 Hz
6V AC	9.6	200
6V DC	40	150
12V AC	46	100
12V DC	160	75
24V AC	180	50
24V DC	650	37
48V DC	2600	18
110V DC	11000	10
120V AC	4430	10
240V AC	15700	5

① At 60 Hz for AC Coils.

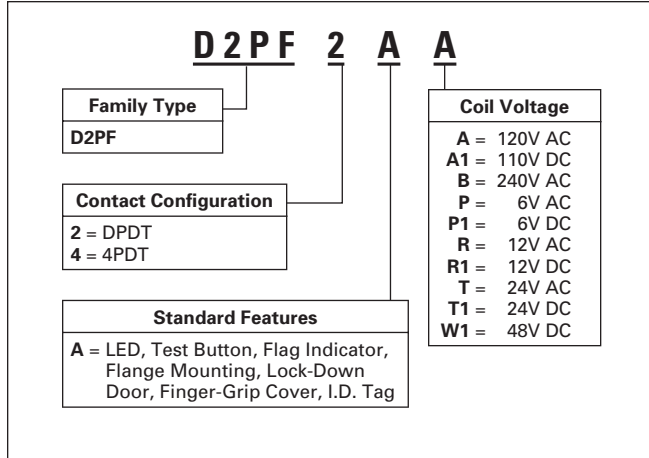
**Table 49-43. D2PF2 and D2PF4 Relay Specifications**

	D2PF2	D2PF4
	Resistive Load (p.f. = 1.0)	Inductive Load (p.f. = 1.0)
<b>Coil</b>		
Pickup Voltage (Max.)	85% AC; 80% DC (% of nominal)	
Drop Out Voltage (Min.)	10% AC; 10% DC (% of nominal)	
Maximum Voltage	110% of nominal	
Insulation System per UL Standard 1446	Class B 266°F (130°C)	
<b>Contacts</b>		
Rated Load	120V AC – 10A 277V AC, 28V DC – 8A (UL), 10A (CSA)	120V AC – 3A 277V AC, 28V DC – 3A
Maximum hp Ratings	1/3 hp, 120V AC 1 hp, 277V AC	1/10 hp, 120V AC 1/10 hp, 277V AC
Contact Material	Silver Tin Oxide (Gold Flashed)	Fine Silver, Gold Diffused
Pilot Duty	B300	
Utilization Category (IEC)	AC-15	
Min. Permissible Load	100mA @ 5V DC or 0.5W	
Contact Resistance	100 Milliohms Max. @ 6V, 1A	
<b>Dielectric Strength</b>		
Coil to Contacts	1500V RMS	
Across Open Contacts	1000V RMS	
Contacts to Frame	1500V RMS	
Insulation Resistance	100 Megohms Min. @ 500V DC	
<b>Temperature</b>		
Operating	-40 – 158°F (-40 – 70°C)	
Storage	-40 – 221°F (-40 – 105°C)	
<b>Life Expectancy</b>		
Electrical at Rated Resistive Load	200,000 Operations	
Mechanical at No Load	10 Million Operations	
<b>Weight</b>		
Approximate Weight	0.079 lbs. (36G)	0.081 lbs. (37G)

D2PF Series — Full Featured

Catalog Number Structure

Table 49-44. D2PF Series Catalog Numbering System ①



① For deciphering Catalog Numbers. Do not use for ordering as not all combinations are readily available.

Table 49-45. D2PF Relay/Socket Quick Reference

Relay Type	Socket	Socket Type	Hold Down Clip
D2PF2	D2PA6	Screw Terminal	PQC-1342
	D2PA7	Screw Terminal, Finger-Safe	Included with Socket
D2PF4	D2PA6	Screw Terminal	PQC-1342
	D2PA7	Screw Terminal, Finger-Safe	Included with Socket

Table 49-46. D2PF Socket Specifications

Catalog Number	Electrical Ratings	Mounting Torque	Hook-up Wire Range
D2PA6	10A, 300V	7 – 8 in-lbs. (0.79 – 0.90 Nm)	AWG 14 to 28 Solid or Stranded
D2PA7	10A, 300V	7 – 8 in-lbs. (0.79 – 0.90 Nm)	AWG 14 to 20 Solid or Stranded

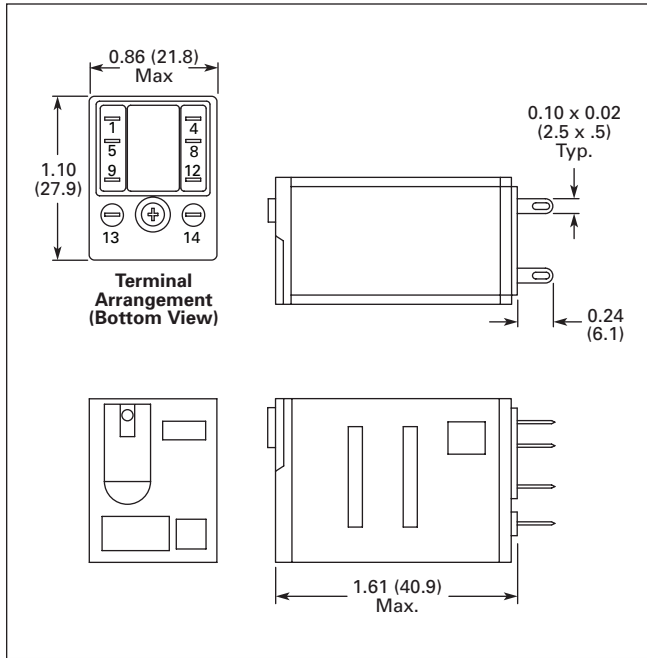
Product Selection

Table 49-47. D2PF Product Selection

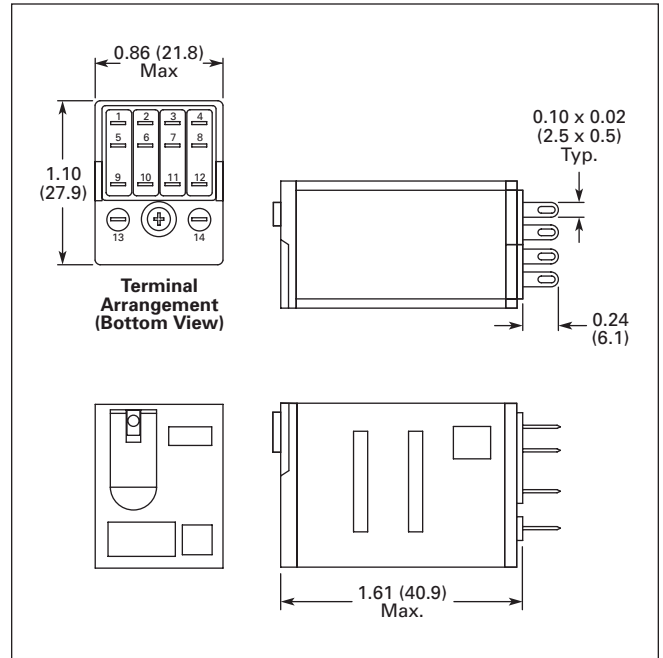
	Std. Pack	Catalog Number	Price U.S. \$
<b>DPDT</b>			
6V AC 6V DC		D2PF2AP D2PF2AP1	
12V AC 12V DC		D2PF2AR D2PF2AR1	
24V AC 24V DC		D2PF2AT D2PF2AT1	
48V DC		D2PF2AW1	
110V DC		D2PF2AA1	
120V AC		D2PF2AA	
240V AC		D2PF2AB	
<b>4PDT</b>			
6V AC		D2PF4AP	
12V AC 12V DC		D2PF4AR D2PF4AR1	
24V AC 24V DC		D2PF4AT D2PF4AT1	
48V DC		D2PF4AW1	
110V DC		D2PF4AA1	
120V AC		D2PF4AA	
240V AC		D2PF4AB	
<b>Sockets and Accessories</b>			
4-Pole DIN or Panel Mount Socket	10	D2PA6	
Hold Down Clip	10	PQC-1342	
4-Pole DIN or Panel Mount Socket — Finger-Safe	10	D2PA7	
DIN Rail End Stop ②	200	PPF-M	

② Additional end stop options available on Page 55-74.

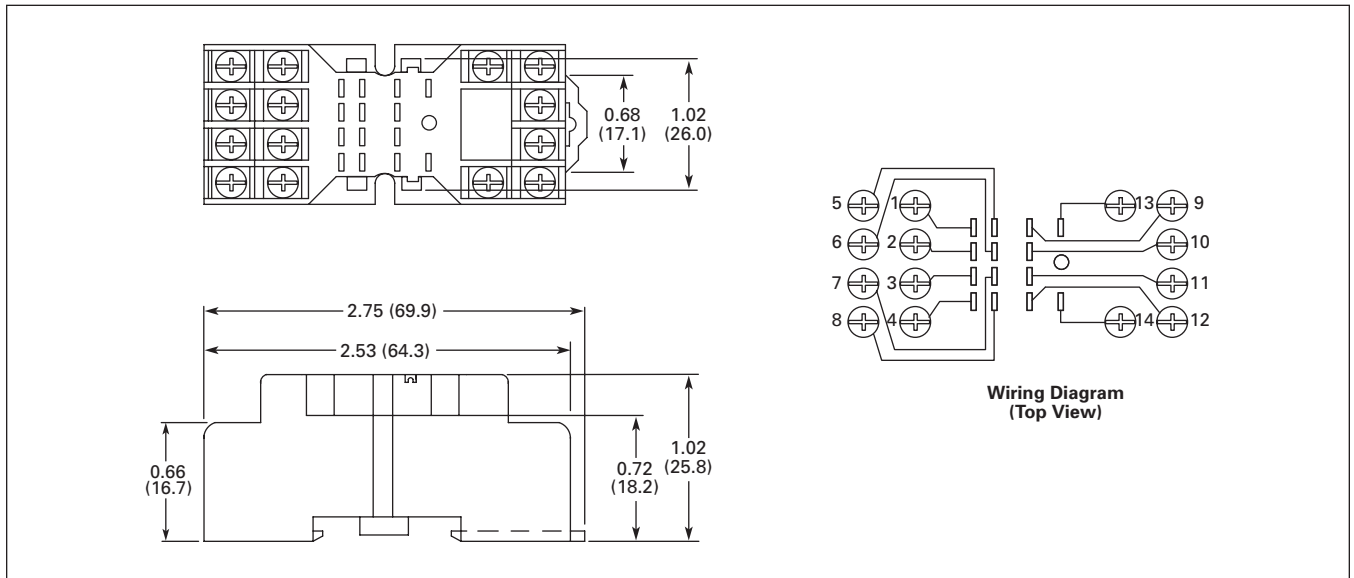
**Dimensions**



**Figure 49-41. D2PF2 — Approximate Dimensions in Inches (mm)**



**Figure 49-42. D2PF4 — Approximate Dimensions in Inches (mm)**



**Figure 49-43. D2PA6 — Approximate Dimensions in Inches (mm)**

D2PF Series — Full Featured

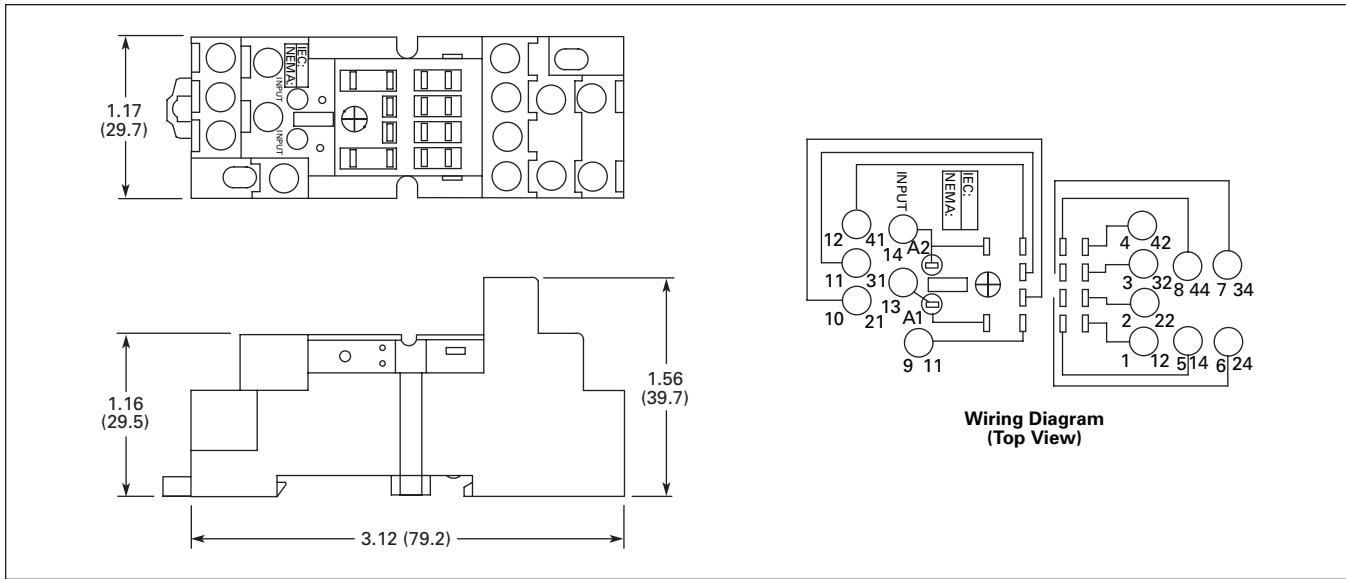


Figure 49-44. D2PA7 — Approximate Dimensions in Inches (mm)

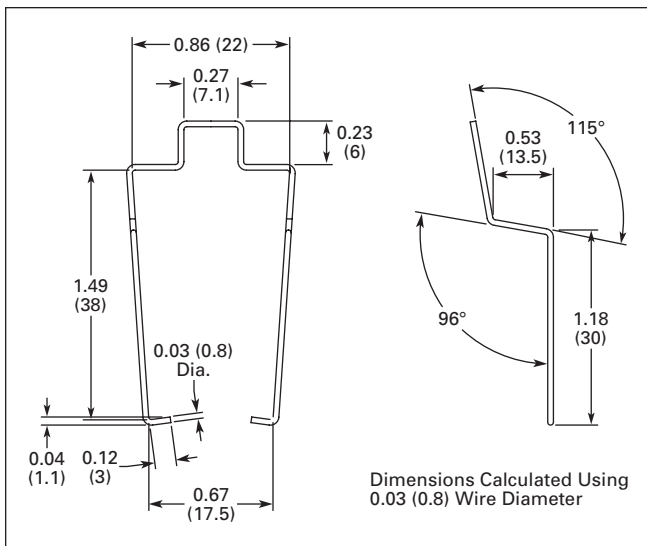


Figure 49-45. PQC-1342 — Approximate Dimensions in Inches (mm)

**D2PR Series — Standard**

**D2PR Series**





*D2PR Series Relay*

**Features**

- Ultra-high sensitivity relay with quick response
- Designed small, 2-pole type break 5A load and 4-pole type, 3A load
- High reliability, long life
- Panel, DIN rail and flange mounting
- Small size

**Standards and Certifications**

 File # E37317, E65657

 File # LR217017, LR217069



**Technical Data and Specifications**

**Table 49-48. D2PR Coil Resistance**

Coil Voltage	Ohms	mA	
		50 Hz	60 Hz
6V AC	11	234	200
12V AC	41	86.5	74
24V AC	180	48	41
48V AC	788	21	18
120V AC	4430	12.9	11
240V AC	15700	7	6
6V DC	40	150	
12V DC	160	75	
24V DC	650	36.9	
48V DC	2600	18.5	
110V DC	11000	10	

**Table 49-49. D2PR Socket Specifications**

Catalog Number	Electrical Ratings	Mounting Torque	Hook-Up Wire Range
D2PA4	7A, 250V	.785 Nm – 1.18 Nm	AWG 14 Max.
D2PA6	10A, 300V	7 – 8 in-lbs	AWG 14 to 28 Solid or Stranded

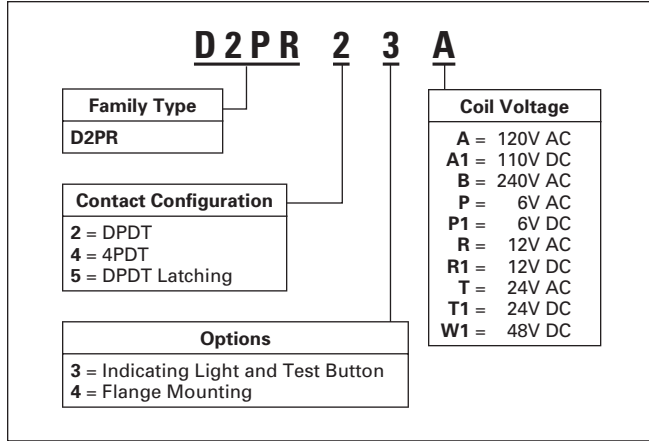
**Table 49-50. D2PR Relay Specifications**

	Resistive Load (p.f. = 1)	Inductive Load (p.f. = 0.4, L/R = 7 ms)
<b>D2PR2</b>		
Rated Load	240V AC 5A 30V DC 5A	240V AC 2A 30V DC 2A
Carry Current	5A	5A
Max. Operating Voltage	250V AC/125V DC	250V AC/125V DC
Max. Operating Current	5A	5A
Contact Material	Silver Cadmium Oxide	Silver Cadmium Oxide
Max. Switching Capacity	1100 VA 120W	440 VA 48W
Min. Permissible Load	100 mA, 5V DC	100 mA, 5V DC
Pickup Voltage (max.)	80% AC, 75% DC	80% AC, 75% DC
Drop Out Voltage (min.)	30% AC, 10% DC	30% AC, 10% DC
Voltage (max.)	110%	110%
Mechanical Life (min.)	10,000,000 operations	10,000,000 operations
Electrical Life @ All Contact Ratings (min.)	200,000 operations	200,000 operations
Maximum hp Ratings	1/6 hp (120V AC)	1/6 hp (120/240V AC)
<b>D2PR4</b>		
Rated Load	240V AC 3A 30V DC 3A	240V AC 0.8A 30V DC 1.5A
Carry Current	3A	3A
Max. Operating Voltage	250V AC/125V DC	250V AC/125V DC
Max. Operating Current	3A	3A
Contact Material	Ag (Au Flashed)	Ag (Au Flashed)
Max. Switching Capacity	660 VA 72W	176 VA 36W
Min. Permissible Load	1 mA, 1V DC	1 mA, 1V DC
Pickup Voltage (max.)	80%	80%
Drop Out Voltage (min.)	30% AC, 10% DC	30% AC, 10% DC
Voltage (max.)	110%	110%
Mechanical Life (min.)	10,000,000 operations	10,000,000 operations
Electrical Life @ All Contact Ratings (min.)	200,000 operations	200,000 operations
Maximum hp Ratings	1/10 hp (120/240V AC)	1/10 hp (120/240V AC)
<b>D2PR5</b>		
Rated Load	250V AC 5A 30V DC 5A	250V AC 2A 30V DC 2A
Carry Current	3A	3A
Max. Operating Voltage	250V AC/125V DC	250V AC/125V DC
Max. Operating Current	3A	3A
Contact Material	Ag (Au flashed)	Ag (Au flashed)
Max. Switching Capacity	660 VA 72W	176 VA 36W
Min. Permissible Load	100 mA, 1V DC	100 mA, 1V DC
Pickup Voltage (max.)	80%	80%
Drop Out Voltage (min.)	30% AC, 10% DC	30% AC, 10% DC
Set/Reset Voltage (max.)	80%	80%
Voltage (max.)	110%	110%
Mechanical Life (min.)	100 million operations	100 million operations
Electrical Life @ All Contact Ratings (min.)	200,000 operations	200,000 operations
Maximum hp Ratings	1/8 hp (265V AC)	1/8 hp (265V AC)

D2PR Series — Standard

Catalog Number Structure

Table 49-51. D2PR Series Catalog Numbering System ①



① For deciphering Catalog Numbers. Do not use for ordering as not all combinations are readily available.

Table 49-52. D2PR Relay/Socket Quick Reference

Relay Type	Socket	Hold Down Spring/Clip
D2PR2	D2PA6	PMC-A1
D2PR4	D2PA6	PMC-A1
D2PR5	D2PA4	PYC-A1

Product Selection

Table 49-53. D2PR Product Selection ②

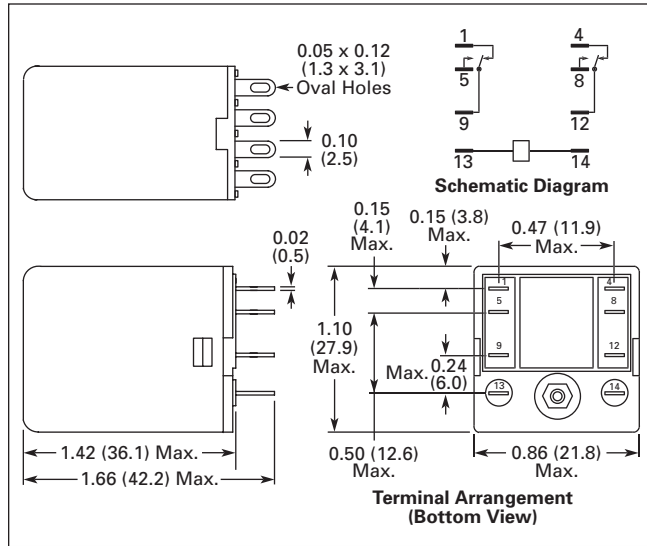
	Std. Pack	Catalog Number	Price U.S. \$
<b>Standard DPDT</b>			
Coil Voltage: 24V AC 110V AC 240V AC		D2PR2T D2PR2A D2PR2B	
12V DC 24V DC		D2PR2R1 D2PR2T1	
<b>DPDT with Indicating Light and Test Button</b>			
24V AC 110V AC 24V DC		D2PR23T D2PR23A D2PR23T1	
<b>DPDT Flange Mount</b>			
110V AC		D2PR24A	
<b>Standard 4PDT</b>			
Coil Voltage: 24V AC 110V AC		D2PR4T D2PR4A	
12V DC 24V DC 110V DC		D2PR4R1 D2PR4T1 D2PR4A1	
<b>4PDT with Indicating Light and Test Button</b>			
24V AC 110V AC		D2PR43T D2PR43A	
12V DC 24V DC 110V DC		D2PR43R1 D2PR43T1 D2PR43A1	
<b>4PDT Flange Mount</b>			
110V AC		D2PR44A	
<b>DPDT Latching</b>			
110V AC 24V DC		D2PR5A D2PR5T1	
<b>DIN Rail or Panel Mount Socket and Accessories</b>			
4-Pole Socket Spring Clip DIN Rail End Stop	10 100 100	D2PA6 PMC-A1 PFP-M	
<b>DIN Rail or Panel Mount Socket and Accessories for D2PR5 Latching Relays</b>			
4-Pole Socket Hold-Down Spring DIN Rail End Stop ③	10 100 100	D2PA4 PYC-A1 PFP-M	

② Additional coil voltages available — consult Sales Office or Customer Support Center.

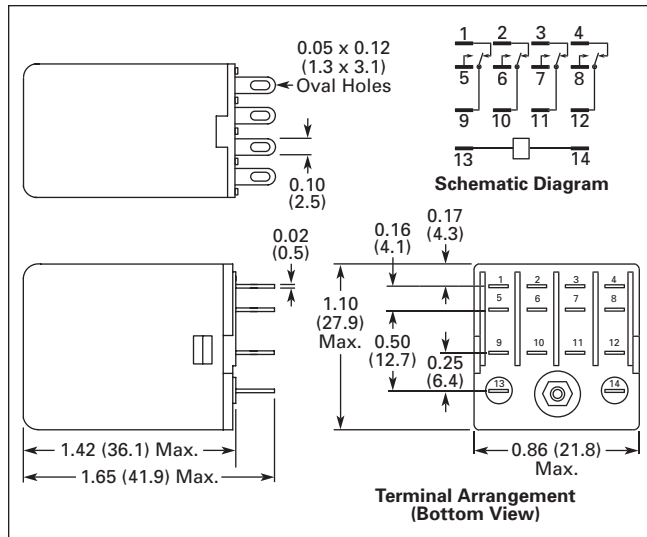
③ Additional end stop options available on Page 55-74.



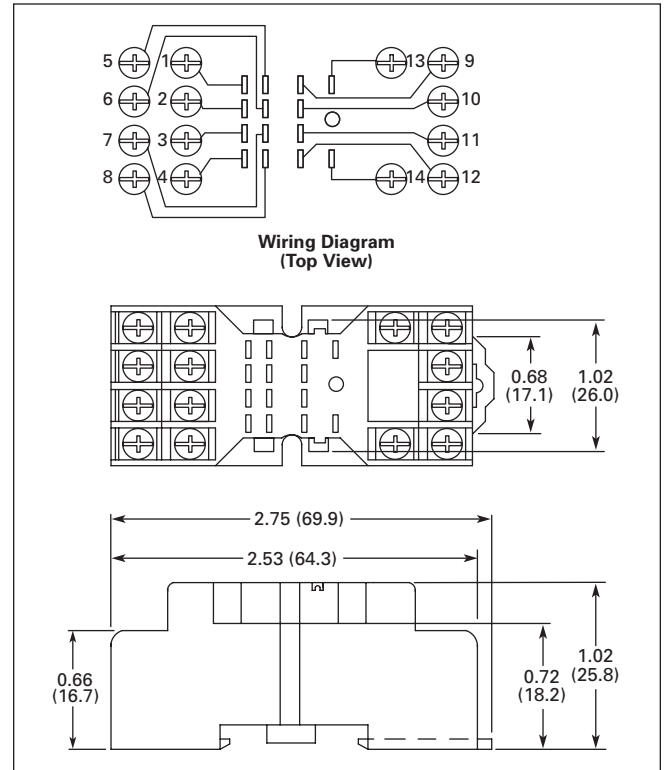
**Dimensions**



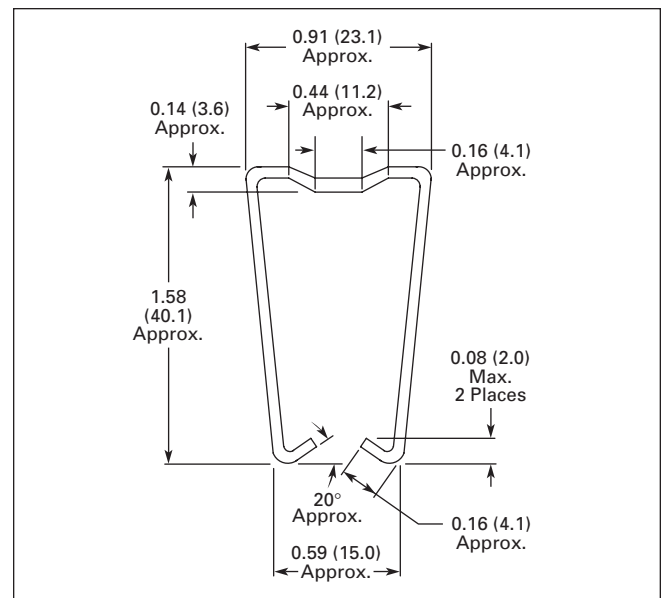
**Figure 49-46. D2PR2 — Approximate Dimensions in Inches (mm)**



**Figure 49-47. D2PR4/D2PR44 — Approximate Dimensions in Inches (mm)**



**Figure 49-48. D2PA6 — Approximate Dimensions in Inches (mm)**



**Figure 49-49. PMC-A1 Spring Clip for D2PA6**

D2PR Series — Standard

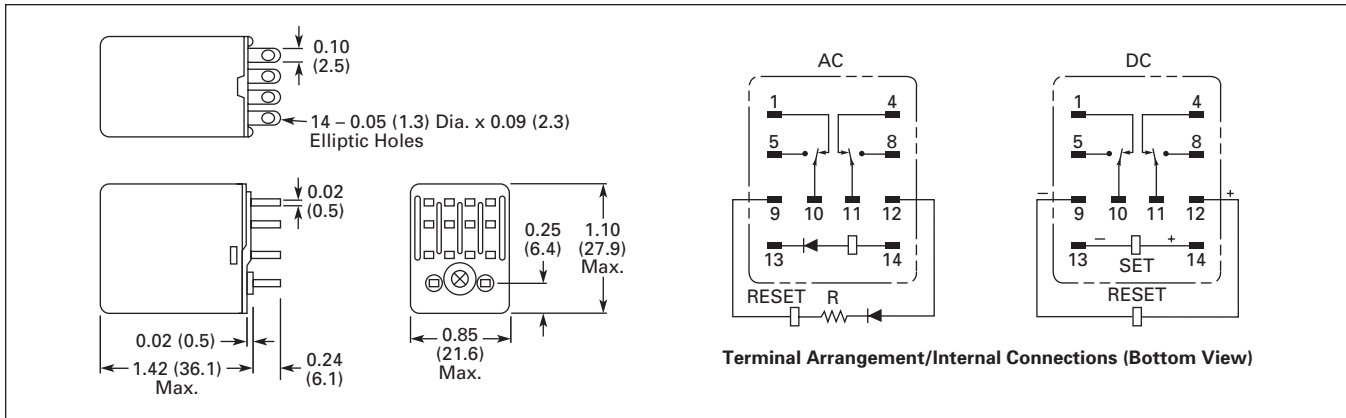


Figure 49-50. D2PR5 — Approximate Dimensions in Inches (mm)

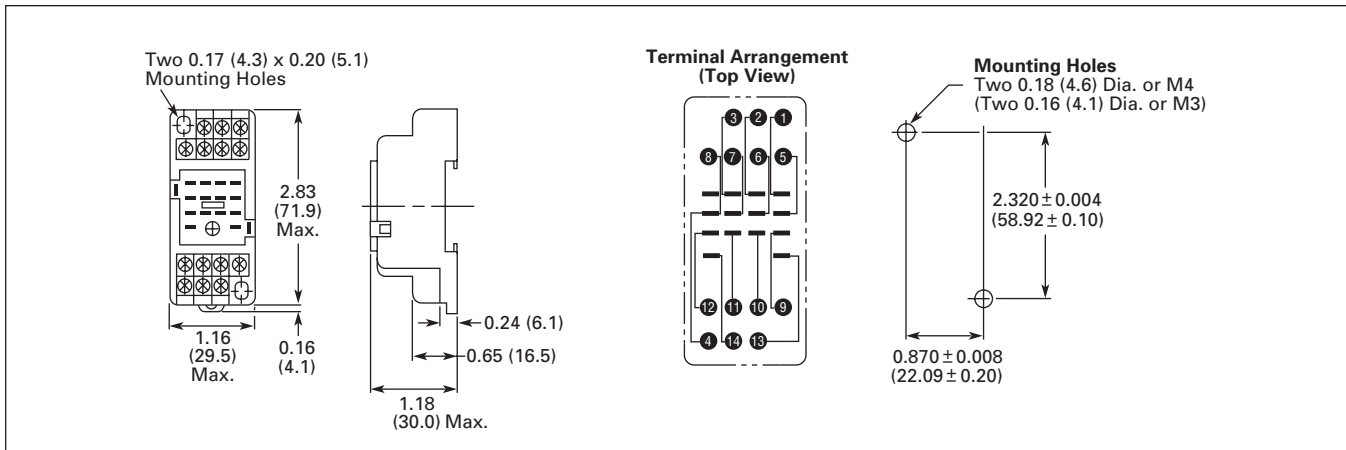


Figure 49-51. D2PA4 Socket for D2PR5 DPDT Latching Relays Only — Approximate Dimensions in Inches (mm)

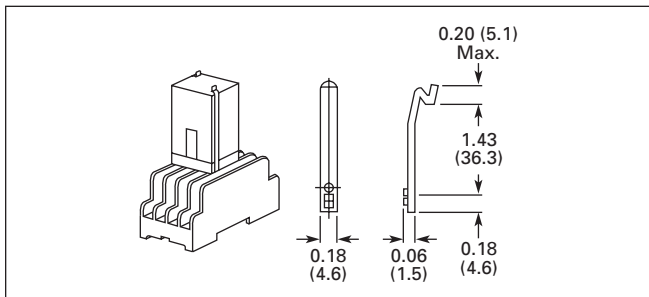


Figure 49-52. PYC-A1 Hold down Clip for D2PA4 Socket — Approximate Dimensions in Inches (mm)

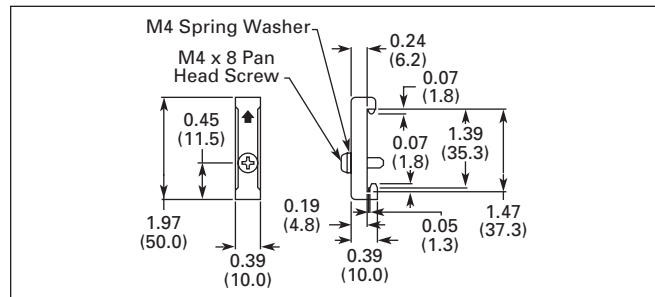


Figure 49-53. PFP-M DIN Rail End Stop — Approximate Dimensions in Inches (mm)

**D3PR/D3PF Series**



*D3 Series Relay*

**Features**

**D3PR**


- Compact relay capable of breaking relatively large load currents
- The contact operation can be easily checked by push-to-test button
- Panel and DIN rail mounting
- 8- or 11-pin octal plug-in

**D3PF**

- 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
- I.D. tag/write label to identify relays in multiple-relay circuits
- Bi-polar LED allows for reverse polarity applications

**Standards and Certifications**




 (CSA approval not applicable to D3PR5 Relays)


 When used with accompanying Cutler-Hammer® screw terminal socket (for D3PF only).

**Technical Data and Specifications**

**Table 49-54. Coil Resistance for D3PR Series**

Coil Voltage	Ohms		mA			
	D3PR2/PR3	D3PR5 – DC (Each Coil)	D3PR2/PR3 – AC		D3PR5 – AC	
			50 Hz	60 Hz	50 Hz	60 Hz
6V AC	4.2	—	550	458	—	—
12V AC	18	—	275	229	—	—
24V AC	72	52	137	114	13	11
120V AC	2200	1200	28	23	3.5	2.8
240V AC	7200	3200	13	11	1.7	1.6
6V DC	32	—	187		—	
12V DC	120	88	100		136	
24V DC	470	350	50		69	
48V DC	1900	—	25		—	
110V DC	10000	4000	11		27	

**Table 49-55. Coil Resistance for D3PF Series**

Coil Voltage	Ohms	mA	
		50 Hz	60 Hz
24V AC	72	398.0	340
120V AC	1,700	76.0	65
240V AC	7,200	28.0	24
12V DC	120	100.0	—
24V DC	470	49.9	—
110V DC	10,000	13.2	—

## D3PR/DP3F Series — Standard and Full Featured

Table 49-56. Relay Specifications

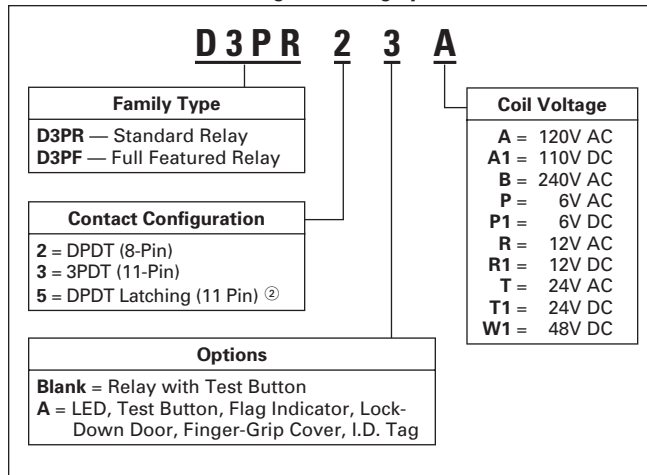
	D3PR2/D3PR3	D3PR2/D3PR3	D3PF2/D3PF3	D3PR5	D3PR5
	Resistive Load (p.f. = 1)	Inductive Load (p.f. = 0.4, L/R = 7 ms)	Resistive Load (p.f. = 1.0)	Resistive Load (p.f. = 1)	Inductive Load (p.f. = 0.4, L/R = 7 ms)
Rated Load	240V AC 10A 120V AC 12A 28V DC 10A	240V AC 7A 120V AC 7A 28V DC 7A	240V AC 12A 120V AC 12A 28V DC 12A	240V AC 10A 120V AC 12A 30V DC 10A	240V AC 7A 120V AC 7A 30V DC 7A
Carry Current	10A	10A	12 Amps	10A	10A
Max. Operating Voltage	240V AC/DC	240V AC/DC	110% of nominal	240V AC/DC	240V AC/DC
Contact Resistance	50 milli $\Omega$ 's Max. @ 10 Amps 120V AC or 24V DC	50 milli $\Omega$ 's Max. @ 10 Amps 120V AC or 24V DC	50 milli $\Omega$ 's Max. @ 10 Amps 120V AC or 24V DC	50 milli $\Omega$ 's Max. @ 10 Amps 120V AC or 24V DC	50 milli $\Omega$ 's Max. @ 10 Amps 120V AC or 24V DC
Dielectric Strength	1500V	1500V	1500V	1500V	1500V
Approx. Weight	3.5 oz (99.2g)	3.5 oz (99.2g)	3.1 oz (88g)	3.5 oz (99.2g)	3.5 oz (99.2g)
Temperature — Operating	-49 – 131°F (-45 – 55°C) AC -49 – 158°F (-45 – 70°C) DC	-49 – 131°F (-45 – 55°C) AC -49 – 158°F (-45 – 70°C) DC	-22 – 122°F (-30 – 50°C)	-49 – 131°F (-45 – 55°C) AC -49 – 158°F (-45 – 70°C) DC	-49 – 131°F (-45 – 55°C) AC -49 – 158°F (-45 – 70°C) DC
Storage	-40 – 221°F (-40 – 105°C)	-40 – 221°F (-40 – 105°C)	-22 – 212°F (-30 – 100°C)	-40 – 221°F (-40 – 105°C)	-40 – 221°F (-40 – 105°C)
Contact Material	AgCdO (Au Flashed)	AgCdO (Au Flashed)	AgCdO (Au Flashed)	AgCdO (Au Flashed)	AgCdO (Au Flashed)
Max. Switching Capacity	2500 VA 280W	1750 VA 196W	12 Amps	1100 VA 72W	440 VA 60W
Min. Permissible Load	100 mA @ 12V	100 mA @ 12V	100 mA	100 mA @ 12V	100 mA @ 12V
Pickup Voltage (max.)	80%	80%	85% AC; 80% DC	—	—
Drop Out Voltage (min.)	10%	10%	30% AC 10% DC	—	—
Set/Reset Voltage (max.)	—	—	—	80%	80%
Voltage (max.)	110%	110%	110%	110%	110%
Mechanical Life (min.)	10,000,000	10,000,000	5 million (No Load)	10,000,000	10,000,000
Electrical Life @ All Contact Ratings (min.)	100,000	100,000	200,000 operations at Rated Res. Load	100,000	100,000
Maximum hp Ratings	1/3 hp (120V AC) 1/2 hp (240V AC)	1/3 hp (120V AC) 1/2 hp (240V AC)	1/3 hp, 120V AC 1/2 hp, 240V AC	1/3 hp (120V AC) 1/2 hp (240V AC)	1/3 hp (120V AC) 1/2 hp (240V AC)

Table 49-57. Socket Specifications

Catalog Number	Electrical Ratings	Mounting Torque	Hook-Up Wire Range
D3PA2	10A, 600V 15A, 300V	8 – 10 in-lbs	AWG 12 to 22 Solid or Stranded
D3PA3-A2	5A, 600V 15A, 300V	8 – 10 in-lbs	AWG 12 to 22 Solid or Stranded
D3PA6	5A, 600V 16A, 300V	8 – 10 in-lbs	AWG 12 to 20 Solid or Stranded
D3PA7	5A, 600V 16A, 300V	8 – 10 in-lbs	AWG 12 to 20 Solid or Stranded
D3PA4	10A, 260V	N/A	AWG 14 Max.
D3PA5	10A, 260V	N/A	AWG 14 Max.

**Catalog Number Structure**

**Table 49-58. D3 Series Catalog Numbering System** ①



① For deciphering Catalog Numbers. Do not use for ordering as not all combinations are readily available.

② D3PR only.

**Table 49-59. Relay/Socket Quick Reference**

Relay Type	Socket Type	Socket	Hold Down Spring/Clip
D3PR2	8 Pin Octal	D3PA2 D3PA4 D3PA6	PQC-1344 Not Available PQC-1332
D3PF2	8 Pin Octal	D3PA2	PQC-1344
	8 Pin Octal — Finger-safe terminals	D3PA6	PQC-1332
D3PR3	11 Pin Octal	D3PA3-A2 D3PA5 D3PA7	PQC-1351 Not Available PQC-1332
D3PF3	11 Pin Octal	D3PA3-A2	PQC-1351
	11 Pin Octal — Finger-safe terminals	D3PA7	PQC-1332
D3PR5	11 Pin Octal	D3PA3-A2	PQC-1351
		D3PA5	Not Available
		D3PA7	PQC-1332

**Product Selection**

**Table 49-60. D3 Product Selection** ③

	Std. Pack	Catalog Number	Price U.S. \$
<b>Standard DPDT with Test Button</b>			
Coil Voltage:			
12V AC	1	D3PR2R	
24V AC	1	D3PR2T	
120V AC	1	D3PR2A	
240V AC	1	D3PR2B	
12V DC	1	D3PR2R1	
24V DC	1	D3PR2T1	
110V DC	1	D3PR2A1	
<b>DPDT Full Featured Relay</b>			
24V AC	1	D3PF2AT	
120V AC	1	D3PF2AA	
240V AC	1	D3PF2AB	
12V DC	1	D3PF2AR1	
24V DC	1	D3PF2AT1	
110V DC	1	D3PF2AA1	
<b>Standard 3PDT with Test Button</b>			
Coil Voltage:			
24V AC	1	D3PR3T	
120V AC	1	D3PR3A	
240V AC	1	D3PR3B	
12V DC	1	D3PR3R1	
24V DC	1	D3PR3T1	
110V DC	1	D3PR3A1	
<b>3PDT Full Featured Relay</b>			
24V AC	1	D3PF3AT	
120V AC	1	D3PF3AA	
240V AC	1	D3PF3AB	
24V DC	1	D3PF3AT1	
110V DC	1	D3PF3AA1	
<b>DPDT Latching</b> ⑤			
24V AC	1	D3PR5T	
120V AC	1	D3PR5A	
<b>DIN Rail Sockets</b>			
2-Pole (8-Pin)	10	D3PA2	
2-Pole (8-Pin) Finger-Safe ⑥	1	D3PA6	
3-Pole (11-Pin)	10	D3PA3	
3-Pole (11-Pin) Finger-Safe ⑥	1	D3PA7	
<b>Panel Mount Sockets</b>			
2-Pole	10	D3PA4	
3-Pole	10	D3PA5	
<b>Accessories</b>			
Hold Down Clip	10	PQC-1344	
Hold Down Clip	25	PQC-1332	
Hold Down Clip	10	PQC-1351	
Hold Down Clip	100	PWC-1325	
Coil Buss Jumper for D3PA6 & D3PA7	25	D3PJ1	
DIN Rail End Stop ④	100	PPF-M	

③ Additional coil voltages available — consult Sales Office or Customer Support Center.

④ Dimensions on **Page 49-51**.

⑤ CSA approval is not applicable to D3PR5 Latching Relays.

⑥ IP20 Rated.

## D3PR/DP3F Series — Standard and Full Featured

### Dimensions

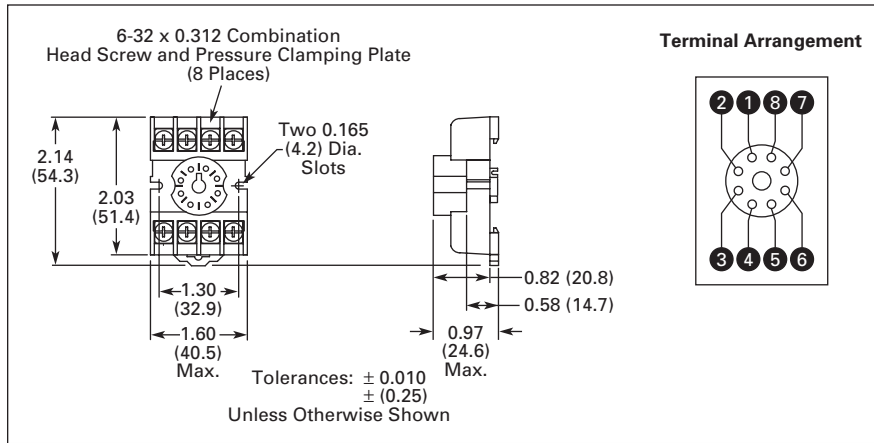


Figure 49-54. D3PA2 — Approximate Dimensions in Inches (mm)

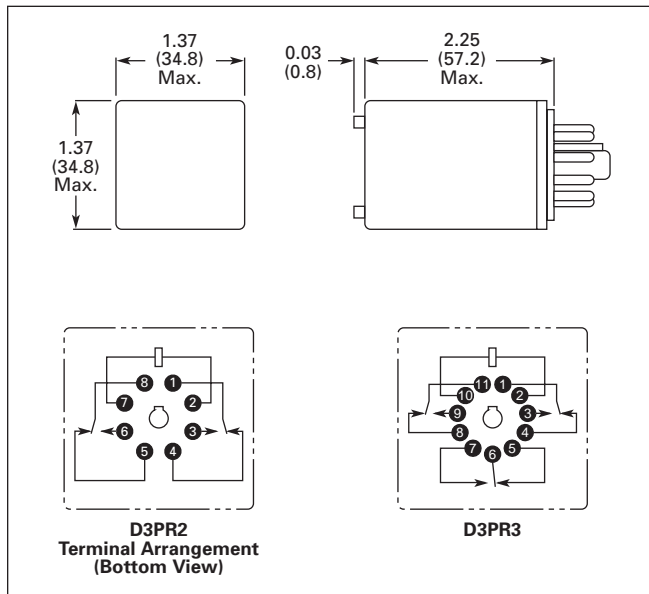


Figure 49-55. D3PR2/D3PR3 — Approximate Dimensions in Inches (mm)

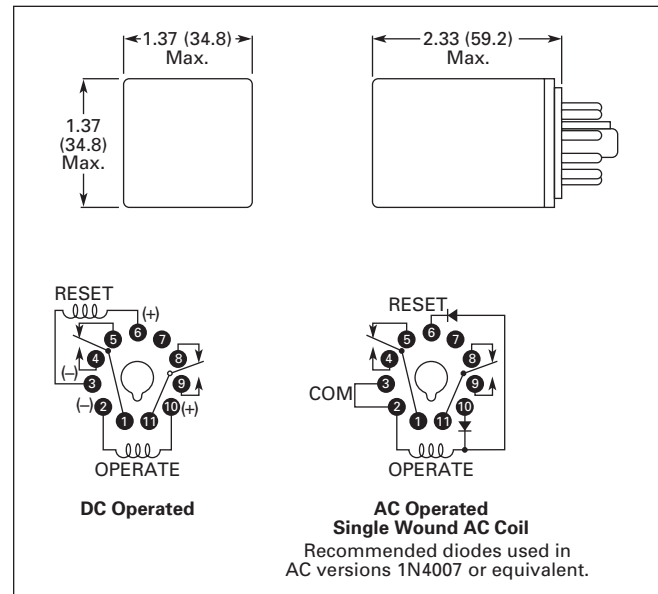


Figure 49-56. D3PR5 — Approximate Dimensions in Inches (mm)

49

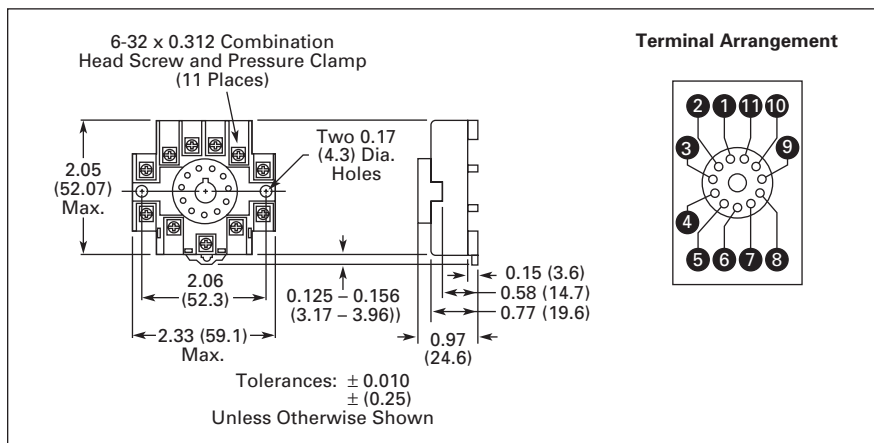
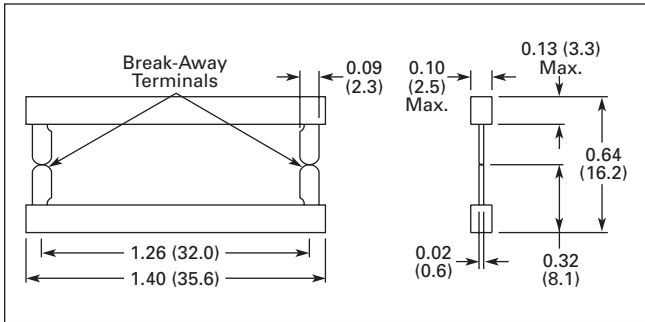


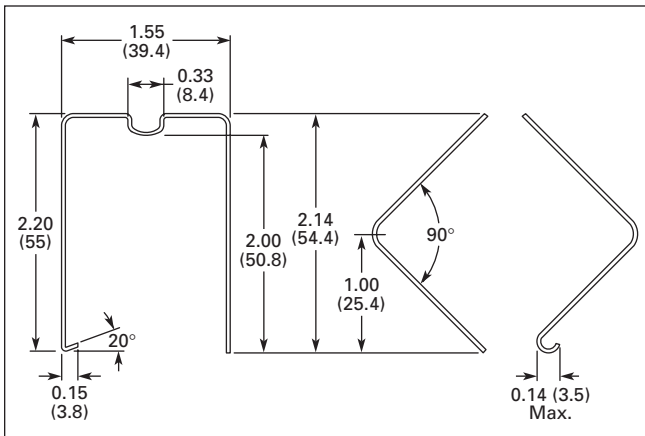
Figure 49-57. D3PA3-A2 — Approximate Dimensions in Inches (mm)



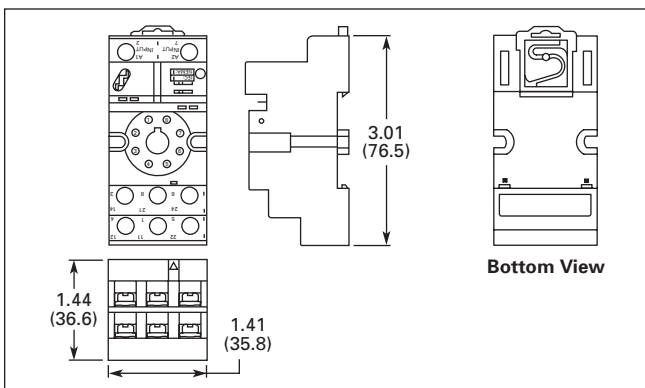
**D3PJ1**



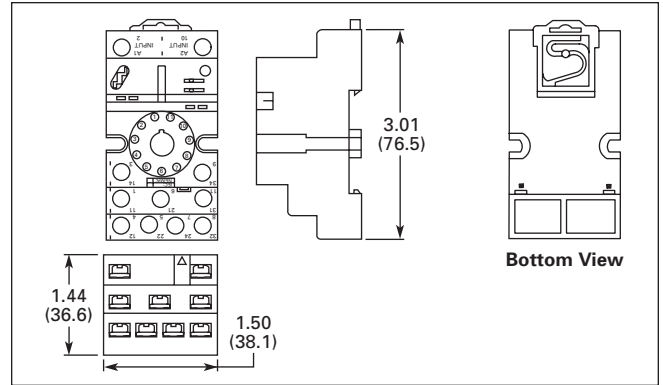
**Figure 49-58. D3PJ1 — Approximate Dimensions in Inches (mm)**



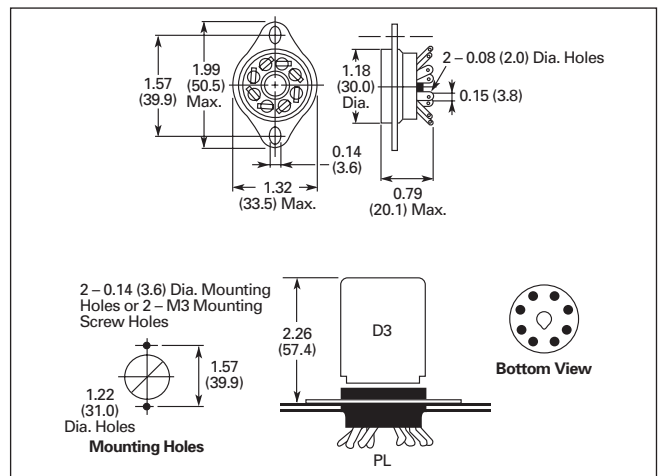
**Figure 49-59. PQC-1332 — Approximate Dimensions in Inches (mm)**



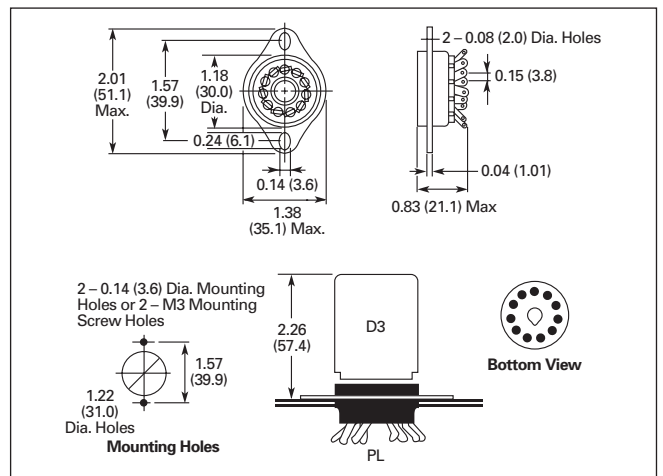
**Figure 49-60. D3PA6 — Approximate Dimensions in Inches (mm)**



**Figure 49-61. D3PA7 — Approximate Dimensions in Inches (mm)**



**Figure 49-62. D3PA4 — Approximate Dimensions in Inches (mm)**



**Figure 49-63. D3PA5 — Approximate Dimensions in Inches (mm)**

D3PR/DP3F Series — Standard and Full Featured

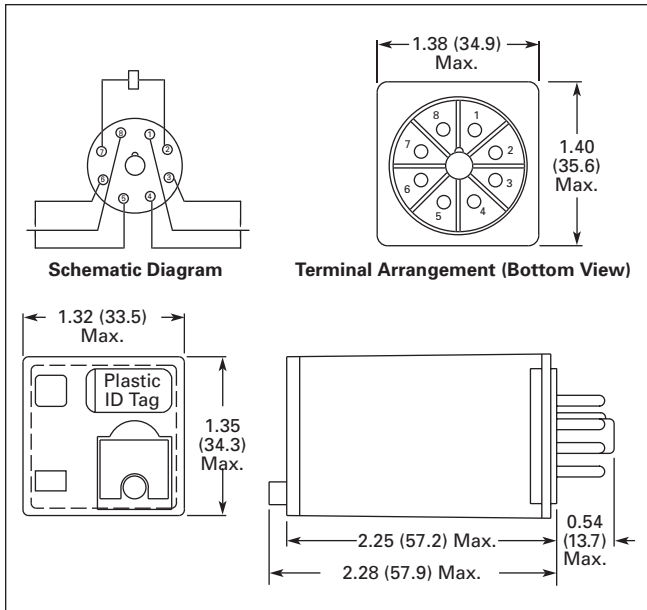


Figure 49-64. D3PF2 — Approximate Dimensions in Inches (mm)

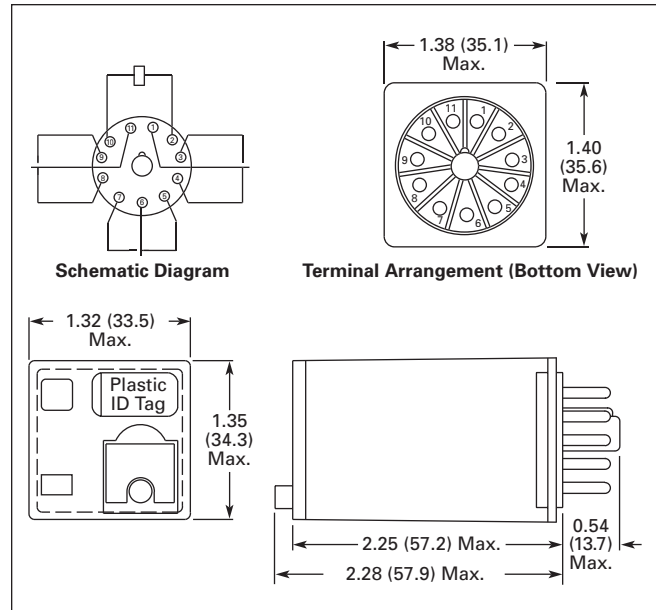


Figure 49-65. D3PF3 — Approximate Dimensions in Inches (mm)



**D4 Series — Standard**

**D4 Series**



*D4 Series Relay*

**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
- 

**Technical Data and Specifications**

**Table 49-61. Coil Resistance**

Coil Voltage	Ohms	mA
		@ 60 Hz AC
6V AC	16	150
12V AC	65	75
24V AC	260	37.5
48V AC	1130	18
110/120V AC	6500	7.5
220/240V AC	30000	3.8
6V DC	68	88.2
12V DC	275	43.6
24V DC	1100	21.8
48V DC	4170	11.5
100/110V DC	22900	4.8

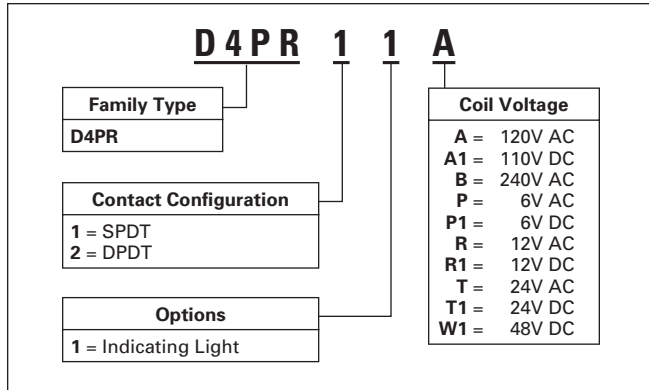
**Table 49-62. Specifications**

	<b>D4PR1</b>		<b>D4PR2</b>	
	<b>Resistive Load (p.f. = 1)</b>	<b>Inductive Load (p.f. = 0.4, L/R = 7 ms)</b>	<b>Resistive Load (p.f. = 1)</b>	<b>Inductive Load (p.f. = 0.4, L/R = 7 ms)</b>
Rated Load	250V AC 10A 30V DC 10A	250V AC 7.5A 30V DC 5A	240V AC 5A 30V DC 5A	250V AC 2A 30V DC 3A
Carry Current	10A	10A	5A	5A
Max. Operating Voltage	380V AC/125V DC	380V AC/125V DC	380V AC/125V DC	380V AC/125V DC
Max. Operating Current	10A	10A	5A	5A
Contact Material	AgCdO	AgCdO	AgCdO	AgCdO
Max. Switching Capacity	2500 VA 300W	1875 VA 150W	1250 VA 150W	500 VA 90W
Min. Permissible Load	100 mA, 5V DC	100 mA, 5V DC	10 mA, 5V DC	10 mA, 5V DC
Pickup Voltage (max.)	80% AC/70% DC	80% AC/70% DC	80% AC/70% DC	80% AC/70% DC
Drop Out Voltage (min.)	30% AC/15% DC	30% AC/15% DC	30% AC/15% DC	30% AC/15% DC
Voltage (max.)	110%	110%	110%	110%
Mechanical Life (min.)	10,000,000 AC/20,000,000 DC	10,000,000 AC/20,000,000 DC	10,000,000 AC/20,000,000 DC	10,000,000 AC/20,000,000 DC
Electrical Life @ All Contact Ratings (min.)	100,000	100,000	100,000	100,000
Maximum hp Ratings	1/3 hp (125V AC) 1/2 hp (250V AC) 1/2 hp (277V AC)	1/3 hp (125V AC) 1/2 hp (250V AC) 1/2 hp (277V AC)	1/6 hp (120V AC) 1/3 hp (240V AC) 1/3 hp (265V AC)	1/6 hp (120V AC) 1/3 hp (240V AC) 1/3 hp (265V AC)

D4 Series — Standard

Catalog Number Structure

Table 49-63. D4 Series Catalog Numbering System ①



① For deciphering Catalog Numbers. Do not use for ordering as not all combinations are readily available.

Table 49-64. Relay/Socket Quick Reference

Relay Type	Socket	Hold Down Clip
D4PR1	D4PA1	②
D4PR2	D4PA2	②

② Socket has built-in hold down spring.

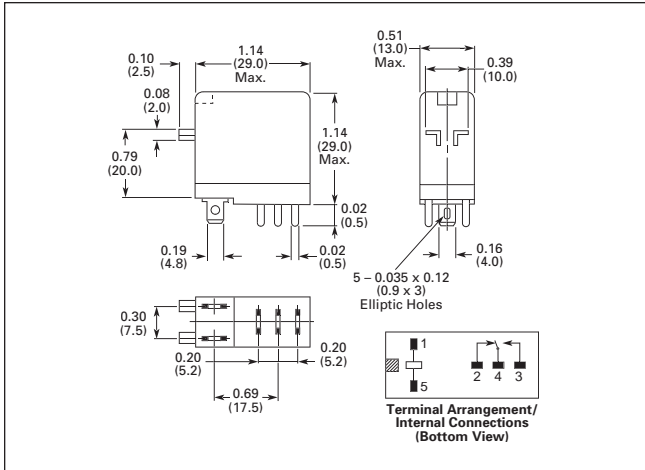
Product Selection

Table 49-65. D4 Product Selection ③

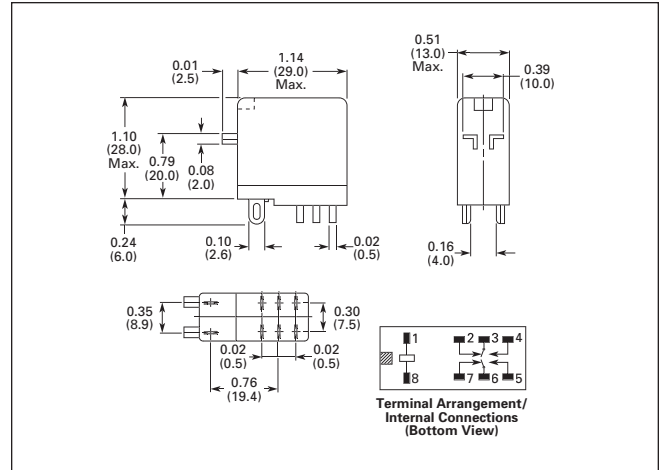
	Std. Pack	Catalog Number	Price U.S. \$
<b>Standard SPDT</b>			
Coil Voltage:			
24V AC		D4PR1T	
120V AC		D4PR1A	
24V DC		D4PR1T1	
<b>SPDT with Indicating Light</b>			
24V AC		D4PR11T	
120V AC		D4PR11A	
24V DC		D4PR11T1	
<b>Standard DPDT</b>			
24V AC		D4PR2T	
120V AC		D4PR2A	
12V DC		D4PR2R1	
24V DC		D4PR2T1	
<b>DPDT with Indicating Light</b>			
120V AC		D4PR21A	
24V DC		D4PR21T1	
<b>DIN Rail Sockets</b>			
1-Pole	10	D4PA1	
2-Pole	10	D4PA2	
<b>Accessories</b>			
DIN Rail End Stop	100	PPF-M	

③ Additional coil voltages available — consult Sales Office or Customer Support Center.

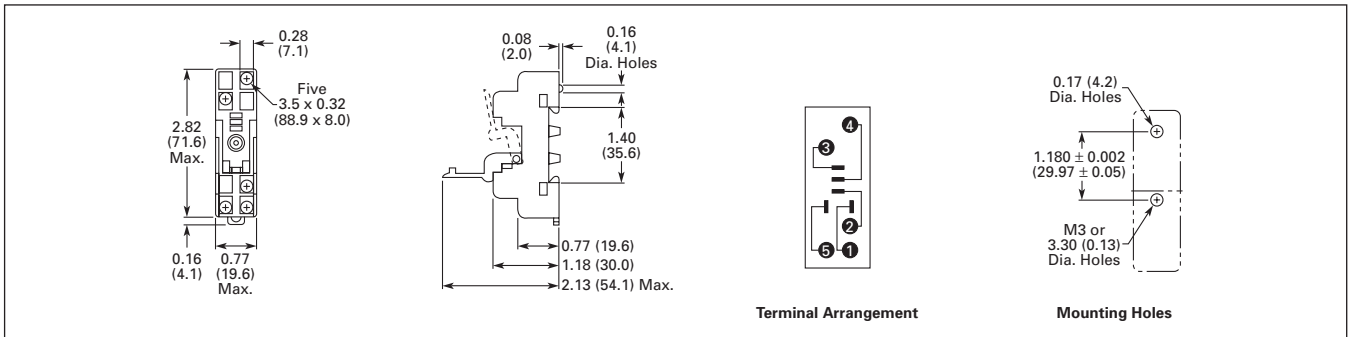
**Dimensions**



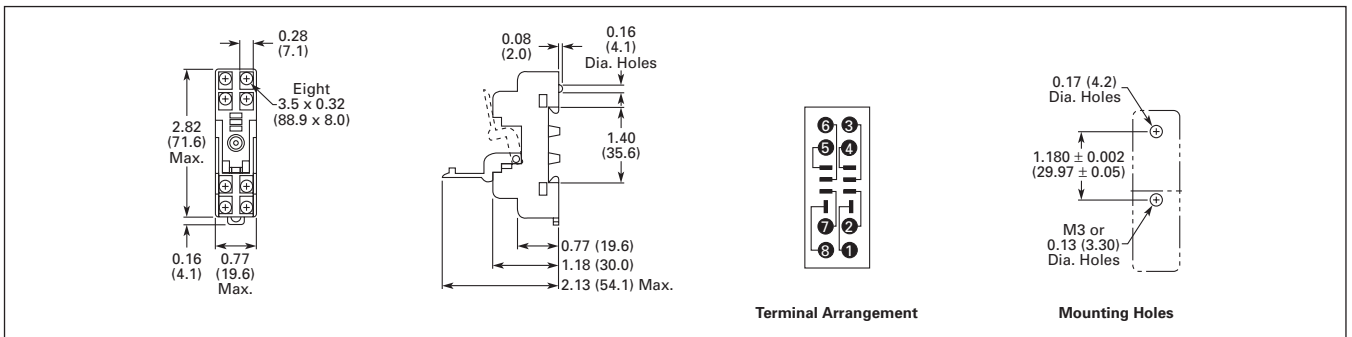
**Figure 49-66. D4PR1 — Approximate Dimensions in Inches (mm)**



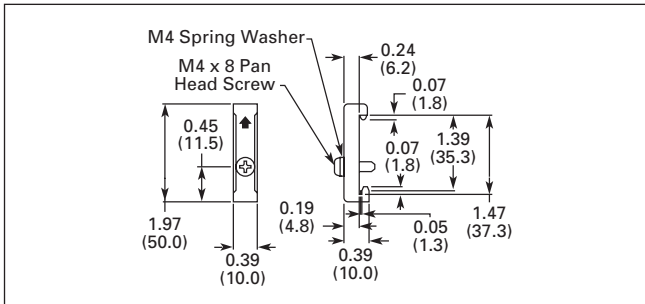
**Figure 49-67. D4PR2 — Approximate Dimensions in Inches (mm)**



**Figure 49-68. D4PA1 — Approximate Dimensions in Inches (mm)**



**Figure 49-69. D4PA2 — Approximate Dimensions in Inches (mm)**



**Figure 49-70. PFP-M DIN Rail End Stop — Approximate Dimensions in Inches (mm)**

## D5PR/D5PF Series



D5 Series Relay

## Features

## D5PR

- Industrial rated 300V, 15A relay in 2-pole and 3-pole configurations
- Compact design can be panel or DIN rail mounted

## D5PF

- 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
- I.D. tag/write label to identify relays in multiple-relay circuits
- Bi-polar LED allows for reverse polarity applications

## Standards and Certifications



When used with accompanying Cutler-Hammer® screw terminal socket (D5PF only).

## Technical Data and Specifications

Table 49-66. Coil Resistance for D5PR Series

Coil Voltage	Ohms		mA	
	D5PR2	D5PR3	D5PR2	D5PR3
6V AC	6	4.2	330	458
12V AC	24	18	160	229
24V AC	85	72	80	114
48V AC	330	290	40	57
120V AC	2250	700	16.6	23
240V AC	9100	7200	8.3	11
6V DC	32		187	
12V DC	120		100	
24V DC	470		50	
48V DC	1900		25	
110V DC	10000		11	

Table 49-67. Coil Resistance for D5PF Series

Coil Voltage	Ohms	mA	
		50 Hz	60 Hz
24V AC	72	398.0	340
120V AC	1,700	76.0	65
240V AC	7,200	28.0	24
12V DC	120	100.0	—
24V DC	470	49.9	—
110V DC	10,000	13.2	—

Table 49-68. Socket Specifications

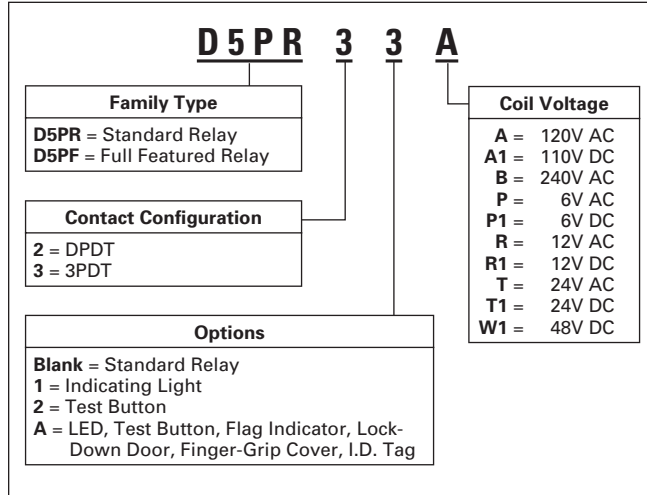
Catalog Number	Electrical Ratings	Mounting Torque	Hook-Up Wire Range
D5PA2	15A, 300V	8 – 10 in-lbs	AWG 12 to 22 Solid or Stranded
D5PA3L D5PA3S	15A, 300V	—	Up to AWG 16 Solid or Stranded

Table 49-69. Relay Specifications

	D5PR (AC)	D5PR (DC)	D5PF2/D5PF3 Resistive Load (p.f. = 1.0)
Rated Load (p.f. = 0.8)	120V AC 15A or 1/3 Hp 240V AC 15A or 1/2 Hp	28V DC, 13A, (1-Pole) 28V DC, 12A, (2-Pole) 28V DC, 11A, (3-Pole)	240V AC 12A 120V AC 12A 28V DC 12A
Carry Current	15A	15A	12A
Max. Operating Voltage	600V AC (3A max.)	125V DC (0.5A max.)	110% of nominal
Max. Operating Current	15A	15A	15A
Dielectric Strength	2000V	2000V	1500V
Approx. Weight	3.1 oz (88g)	3.1 oz (88g)	3.1 oz (88g)
Temperature — Operating Storage	-22 – 122°F (-30 – 50°C) -22 – 212°F (-30 – 100°C)	-22 – 149°F (-30 – 65°C) -22 – 212°F (-30 – 100°C)	-22 – 122°F (-30 – 50°C) -22 – 212°F (-30 – 100°C)
Contact Resistance	50 milli Ω's Max. @ Rated Current	50 milli Ω's Max. @ Rated Current	50 milli Ω's Max. @ Rated Current
Contact Material	AgCdO (Au Flashed)	AgCdO (Au Flashed)	AgCdO (Au Flashed)
Pickup Voltage	85% of Nominal	80% of Nominal	85% AC 80% DC
Dropout Voltage (min.)	10%	10%	30% AC 10% DC
Voltage (max.)	110%	110%	110%
Mechanical Life (min.)	5,000,000	5,000,000	5 million (No Load)
Electrical Life (min.)	100,000	100,000	200,000 operations at Rated Res. Load
Max. hp Ratings	1/3 hp, 120V AC 1/2 hp, 240V AC	1/3 hp, 120V AC 1/2 hp, 240V AC	1/3 hp, 120V AC 1/2 hp, 240V AC

**Catalog Number Structure**

**Table 49-70. D5 Series Catalog Numbering System** ①



① For deciphering Catalog Numbers. Do not use for ordering as not all combinations are readily available.

**Table 49-71. Relay/Socket Quick Reference**

Relay Type	Socket Type	Socket	Hold Down Spring
D5PR2	11 Pin Screw	D5PA2	D5PB2
	11 Pin Solder	D5PA3S or D5PA3L	D5PB2
D5PR3	11 Pin Screw	D5PA2	D5PB2
	11 Pin Solder	D5PA3S or D5PA3L	D5PB2
D5PF2/D5PF3	11 Pin Screw	D5PA2	PQC-1351
	11 Pin Solder	D5PA3S or D5PA3L	PWC-1325

**Product Selection**

**Table 49-72. D5 Product Selection** ②

	Std. Pack	Catalog Number	Price U.S. \$
<b>DPDT</b>			
Coil Voltage:			
24V AC	—	D5PR2T	
120V AC	—	D5PR2A	
240V AC	—	D5PR2B	
12V DC	—	D5PR2R1	
24V DC	—	D5PR2T1	
110V DC	—	D5PR2A1	
<b>DPDT with Indicating Light</b>			
120V AC	—	D5PR21A	
<b>DPDT with Test Button</b>			
120V AC	—	D5PR22A	
<b>3PDT</b>			
24V AC	—	D5PR3T	
120V AC	—	D5PR3A	
240V AC	—	D5PR3B	
12V DC	—	D5PR3R1	
24V DC	—	D5PR3T1	
110V DC	—	D5PR3A1	
<b>3PDT with Indicating Light</b>			
120V AC	—	D5PR31A	
24V DC	—	D5PR31T1	
<b>3PDT with Test Button</b>			
120V AC	—	D5PR32A	
<b>DPDT — 8 Pin</b>			
24V AC	—	D5PF2AT	
120V AC	—	D5PF2AA	
240V AC	—	D5PF2AB	
12V DC	—	D5PF2AR1	
24V DC	—	D5PF2AT1	
110V DC	—	D5PF2AA1	
<b>3PDT — 11 Pin</b>			
24V AC	—	D5PF3AT	
120V AC	—	D5PF3AA	
240V AC	—	D5PF3AB	
12V DC	—	D5PF3AR1	
24V DC	—	D5PF3AT1	
110V DC	—	D5PF3AA1	
<b>DIN Rail or Panel Mounting</b>			
Screw Terminal Socket	10	D5PA2	
Hold Down Spring	100	D5PB2	
Hold Down Clip	100	PWC-1325	
	100	PQC-1351	
End Clamp with Mounting Screw — use with track below, one at each end	100	PFP-M	
35 mm x 7.5 mm Aluminum DIN Mounting Track (2 meter lengths)	20	XBANS3575PL	
<b>Panel Mount Socket — Square Base</b>			
Long 0.130" Solder	10	D5PA3L	
Standard 0.130" Solder	10	D5PA3S	

② Additional coil voltages may be available — consult Sales Office or Customer Support Center.

D5PR/D5PF Series — Standard and Full Featured

## Dimensions

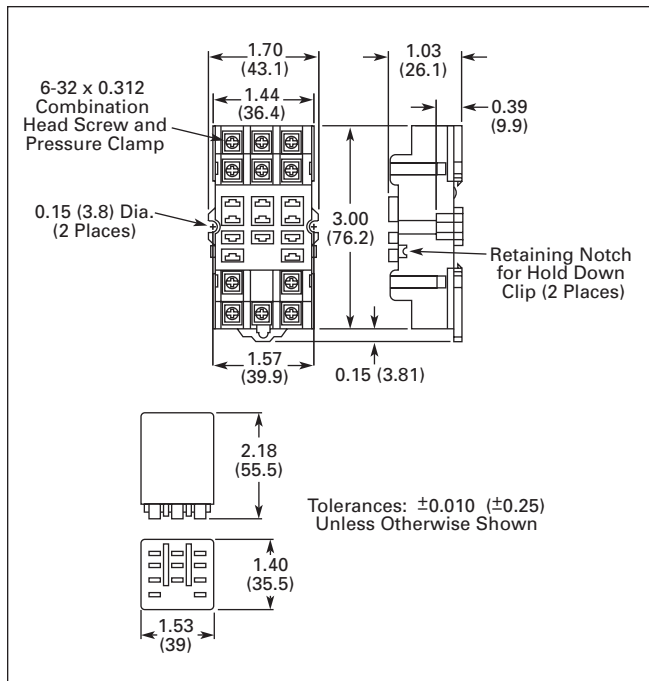


Figure 49-71. D5PA2 — Approximate Dimensions in Inches (mm)

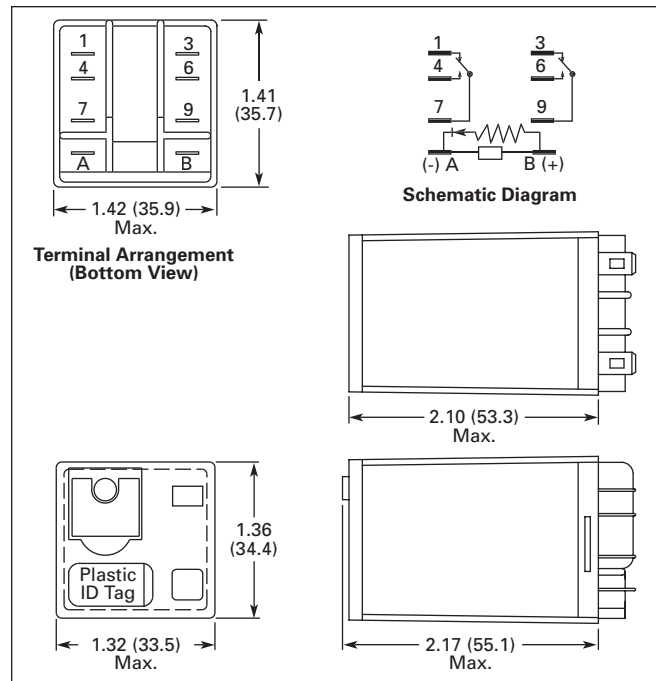


Figure 49-73. D5PF2 — Approximate Dimensions in Inches (mm)

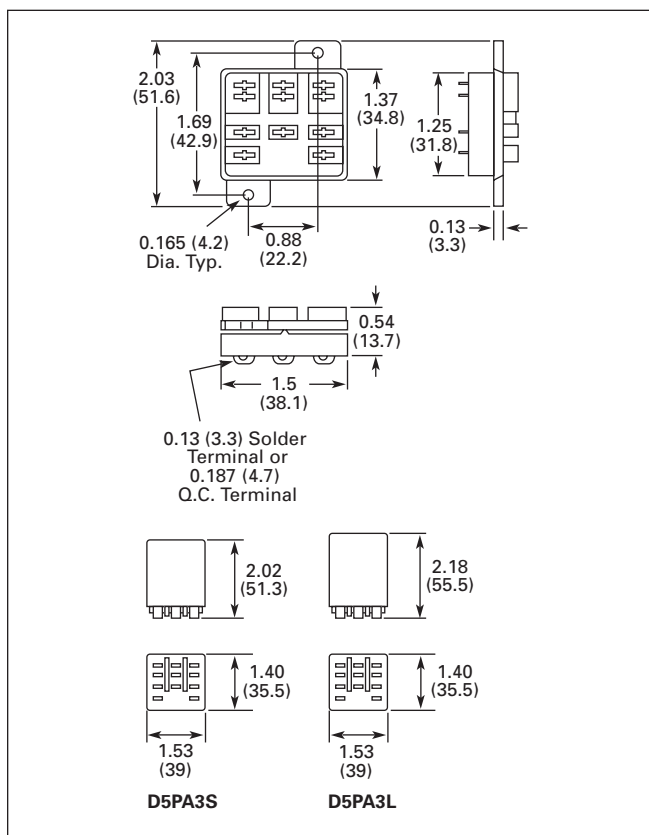


Figure 49-72. D5PA3L and D5PA3S — Approximate Dimensions in Inches (mm)

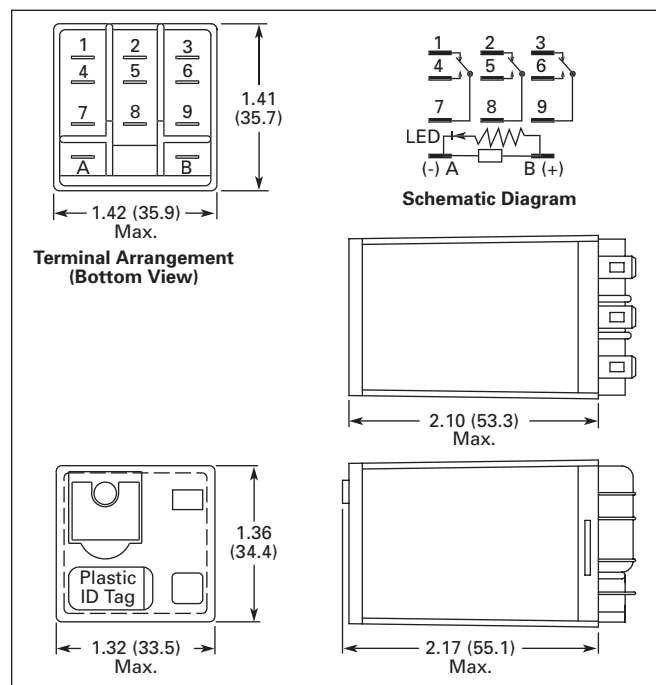
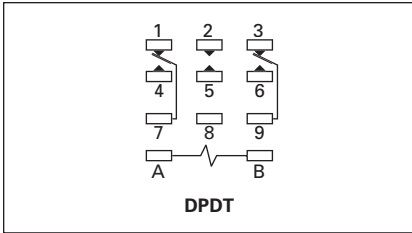
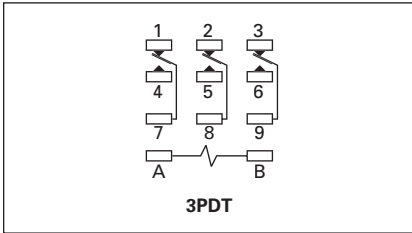


Figure 49-74. D5PF3 — Approximate Dimensions in Inches (mm)

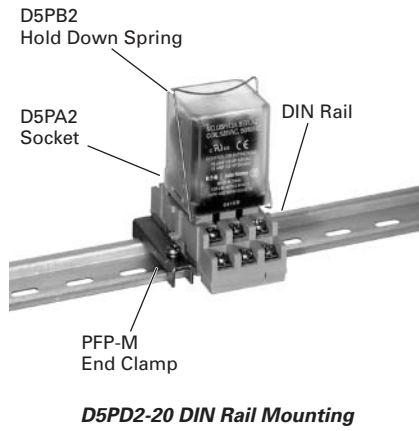
**Terminal Arrangements**



**Figure 49-75. D5PR2 (Bottom View)**



**Figure 49-76. D5PR3 (Bottom View)**



## D7PR Series — Standard



## D7PR Series

## Features

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

## Standards and Certifications

 File # E37317, E65657

 File # LR217017, LR217069  




D7 Series Relay

## Technical Data and Specifications

Table 49-73. D7PR Coil Resistance

Coil Voltage	Ohms				Milliamps							
	D7PR1	D7PR2	D7PR3	D7PR4	D7PR1		D7PR2		D7PR3		D7PR4	
					50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
6V AC	11	11	6.5	5	222.3	190	234	200	326	278	393	336
12V AC	41	41	25.5	20	111.2	95	95.9	82	148	126	202	173
24V AC	180	180	102	80	58.5	50	48	41	77	66	91	78
48V AC	788	788	735	735	21	18	21	18	21.5	18.4	24	20
120V AC	4430	4430	2700	2000	12.9	11	12.9	11	14.7	12.6	17.3	14.8
240V AC	15700	15700	10000	8000	5.9	5	7	6	9.7	8.3	11.4	9.7
6V DC	47	40	25	24	—	127.7	—	150	—	240	—	250
12V DC	188	160	100	96	—	63.8	—	75	—	120	—	125
24V DC	750	650	400	360	—	32	—	36.9	—	60	—	67
48V DC	2600	2600	1600	1600	—	18.5	—	18.5	—	18.5	—	18.5
110V DC	13800	11000	8400	6800	—	8	—	10	—	13	—	16.2

Table 49-74. D7PR Relay Specifications

	D7PR1		D7PR2/D7PR3/D7PR4	
	Resistive Load (p.f. = 1)	Inductive Load (p.f. = 0.4, L/R = 7 ms)	Resistive Load (p.f. = 1)	Inductive Load (p.f. = 0.4, L/R = 7 ms)
Rated Load	120/240V AC 15A 30V DC 15A	120/240V AC 10A 30V DC 7A	120/240V AC 10A (D7PR2 only) 30V DC 10A (D7PR2 only) 250V AC 10A (D7PR3/D7PR4 only) 120V AC 15A (D7PR2 only) 28V DC 10A (D7PR3/D7PR4 only)	120/240V AC 7.5A 30V DC 5A
Carry Current	15A	15A	10A	10A
Max. Operating Voltage	250V AC/125V DC	250V AC/125V DC	250V AC/125V DC	250V AC/125V DC
Max. Operating Current	15A	15A	10A	10A
Contact Material	AgCdO	AgCdO	AgCdO	AgCdO
Max. Switching Capacity	1700 VA 360W	1100 VA 170W	1100 VA 240W	830 VA 120W
Min. Permissible Load	100 mA, 5V DC	100 mA, 5V DC	100 mA, 5V DC	100 mA, 5V DC
Pickup Voltage (max.)	80%	80%	80%	80%
Drop Out Voltage (min.)	30% AC, 10% DC	30% AC, 10% DC	30% AC, 10% DC	30% AC, 10% DC
Voltage (max.)	110%	110%	110%	110%
Mechanical Life (min.)	10,000,000 AC 100,000,000 DC	10,000,000 AC 100,000,000 DC	10,000,000 AC 100,000,000 DC	10,000,000 AC 100,000,000 DC
Electrical Life @ All Contact Ratings (min.)	200,000	200,000	200,000	200,000
Maximum hp Rating	1/3 hp (120V AC)	1/2 hp (240V AC)	1/3 hp (120V AC) (D7PR2 only)	1/2 hp (240V AC) (D7PR2 only)

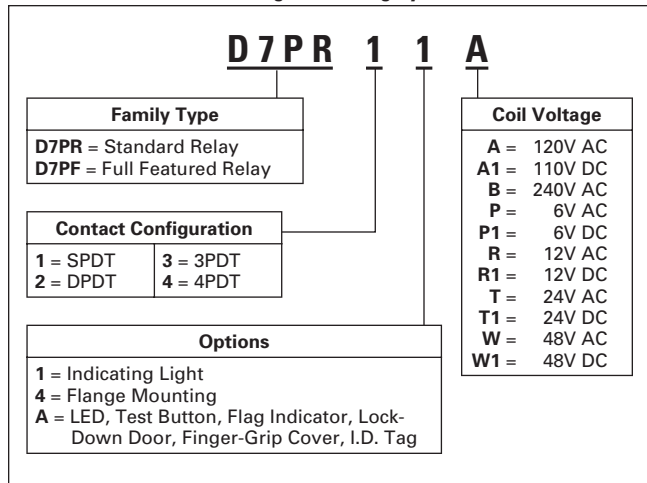
Table 49-75. D7PR Socket Specifications

Catalog Number	Electrical Ratings	Mounting Torque	Hook-Up Wire Range
D7PA2	15A, 250V	.785 Nm – 1.18 Nm	AWG 14 Max.
D7PA3	10A, 300V	7 – 8 in-lbs	AWG 12 to 22 Solid or Stranded
D7PA4	10A, 300V	7 – 8 in-lbs	AWG 12 to 22 Solid or Stranded
D7PA5	15A, 250V	N/A	AWG 14 Max.



### Catalog Number Structure

Table 49-76. D7 Series Catalog Numbering System ①



① For deciphering Catalog Numbers. Do not use for ordering as not all combinations are readily available.

Table 49-77. Relay/Socket Quick Reference

Relay Type	Socket	Hold Down Spring
D7PR1	D7PA2/D7PA5	PMC-A1
D7PR2	D7PA2/D7PA5	PMC-A1
D7PR3	D7PA3	PYC-B2
D7PR4	D7PA4	PYC-B2
D7PF1/D7PF2	D7PA9/D7PA5	PQC-1342
D7PF1/D7PF2	D7PAA	Included w/socket
D7PF3	D7PA3	PYC-B2
D7PF4	D7PA4	PYC-B2
D7PF3	D7PAB	PQC-1350
D7PF4	D7PAD	PQC-1351

### Product Selection

Table 49-78. D7 Product Selection ②

	Catalog Number	Price U.S. \$
<b>Standard SPDT</b>		
Coil Voltage: 24V AC 120V AC 240V AC	D7PR1T D7PR1A D7PR1B	
6V DC 12V DC 24V DC	D7PR1P1 D7PR1R1 D7PR1T1	
<b>SPDT with Indicating Light</b>		
24V AC 120V AC	D7PR11T D7PR11A	
24V DC	D7PR11T1	
<b>SPDT Flange Mount</b>		
120V AC	D7PR14A	
<b>SPDT Full Featured Relay</b>		
120V AC 110V DC 12V DC 24V AC 24V DC	D7PF1AA D7PF1AA1 D7PF1AR1 D7PF1AT D7PF1AT1	

Table 49-78. D7 Product Selection, continued ②

	Std. Pack	Catalog Number	Price U.S. \$
<b>Standard DPDT</b>			
24V AC 120V AC 240V AC		D7PR2T D7PR2A D7PR2B	
12V DC 24V DC 48V DC 110V DC		D7PR2R1 D7PR2T1 D7PR2W1 D7PR2A1	
<b>DPDT Full Featured Relay</b>			
Coil Voltage: 120V AC 110V DC 240V AC 12V DC 24V AC 24V DC		D7PF2AA D7PF2AA1 D7PF2AB D7PF2AR1 D7PF2AT D7PF2AT1	
<b>DPDT Flange Mount</b>			
24V AC 120V AC		D7PR24T D7PR24A	
<b>Standard 3PDT</b>			
120V AC 12V DC 24V DC		D7PR3A D7PR3R1 D7PR3T1	
<b>3PDT with Indicating Light</b>			
120V AC 12V DC 24V DC		D7PR31A D7PR31R1 D7PR31T1	
<b>3PDT Flange Mount</b>			
120V AC		D7PR34A	
<b>3PDT Full Featured Relay</b>			
120V AC 110V DC 240V AC 12V DC 24V AC 24V DC		D7PF3AA D7PF3AA1 D7PF3AB D7PF3AR1 D7PF3AT D7PF3AT1	
<b>Standard 4PDT</b>			
Coil Voltage: 24V AC 120V AC 24V DC 110V DC		D7PR4T D7PR4A D7PR4T1 D7PR4A1	
<b>4PDT Full Featured</b>			
Coil Voltage: 120V AC 240V AC 12V AC 12V DC 24V AC 24V DC 48V DC		D7PF4AA D7PF4AB D7PF4AR D7PF4AR1 D7PF4AT D7PF4AT1 D7PF4AW1	
<b>4PDT Flange Mount</b>			
120V AC 24V DC		D7PR44A D7PR44T1	
<b>DIN Rail Mount Sockets</b>			
1- and 2-Pole 1- and 2-Pole Finger-Safe ③ 3-Pole 3-Pole Finger-Safe ③ 4-Pole 4-Pole Finger-Safe ③	10 10 10 10 10 10	D7PA2 D7PAA D7PA3 D7PAB D7PA4 D7PAD	
<b>Panel Mount Sockets</b>			
1- and 2-Pole	10	D7PA5	
<b>Accessories</b>			
Spring Clip DIN Rail End Stop Hold Down Spring	100 100 100	PMC-A1 PPF-M PYC-B2	

② Additional coil voltages available — consult Sales Office or Customer Support Center.

③ IP20 rated.

Dimensions

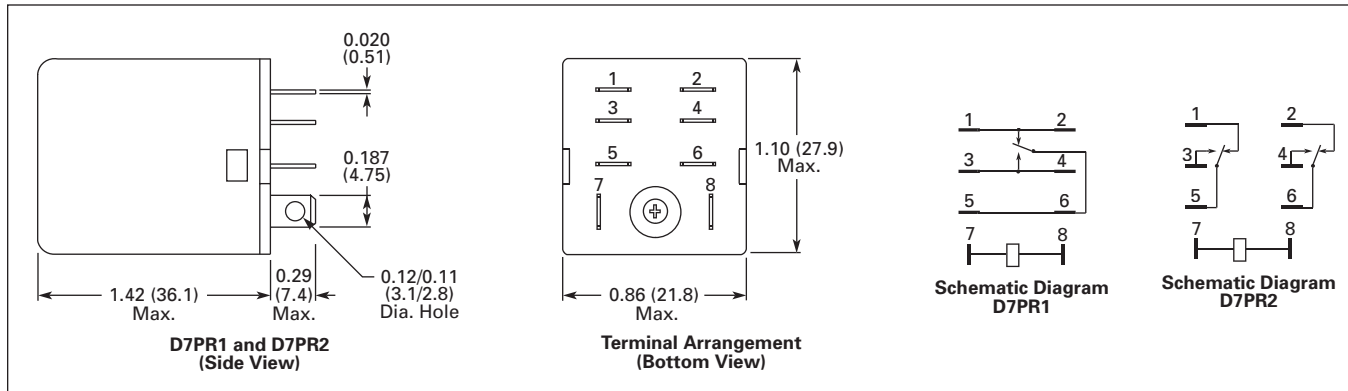


Figure 49-77. D7PR1 and D7PR2 — Approximate Dimensions in Inches (mm)

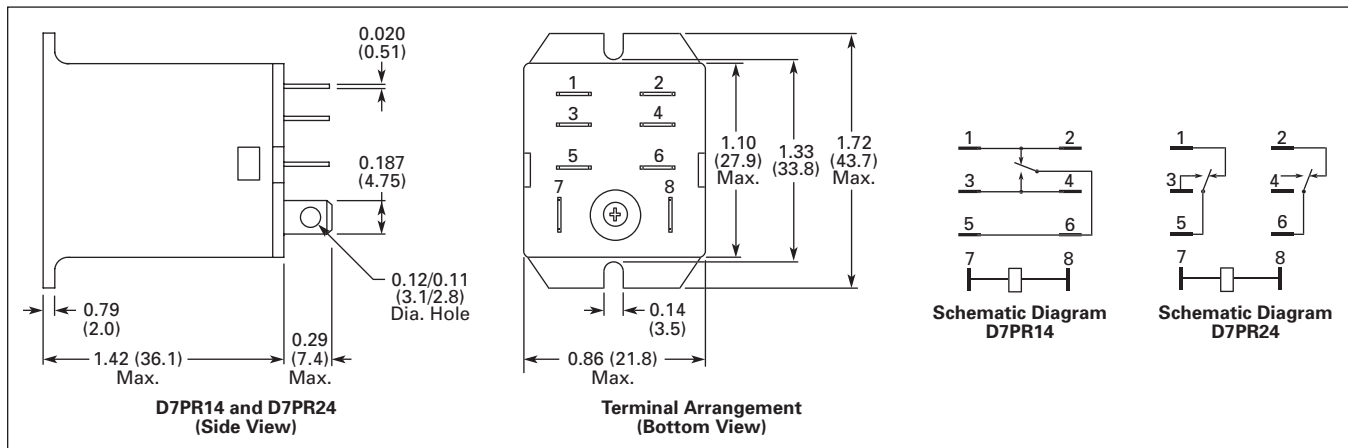


Figure 49-78. D7PR14 and D7PR24 — Approximate Dimensions in Inches (mm)

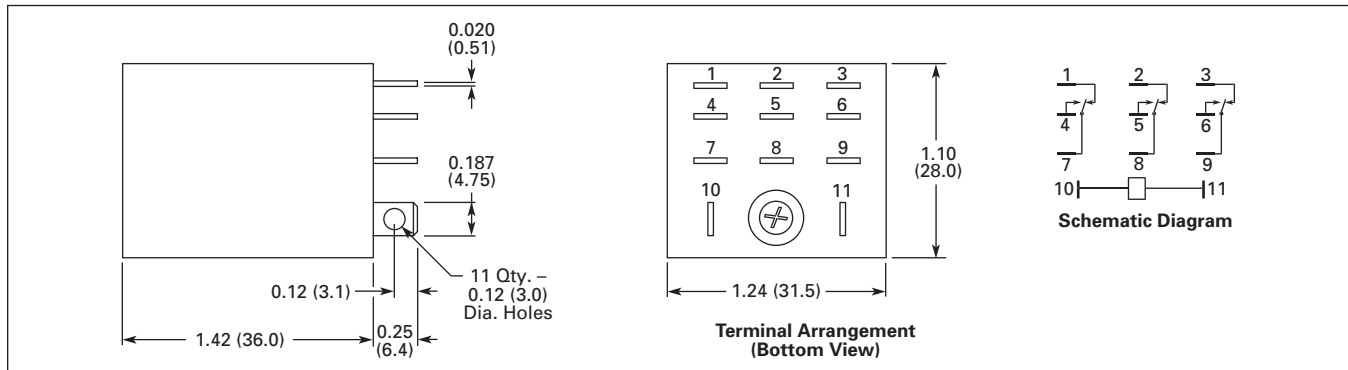
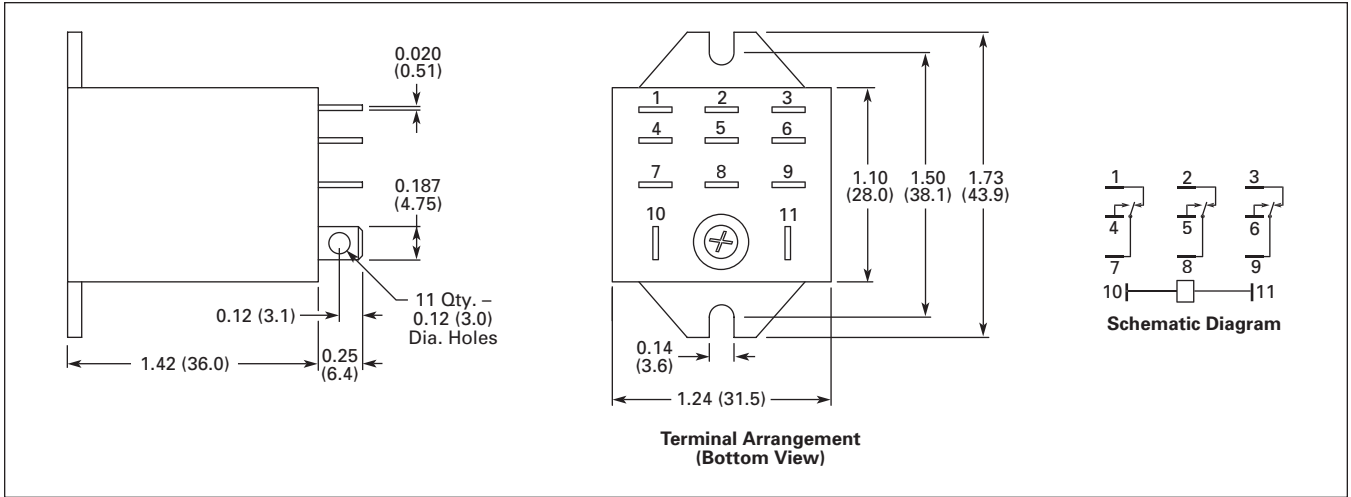
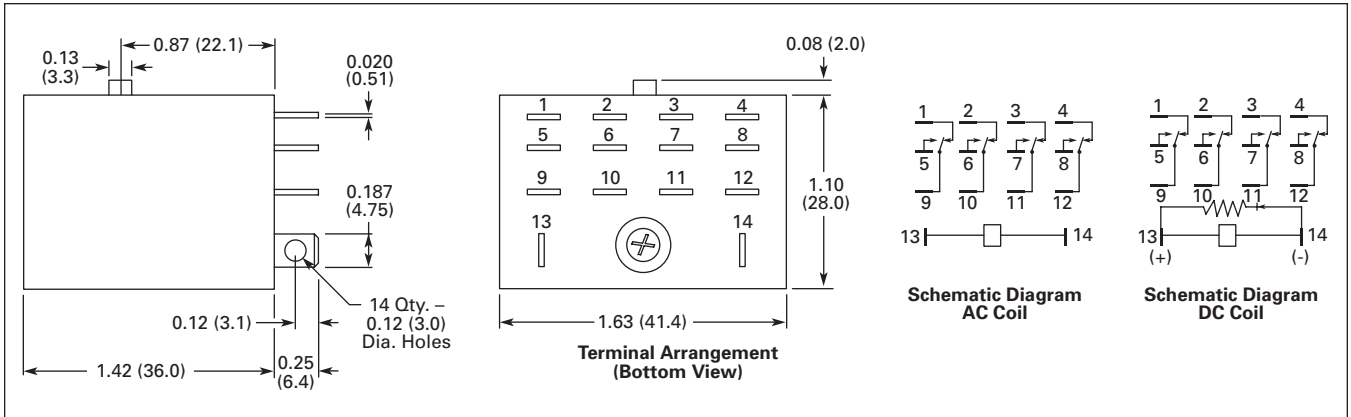


Figure 49-79. D7PR3 — Approximate Dimensions in Inches (mm)

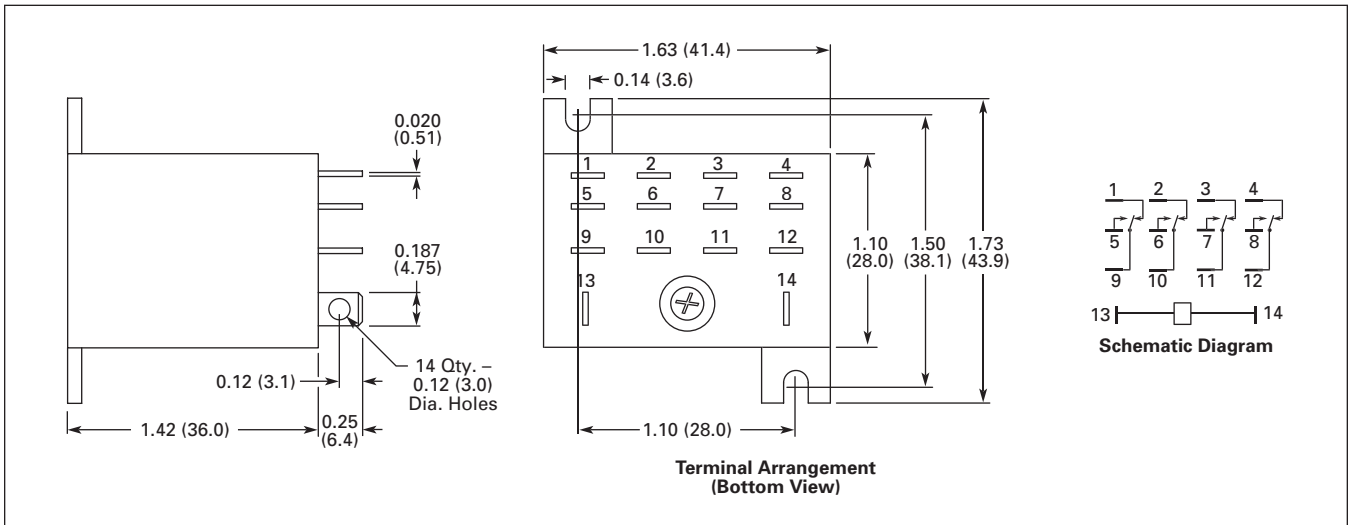
**D7PR Series — Standard**



**Figure 49-80. D7PR34 — Approximate Dimensions in Inches (mm)**



**Figure 49-81. D7PR43 — Approximate Dimensions in Inches (mm)**



**Figure 49-82. D7PR44 — Approximate Dimensions in Inches (mm)**

D7PR Series — Standard

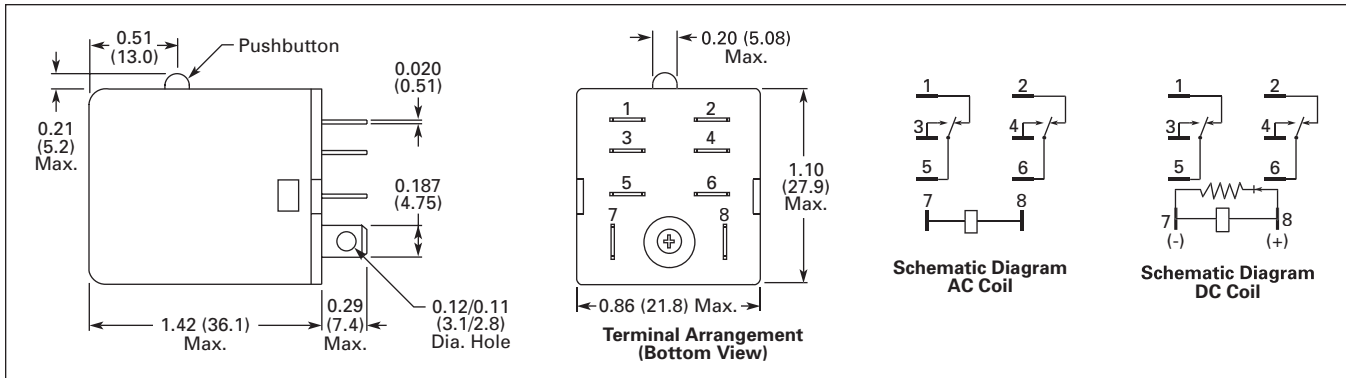


Figure 49-83. D7PR23 — Approximate Dimensions in Inches (mm)

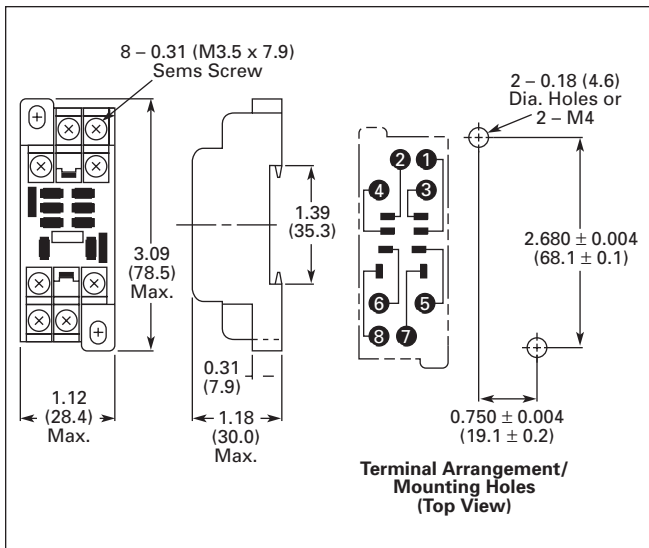


Figure 49-84. D7PA2 — Approximate Dimensions in Inches (mm)

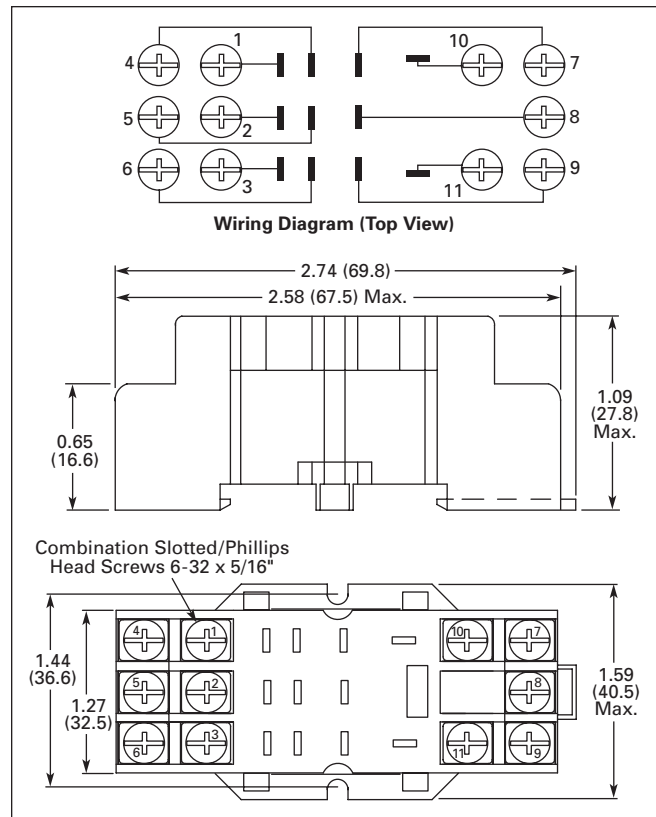
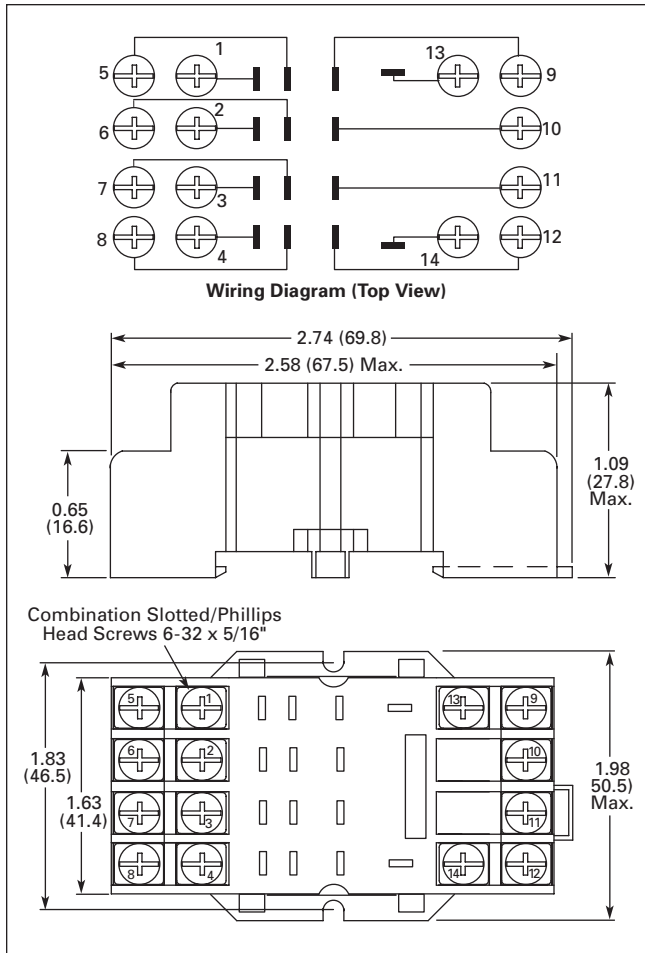
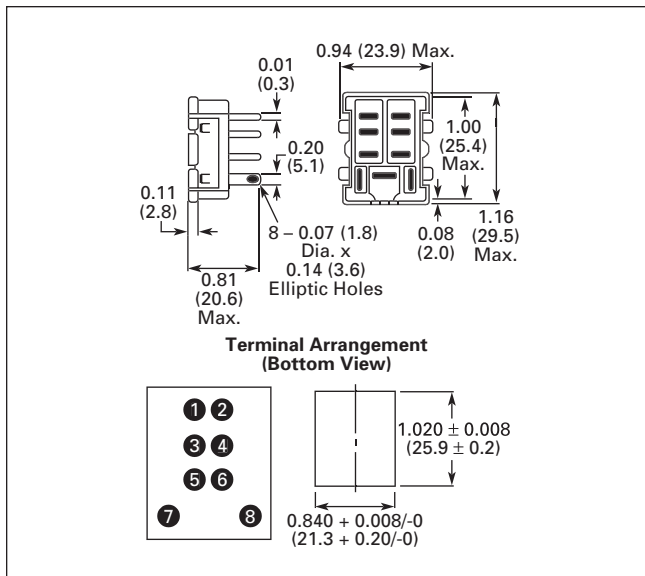


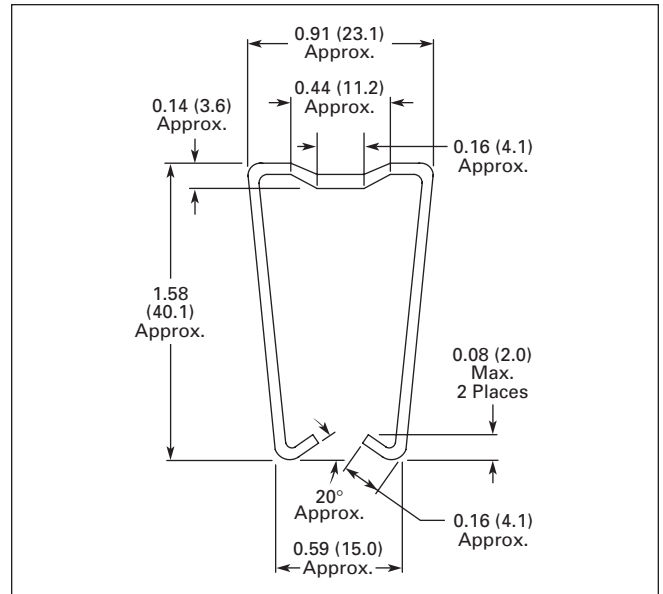
Figure 49-85. D7PA3 — Approximate Dimensions in Inches (mm)



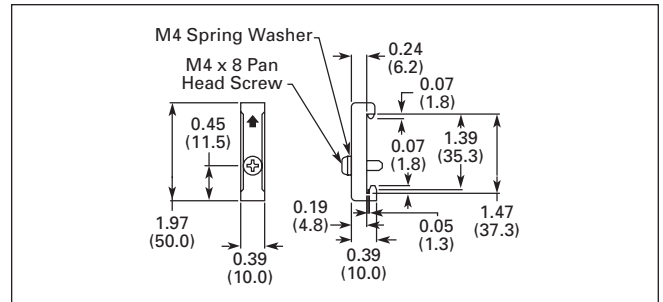
**Figure 49-86. D7PA4 — Approximate Dimensions in Inches (mm)**



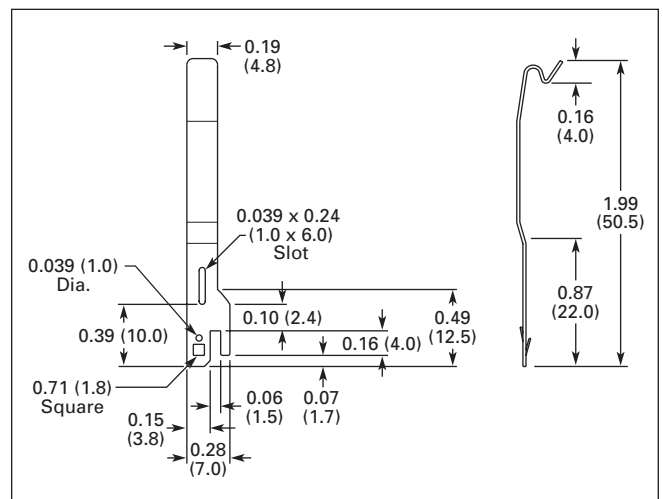
**Figure 49-87. D7PA5 — Approximate Dimensions in Inches (mm)**



**Figure 49-88. PMC-A1 Hold Down Clip — Approximate Dimensions in Inches (mm)**



**Figure 49-89. PFP-M DIN Rail End Stop — Approximate Dimensions in Inches (mm)**



**Figure 49-90. PYC-B2 Hold Down Spring — Approximate Dimensions in Inches (mm)**

## D7PF Series — Full Featured

## D7PF Series



D7PF Series Relay

## Features

- Flag indicator shows relay status in manual or powered condition
- Bi-polar 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 I.D. tag/write label used for identification of relays in multi-relay circuits

## Standards and Certifications



## Technical Data and Specifications

Table 49-79. D7PF Coil Resistance

Coil Voltage	Ohms				Amps <sup>①</sup>			
	D7PF1	D7PF2	D7PF3	D7PF4	D7PF1	D7PF2	D7PF3	D7PF4
6V AC	9.5	9.5	6	5.4	0.167	0.168	0.27	0.255
12V AC	46	46	25.3	21.2	0.081	0.082	0.148	0.164
24V AC	180	180	103	84.5	0.042	0.041	0.08	0.09
48V AC	770	770	460	338	0.018	0.018	0.035	0.044
120V AC	3830	3830	2770	2200	0.012	0.012	0.016	0.018
240V AC	15700	15700	12100	9120	0.004	0.004	0.006	0.008
6V DC	40	40	25	24	0.15	0.15	0.24	0.25
12V DC	160	160	100	96	0.075	0.075	0.120	0.125
24V DC	650	650	400	388	0.037	0.037	0.060	0.062
48V DC	2600	2600	1600	1550	0.018	0.018	0.030	0.031
110V DC	11000	11000	8600	7340	0.010	0.010	0.013	0.015

<sup>①</sup> At 60 Hz for AC Coils.

## D7PF Series — Full Featured

**Table 49-80. D7PF Relay Specifications**

	D7PF1 Resistive Load (p.f. = 1.0)	D7PF2 Resistive Load (p.f. = 1.0)	D7PF3 Resistive Load (p.f. = 1.0)	D7PF4 Resistive Load (p.f. = 1.0)
<b>Coil</b>				
Pickup Voltage (Max.)	85% AC; 80% DC (% of nominal)			
Drop Out Voltage (Min.)	10% AC; 10% DC (% of nominal)			
Maximum Voltage	110% of nominal			
Insulation System per UL Standard 1446	Class B 266°F (130°C)			
<b>Contacts</b>				
Rated Load	277V AC, 28V DC – 20A 220V DC – 0.5A	120V AC – 15A 277V AC, 28V DC – 12A 220V DC – 0.5A	120V AC, 28V DC – 15A 277V AC – 12A 220V DC – 0.5A	120V AC, 28V DC – 15A 277V AC – 12A 220V DC – 0.5A
Maximum hp Ratings	1/2 hp, 120V AC 1 hp, 250V AC		1/2 hp, 120V AC 3/4 hp, 250V AC	
Contact Material	Silver Alloy, Gold Flashed			
Pilot Duty	B300			
Utilization Category (IEC)	AC-15			
Min. Permissible Load	100mA @ 5V DC or 0.5W			
Contact Resistance	100 Milliohms Max @ 6V, 1A			
<b>Dielectric Strength</b>				
Coil to Contacts	2500V RMS			
Across Open Contacts	1500V RMS	1000V RMS	1000V RMS	1000V RMS
Pole to Pole	—	2500V RMS	2500V RMS	2500V RMS
Insulation Resistance	100 Megohms Min. @ 500V DC			
<b>Temperature</b>				
Operating	-40 – 158°F (-40 to 70°C)			
Storage	-40 – 221°F (-40 to 105°C)			
<b>Life Expectancy</b>				
Electrical at Rated Resistive Load	100,000 Operations	200,000 Operations	150,000 Operations	150,000 Operations
Mechanical at No Load	10 Million Operations			
<b>Weight</b>				
Approximate Weight	0.079 lbs. (36g)	0.079 lbs. (36g)	0.132 lbs. (60g)	0.176 lbs. (80g)

**Table 49-81. D7PF Socket Specifications**

Catalog Number	Electrical Ratings	Mounting Torque	Hook-Up Wire Range
D7PA3	10A, 300V	7 – 8 in-lbs	AWG 12 to 22 Solid or Stranded
D7PA4	10A, 300V	7 – 8 in-lbs	AWG 12 to 22 Solid or Stranded
D7PA5	15A, 250V	N/A	AWG 14 Max.
D7PAA	16A, 300V	8 – 10 in-lbs	20 – 12 AWG
D7PAB	16A, 300V	8 – 10 in-lbs	20 – 12 AWG
D7PAO	16A, 300V	8 – 10 in-lbs	20 – 12 AWG
D7PA9	10A, 300V	7 – 8 in-lbs	20 – 12 AWG

Dimensions

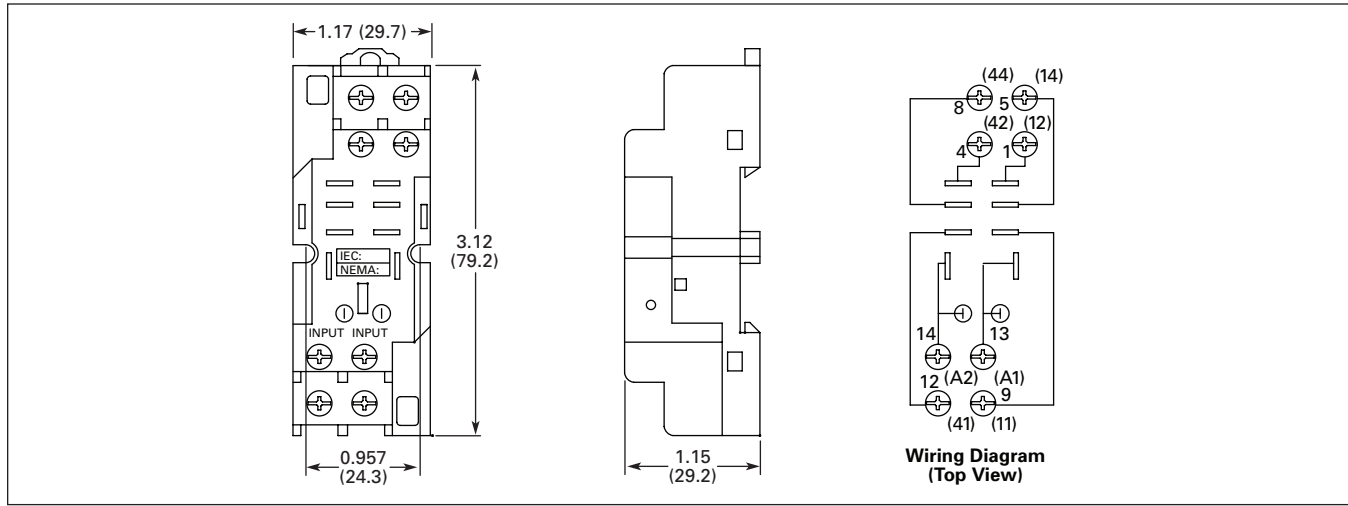


Figure 49-91. D7PAA — Approximate Dimensions in Inches (mm)

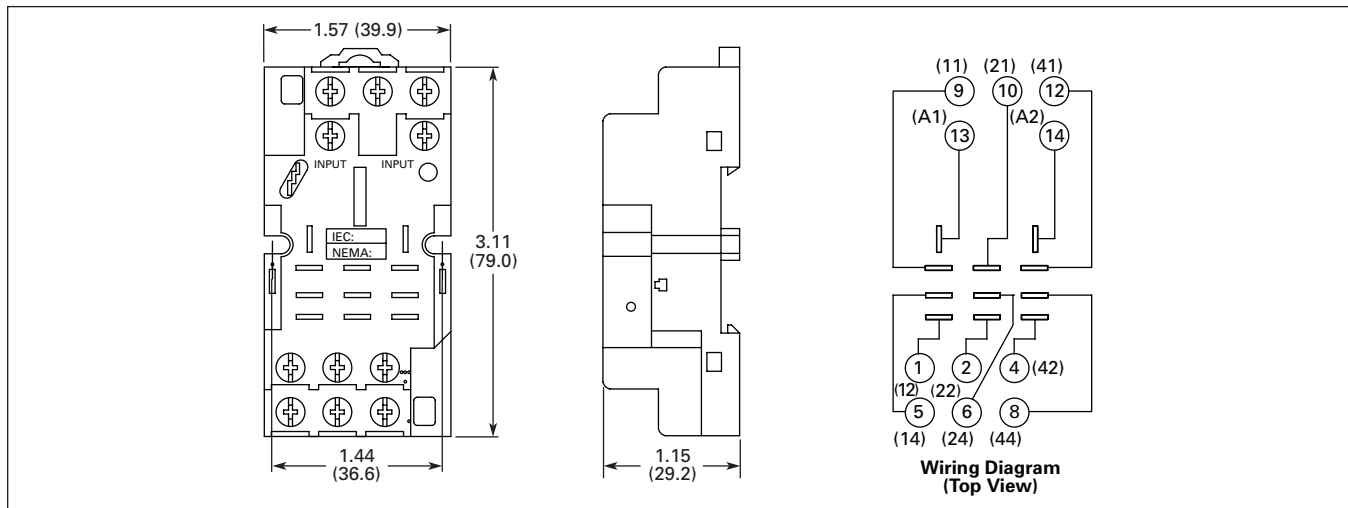


Figure 49-92. D7PAB — Approximate Dimensions in Inches (mm)

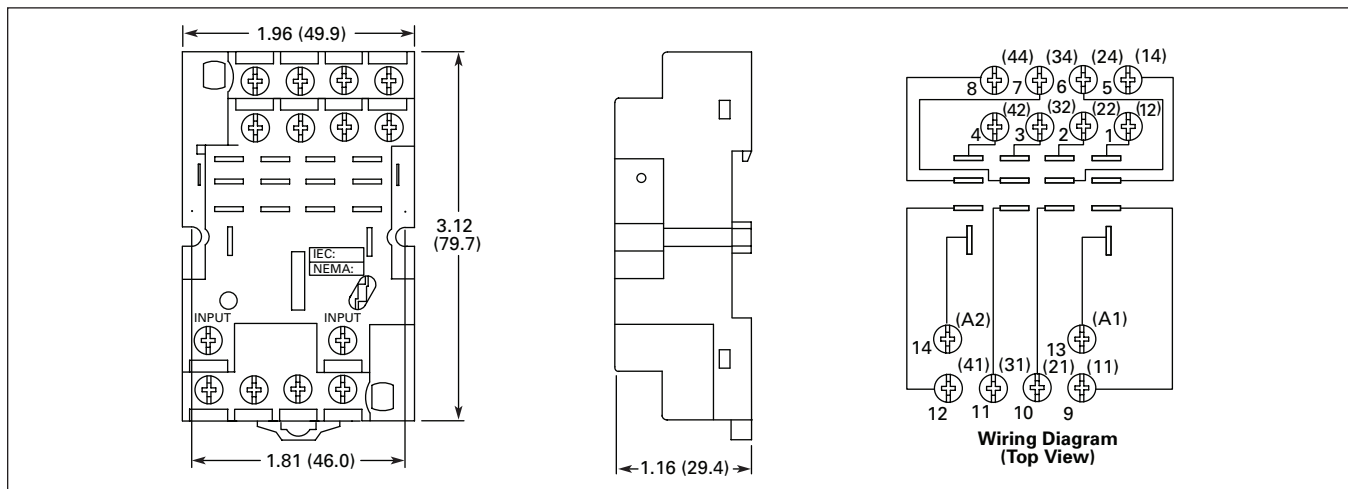
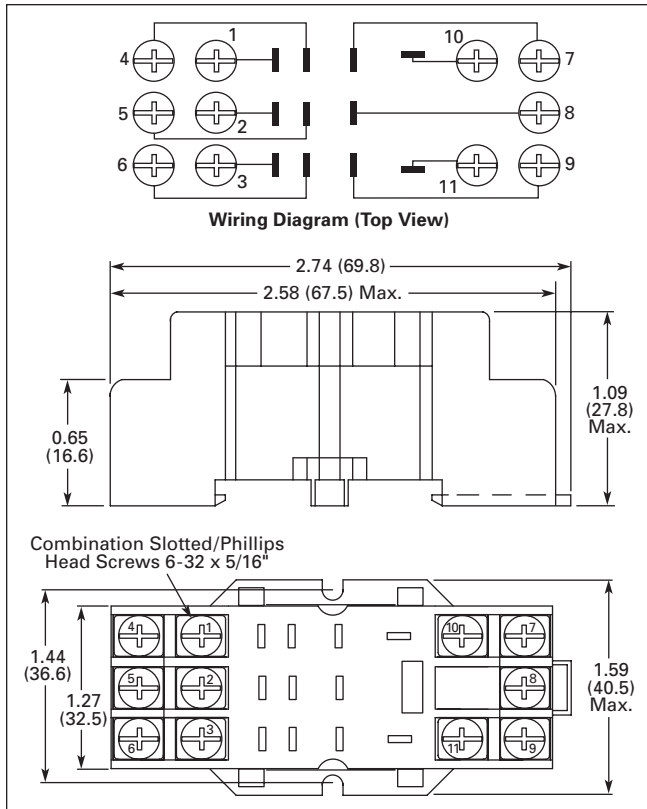


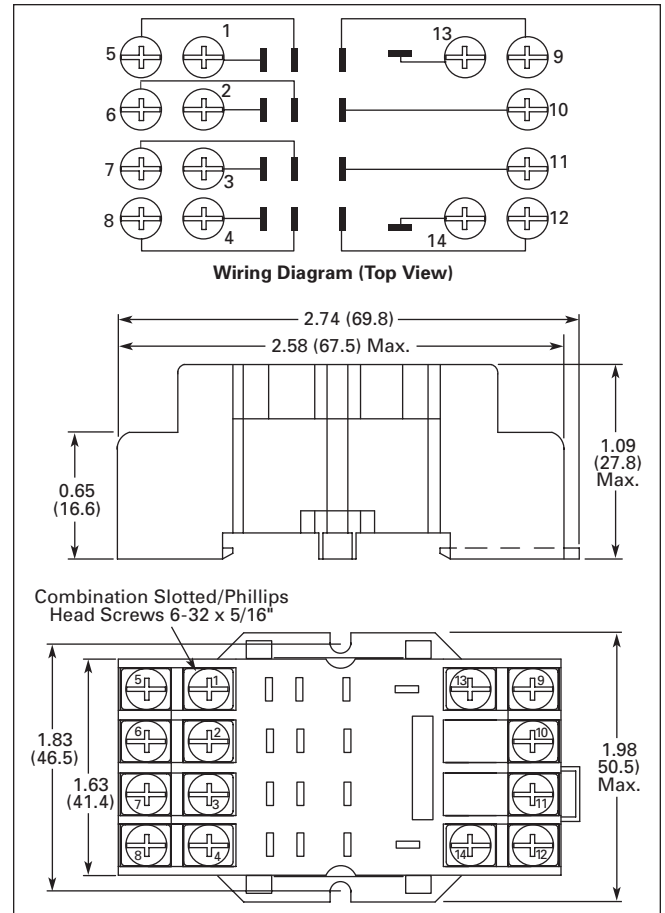
Figure 49-93. D7PAD — Approximate Dimensions in Inches (mm)

49

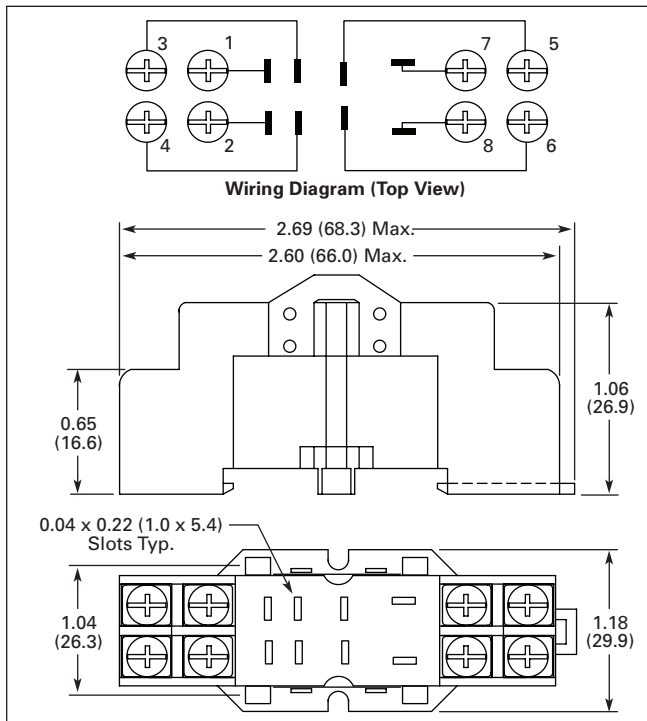




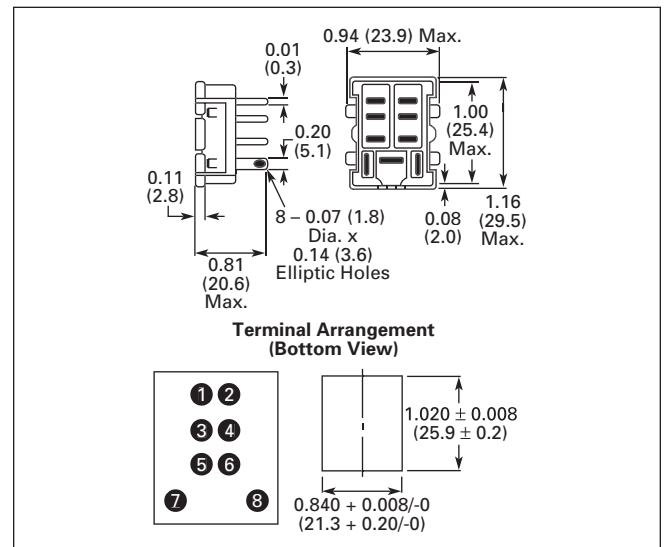
**Figure 49-94. D7PA3 Standard Mount — Approximate Dimensions in Inches (mm)**



**Figure 49-96. D7PA4 Panel Mount — Approximate Dimensions in Inches (mm)**



**Figure 49-95. D7PA9 Standard Mount — Approximate Dimensions in Inches (mm)**



**Figure 49-97. D7PA5 Panel Mount — Approximate Dimensions in Inches (mm)**

D7PF Series — Full Featured

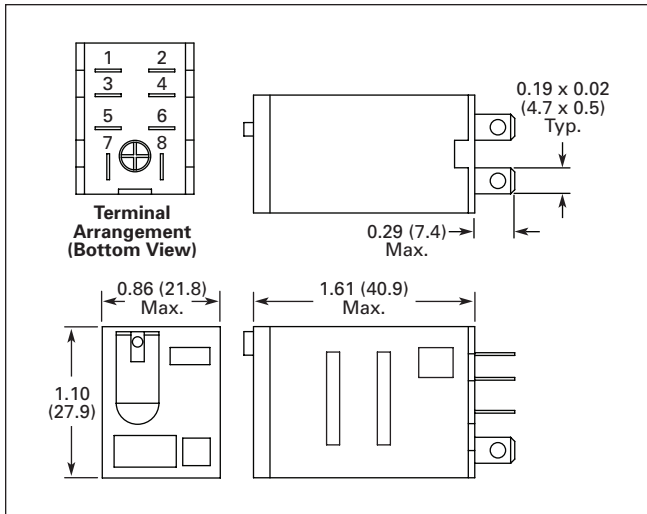


Figure 49-98. D7PF1 — Approximate Dimensions in Inches (mm)

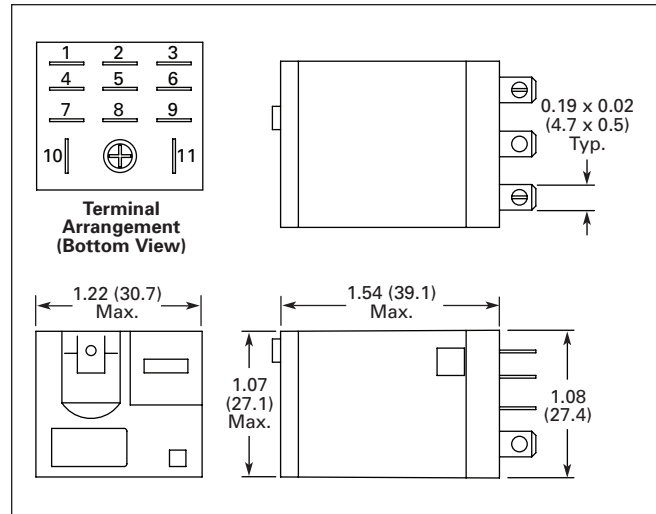


Figure 49-100. D7PF3 — Approximate Dimensions in Inches (mm)

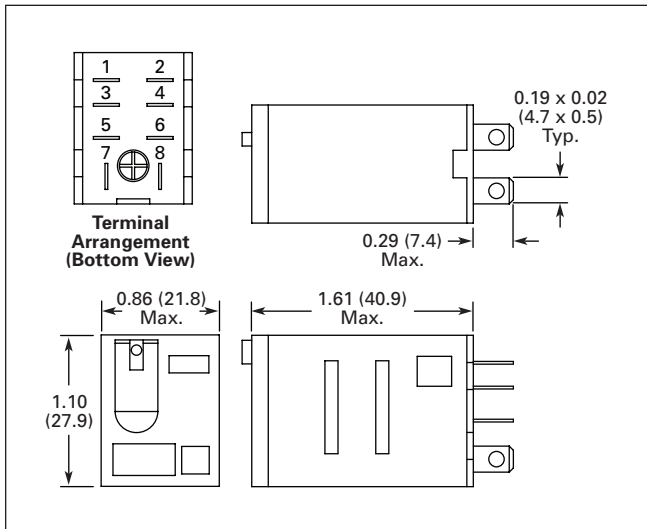


Figure 49-99. D7PF2 — Approximate Dimensions in Inches (mm)

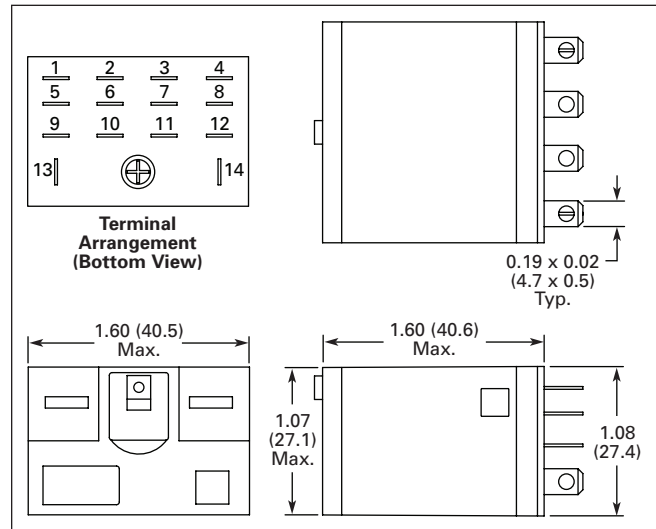


Figure 49-101. D7PF4 — Approximate Dimensions in Inches (mm)

**D8 Series — Standard**

**D8 Series**



*D8 Series Relay*

**Features**

- Allows switching of 25A and 30A 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 120V AC at either 50 or 60 Hz
- Panel, DIN rail and flange mounting

**Standards and Certifications**

- File # E1491
- File # LR701520
- 

**Technical Data and Specifications**

**Table 49-82. Coil Resistance**

Coil Voltage	Ohms	mA
24V AC	303	71
110/120V AC	5260	20.4
220/240V AC	21000	10.2
12V DC	75	158
24V DC	303	79

**Table 49-83. Specifications**

	<b>D8PR6</b>		<b>D8PR7</b>
Rated Load	220V AC 30A	220V AC 25A	220V AC 25A
Carry Current	30A	30A	25A
Max. Operating Voltage	250V AC	250V AC	250V AC
Max. Switching Current	30A	30A	25A
Contact Material	AgCdO	AgCdO	AgCdO
Max. Switching Capacity	6600 VA	6600 VA	5500 VA
Min. Permissible Load	100 mA @ 5V DC	100 mA @ 5V DC	100 mA @ 5V DC
Mechanical Life (min.)	5,000,000 Operations	5,000,000 Operations	5,000,000 Operations
Electrical Life @ All Contact Ratings (min.)	100,000 Operations	100,000 Operations	100,000 Operations
Maximum hp Ratings	1-1/2 hp (120V AC) 3 hp (240/265/277V AC)	1-1/2 hp (120V AC) 3 hp (240/265/277V AC)	1-1/2 hp (120V AC) 3 hp (240/265/277V AC)

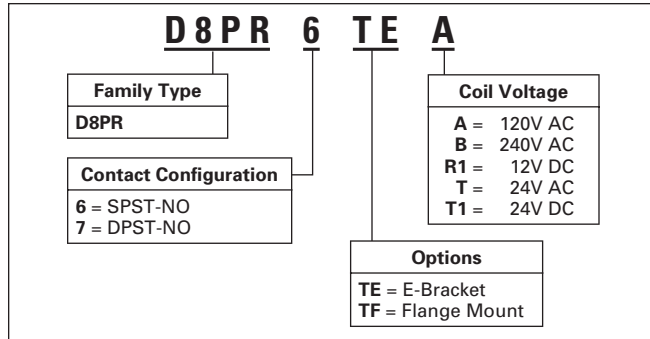
**Table 49-84. Coil Data**

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

D8 Series — Standard

Catalog Number Structure

Table 49-85. D8 Series Catalog Numbering System ①



① For deciphering Catalog Numbers. Do not use for ordering as not all combinations are readily available.

Table 49-86. 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

Product Selection

Table 49-87. D8 Product Selection ②

	Std. Pack	Catalog Number	Price U.S. \$
<b>SPST E-Bracket</b>			
Coil Voltage: 24V AC		D8PR6TET	
24V DC		D8PR6TET1	
<b>SPST Flange Mount</b>			
120V AC		D8PR6TFA	
24V DC		D8PR6TFT1	
<b>DPST E-Bracket</b>			
Coil Voltage: 120V AC		D8PR7TEA	
<b>DPST Flange Mount</b>			
120V AC		D8PR7TFA	
24V DC		D8PR7TFT1	
<b>Sockets</b>			
DIN Rail Adapter	10	D8PA1	
Screw Terminal Adapter	10	D8PA2	
Bracket Adapter	10	D8PA5	
<b>Accessory</b>			
DIN Rail End Stop	100	FPF-M	

② Additional coil voltages available — consult Sales Office or Customer Support Center.

Dimensions

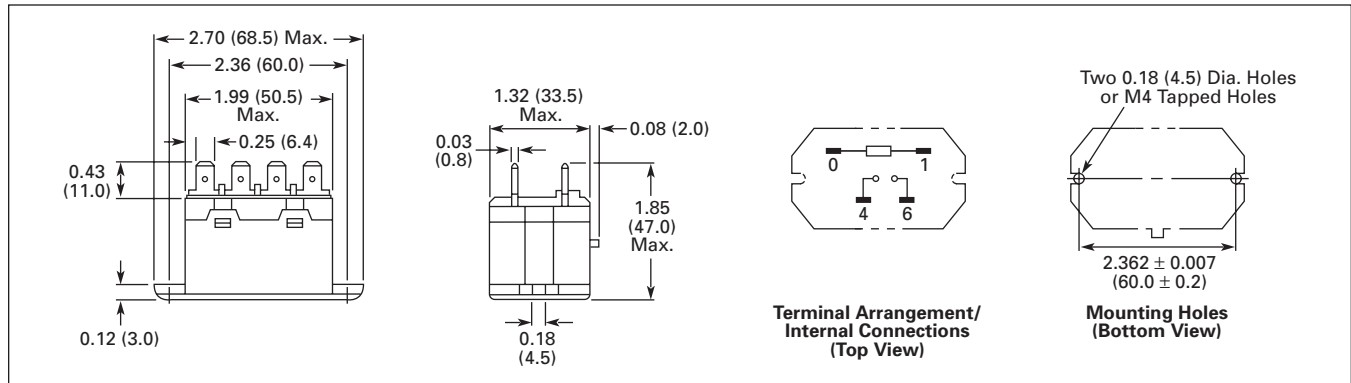


Figure 49-102. D8PR6TF — Approximate Dimensions in Inches (mm)

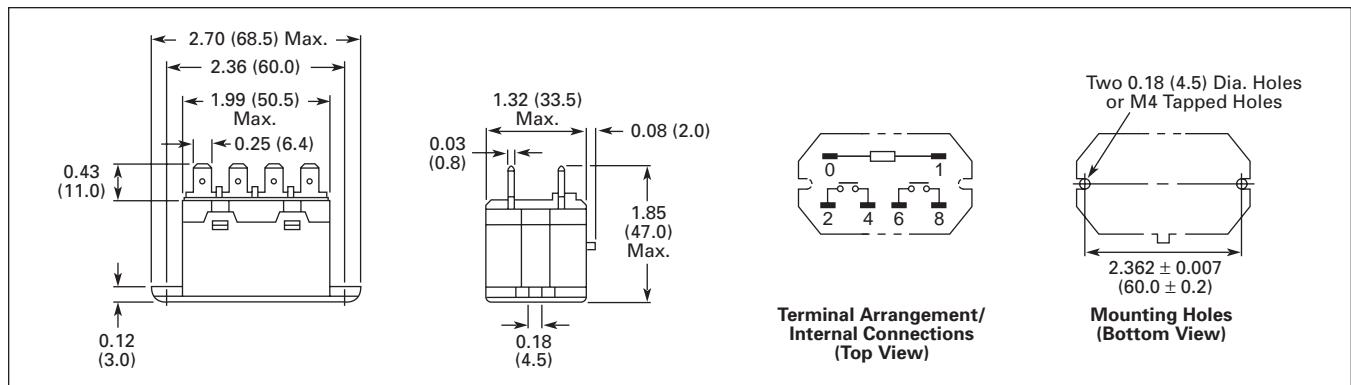
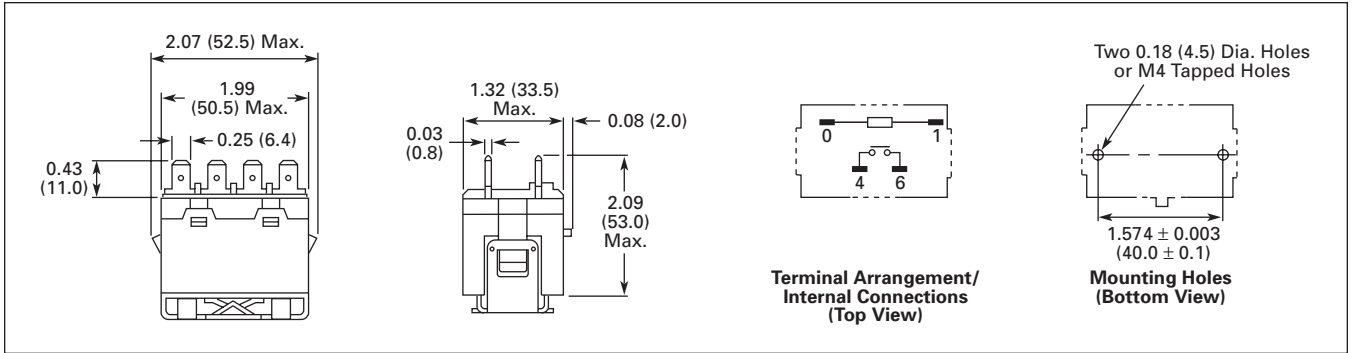
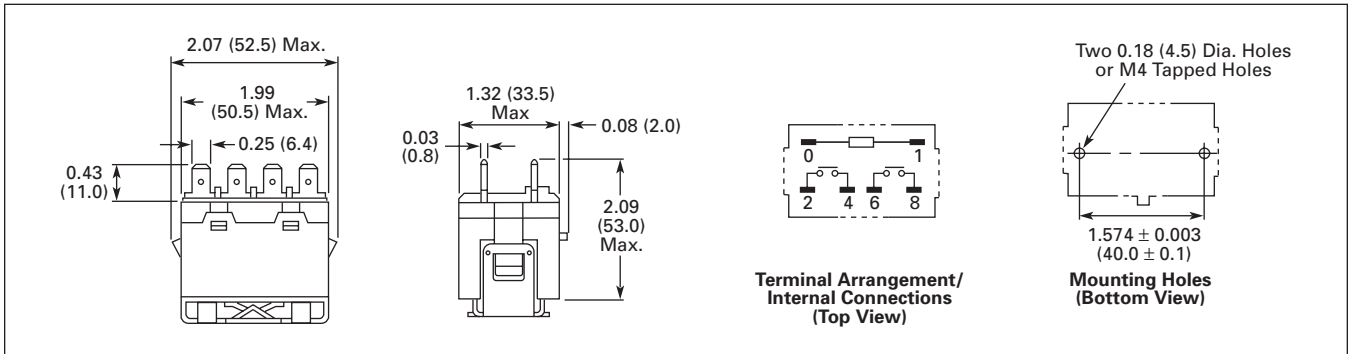


Figure 49-103. D8PR7TF — Approximate Dimensions in Inches (mm)

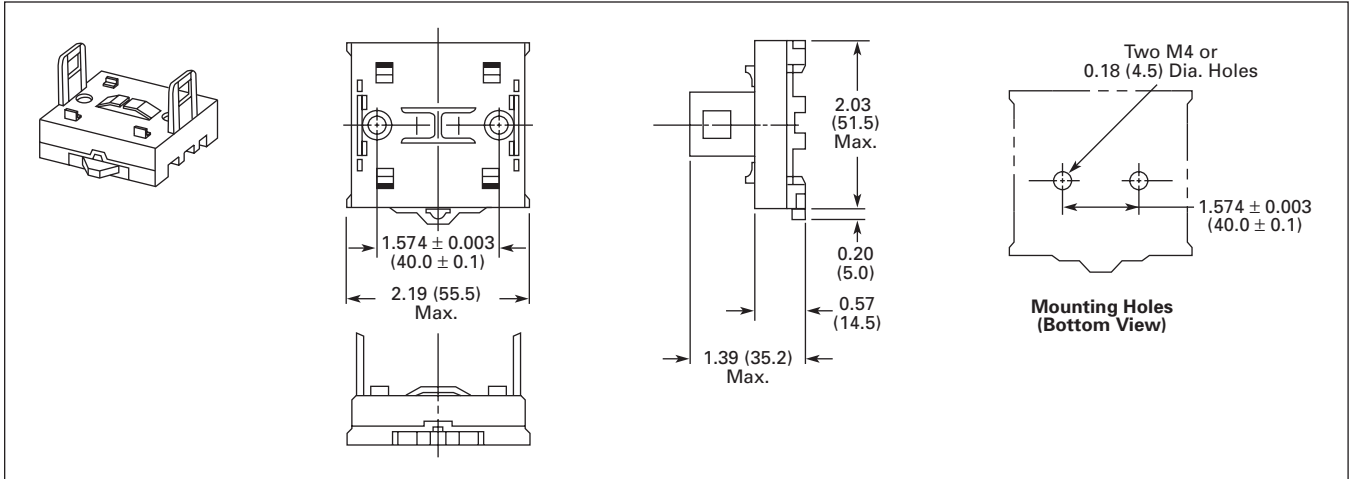
**D8 Series — Standard**



**Figure 49-104. D8PR6TE with D8PA5 Bracket Attached — Approximate Dimensions in Inches (mm)**



**Figure 49-105. D8PR7TE with D8PA5 Bracket Attached — Approximate Dimensions in Inches (mm)**



**Figure 49-106. D8PA1 — Approximate Dimensions in Inches (mm)**

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

D8 Series — Standard

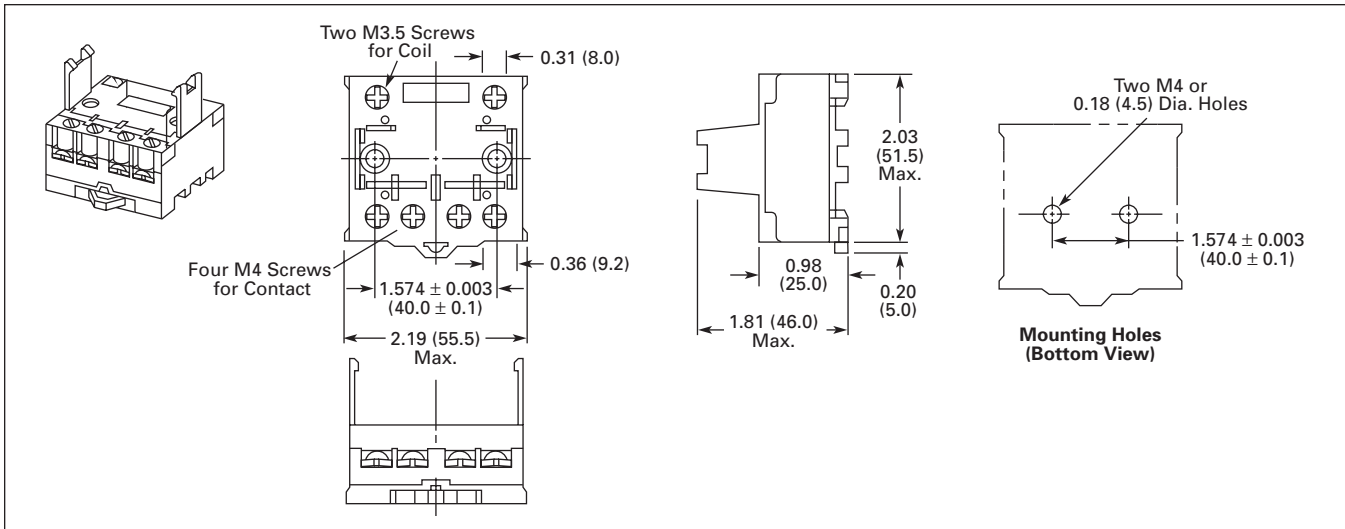


Figure 49-107. D8PA2 — Approximate Dimensions in Inches (mm)

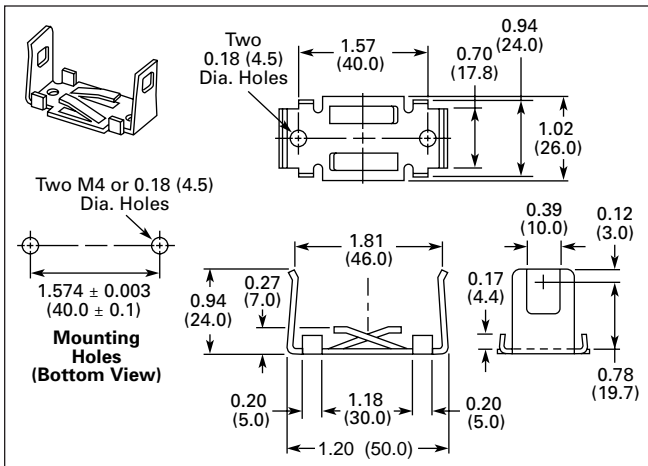


Figure 49-108. D8PA5 — Approximate Dimensions in Inches (mm)

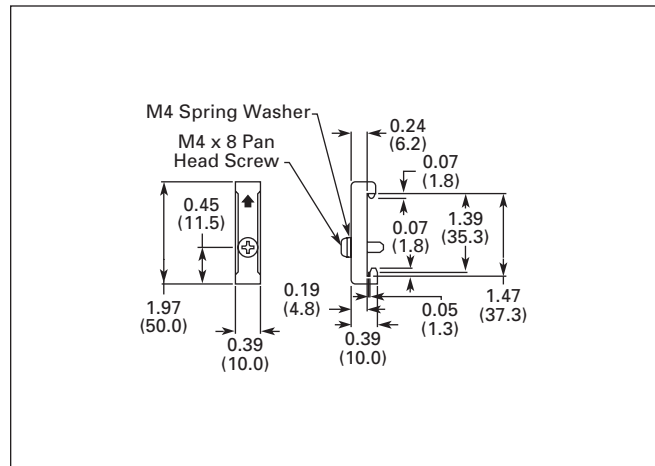


Figure 49-109. PFP-M DIN Rail End Stop — Approximate Dimensions in Inches (mm)

### D9 Series




D9 Series Relay

### Features

- Ideal for 3-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

### Technical Data and Specifications

Table 49-88. Coil Resistance

Coil Voltage	Ohms	mA
24V AC	—	75
120V AC	—	21.6
240V AC	—	10.8
12V DC	72	167
24V DC	288	83
110V DC	6050	18

Table 49-89. Specifications

	D9PR	
	NO Contacts Resistive Load (p.f. = 1)	NC Contacts Resistive Load (p.f. = 1)
Rated Load	220V AC 25A 30V DC 25A	220V AC 8A 30V DC 8A
Carry Current	25A	8A
Max. Operating Voltage	250V AC/125V DC	250V AC/125V DC
Max. Switching Current	25A	8A
Max. Switching Capacity	5500 VA 750W	1760 VA 240 W
Min. Permissible Load	100 mA @ 24V DC	100 mA @ 24V DC
Mechanical Life (min.)	1,000,000 operations	1,000,000 operations
Electrical Life @ All Contact Ratings (min.)	100,000 operations	100,000 operations
Maximum hp Ratings	1-1/2 hp (120V AC) 3 hp (240/265/277V AC) 3-Phase 3 hp (240/265/277V AC) 30,000 cycles 3-Phase 5 hp (240/265/277V AC) 30,000 cycles	1-1/2 hp (120V AC) 3 hp (240/265/277V AC) 3-Phase 3 hp (240/265/277V AC) 30,000 cycles 3-Phase 5 hp (240/265/277V AC) 30,000 cycles

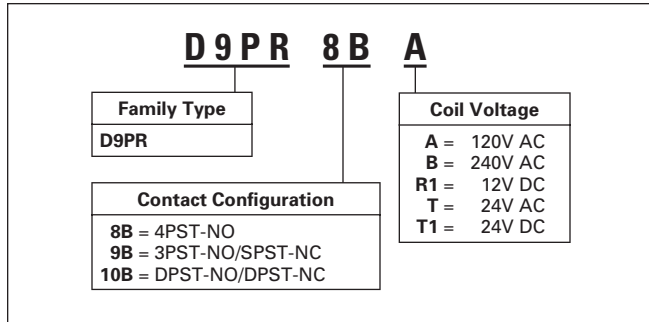
Table 49-90. Coil Data

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

D9 Series — Standard

### Catalog Number Structure

Table 49-91. D9 Series Catalog Numbering System ①



① For deciphering Catalog Numbers. Do not use for ordering as not all combinations are readily available.

### Product Selection

Table 49-92. D9 Product Selection ②

	Catalog Number	Price U.S. \$
<b>4PST-NO Power Relay</b>		
Coil Voltage:		
24V AC	D9PR8BT	
120V AC	D9PR8BA	
240V AC	D9PR8BB	
24V DC	D9PR8BT1	
<b>3PST-NO/SPST-NC Power Relay</b>		
120V AC	D9PR9BA	
<b>DPST-NO/DPST-NC Power Relay</b>		
Coil Voltage:		
24V AC	D9PR10BT	
120V AC	D9PR10BA	
24V DC	D9PR10BT1	

② Additional coil voltages available — consult Sales Office or Customer Support Center.

### Dimensions

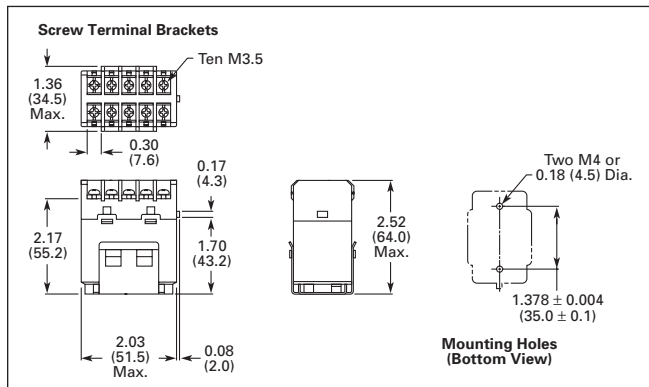


Figure 49-110. D9PR — Approximate Dimensions in Inches (mm)

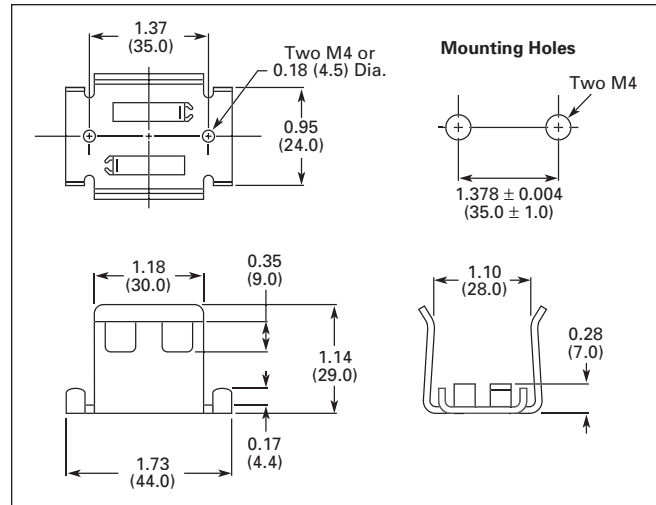


Figure 49-111. Mounting Bracket — Approximate Dimensions in Inches (mm)

### Terminal Arrangements

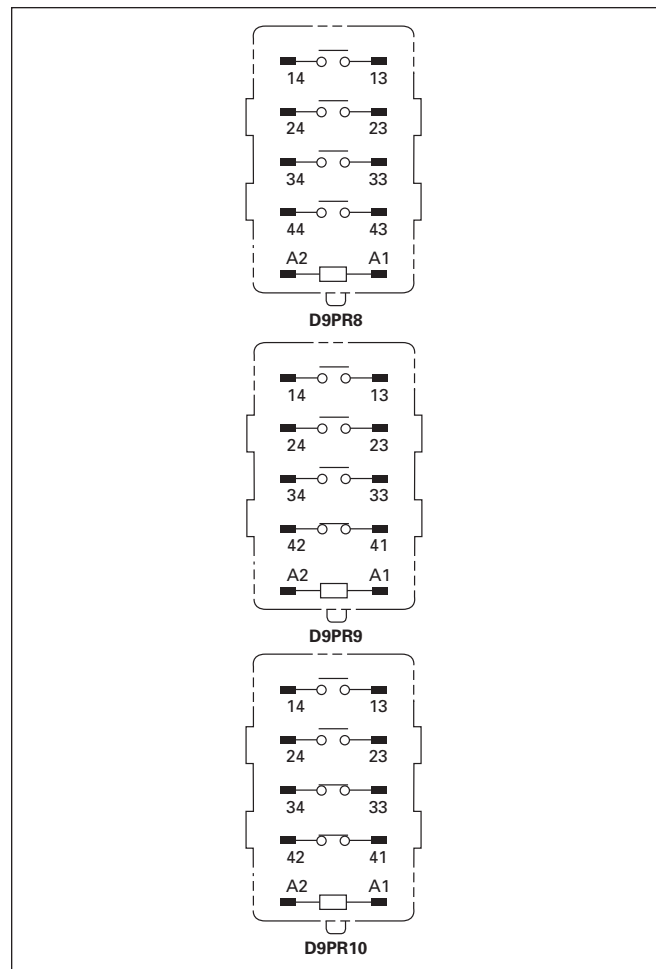


Figure 49-112. Terminal Arrangements



**9575H Series 3000 —  
Type AA — AC and DC**



*9575H Series 3000 Relay*

**Product Description**

Type AA panel mounted relays are rated (each pole) 40A up to 300V AC, 50/60 Hz; 5A @ 480/600V AC, 50/60 Hz and 40A @ 28V DC.

**Application Description**

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

**Technical Data and Specifications**

**Relay Specifications**

**Coil**

- Pull-In Voltage: 80% DC coils, 85% AC coils of nominal voltage or less @ 25° C
- Dropout Voltage: 10% of nominal voltage or more @ 25° C
- Coil Resistance: ±10% measured @ 25° C
- Max DC Coil Dissipation Capability: 4 Watts DC continuous @ 25° C

**Contacts**

- Contact Combination: DPDT
- Contact Rating Each Pole (Main Contacts): Each pole rated 40 Amps up to 300V AC, 50/60 Hz, 5 Amps @ 480/600V AC 50/60 Hz, 0.75pF inductive load. 1-1/2 hp motor load (each pole) @ 120 thru 600V AC 50/60 Hz. 2 hp motor load @ 200 thru 600V AC, 50/60 Hz only when using both poles to switch both sides of load, 40 Amps @ 28V DC resistive load each pole. NEMA A 600 pilot duty 50/60 Hz.

- Additional contact ratings for relays with blowout magnets: 10A @ 110V DC Resistive, 4A @ 225V DC Resistive, 2A @ 325V DC Resistive. For inductive loads, contacts must be derated accordingly.
- Contact Material: Silver Cadmium Oxide, Gold Flashed. 5/16 inch (7.9 mm) diameter standard.

**Dielectric Withstanding Voltage**

- Between Open Contacts: 1500 V<sub>rms</sub>
- All Other Mutually Insulated Conductive Elements: 2200 V<sub>rms</sub>

**Miscellaneous**

- Coil Terminals: 6-32 Binder Head Screws
- Contact Terminals: 8-32 Binder Head 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 @ 125 or 250V AC, resistive load; 1/4 hp at 125 or 250V AC, motor load; 0.4 Amps at 125V DC or 0.20 Amps at 250V DC, resistive load; 3 Amps at 125V AC lamp load. All AC ratings are 50/60 Hz.
- Dielectric Withstanding Voltage: 500V AC RMS between open contacts, 1500V AC RMS between all other mutually insulated conductive elements.
- Terminals: 4-40 Round Head Screws for Auxiliary Contacts standard.

**Table 49-93. Average Operating Times (Milliseconds)**

Operation	DPDT Relay	DPDT Relay with Auxiliary Switch
Pick-Up	40	50
Drop-Out	35	35

**Table 49-94. Temperature Ranges**

Temperature	AC	DC
Operating Range	-30°C to +50°C	-30°C to +60°C
Non-operating Range	-30°C to +100°C	-30°C to +100°C

**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 120V 50/60 Hz coil, order Catalog Number 9575H3A010.

**Table 49-95. Type AA Relays**

Relay Style	Catalog Number ①	Price U.S. \$
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	

① Underscore indicates missing Code Suffix for Magnet Coil — see Selection Table below.

**Table 49-96. Coil Voltage Selection Table**

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

**Options and Accessories**

**Table 49-97. Enclosure ②**

Description	Catalog Number	Price U.S. \$
NEMA1 Enclosure —	9575H2449	

② Only 9575H3 relays without an auxiliary switch should be mounted in the 9575H2449 enclosure.

**Note:** There are no “repair parts” available for these relays.

9575H Series 3000 — AC and DC

Dimensions

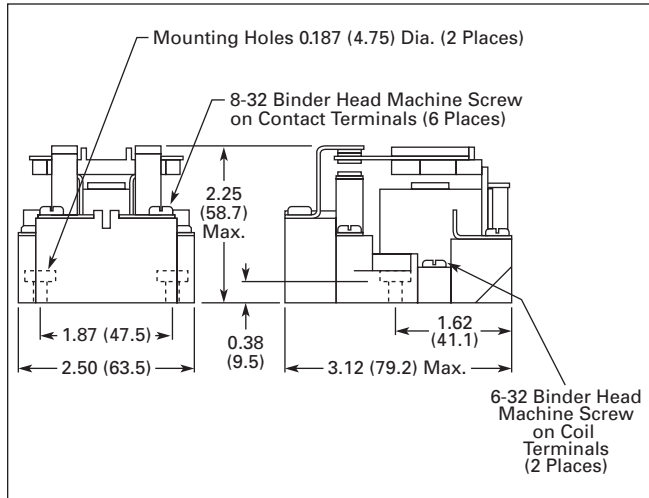


Figure 49-113. 9575H3 DPDT Relay — Approximate Dimensions in Inches (mm)

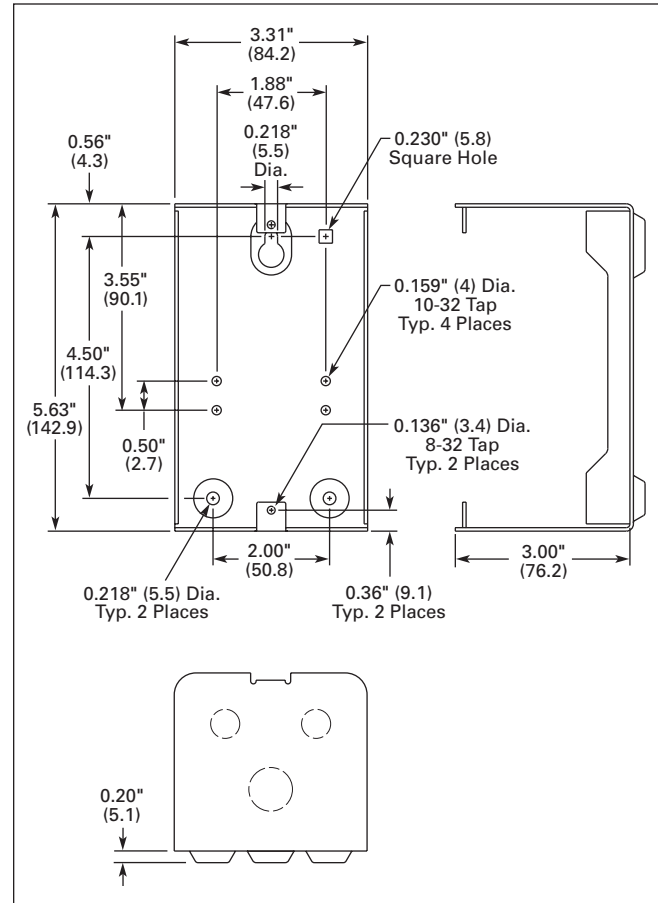


Figure 49-115. 9575H2449 — Approximate Dimensions in Inches (mm)

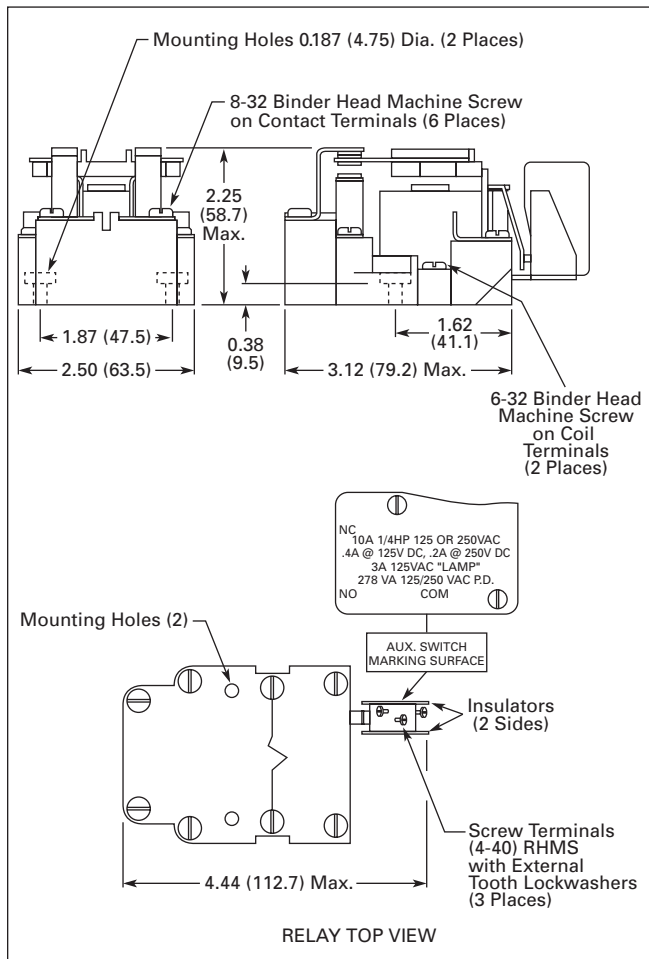


Figure 49-114. 9575H3 DPDT Relay with Auxiliary SPDT Switch — Approximate Dimensions in Inches (mm)

**Contents**

<i>Description</i>	<i>Page</i>
<b>Machine Tool Relays</b>	
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Type M — DC Multipole with Convertible Contacts . . .	49-90

**D15 Series — Freedom 600V Multipole**



**4-Pole Relay**



**4-Pole Relay with Front Contact Pole Deck Assembled**

**Product Description**

Contact poles on the D15 relay are of the fixed design and are not convertible. The basic 4-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**

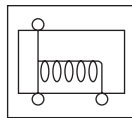
Side-mounted contact blocks can be used to provide additional poles in applications where a pneumatic timer is installed on the front of the relay. They can also be used where panel depth is restricted.

The maximum number of contacts recommended per relay is 8, 6 of which can be NC. When a pneumatic timer is used, the maximum recommended number of NC contacts is 3.

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

**Features**

- 600V, 10A 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
- Designed to meet or exceed UL, NEMA, IEC, CSA, VDE, BS and other international standards



**Standards and Certifications**



**Technical Data and Specifications**

**Table 49-98. Contact Ratings**

NEMA A600		
Continuous Thermal Rating: 10A		
AC Volts	Make	Break
120	60	6.0
240	30	3.0
480	15	1.5
600	12	1.2

NEMA P300	
Continuous Thermal Rating: 5A	
DC Volts	Make/Break Amperes
125	1.1
250	0.55

**Table 49-99. Magnet Coil Data**

AC Voltage	Pick-Up		Sealed	
	VA	Watts	VA	Watts
12 – 600V	80	49	7.5	2.4

DC Voltage	Pick-Up		Sealed	
	Amps	Watts	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

**D15 Series — Freedom 600V Multipole**

**Product Selection**

**When Ordering Specify**

- Catalog Number and Magnet Coil Code Letter. Example For a 4-pole relay having 4NO contacts with a 120V 60 Hz coil, order Catalog Number D15CR40AB.

**Table 49-100. Factory Assembled Multipole Relays**

Number of Poles	Type of Contacts		Open Type	
	NO	NC	Catalog Number <sup>①</sup>	Price U.S. \$
4	4	0	D15CR40_B	
	3	1	D15CR31_B	
	2	2	D15CR22_B	
	1	3	D15CR13_B	
	0	4	D15CR04_B	
6 (4-Pole Relay with 2-Pole Front-Mounted Deck)	6	0	D15CR60_B	
	5	1	D15CR51_B	
	4	2	D15CR42_B	
	3	3	D15CR33_B	
	2	4	D15CR24_B	
	1	5	D15CR15_B ②	
	0	6	D15CR06_B ②	
8 (4-Pole Relay with 4-Pole Front-Mounted Deck)	8	0	D15CR80_B	
	7	1	D15CR71_B	
	6	2	D15CR62_B	
	5	3	D15CR53_B	
	4	4	D15CR44_B	
	3	5	D15CR35_B ②	
	2	6	D15CR26_B ②	

① Underscore indicates missing code suffix for magnet coil — see Selection Table below.  
 ② Not all Suffix Codes available: consult Customer Support Center.

**Table 49-101. Additional Contact Poles**

Description	Catalog Number	Price U.S. \$
<b>Front Contact Pole Deck</b>		
1NO-1NC	C320KGT3	
2NO	C320KGT4	
2NC	C320KGT5	
1NO (E.C.) – 1NC (L.O.)	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 (E.C.) – 1NC (L.O.)	C320KGS7	

E.C. = Early Closing L.O. = Late Opening

**Table 49-102. Magnet Coil Selection Table**

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

**Accessories**

**Pneumatic Timer Attachment**

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.



**C320 Pneumatic Timer Attachment**

**Table 49-103. Pneumatic Timer Attachment**

Timing Range	Catalog Number	Price U.S. \$
0.1 to 30 Seconds	C320TP1	
10 to 180 Seconds	C320TP2	

**Table 49-104. Maximum Ampere Ratings**

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

**Finger Protection Shields**

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

**Table 49-105. Finger Protection Shields**

Application	Catalog Number	Price U.S. \$
D15	C320LS1	

**Adhesive Dust Cover**

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.

**Table 49-106. Adhesive Dust Cover**

Catalog Number	Price U.S. \$
C320DSTCVR (25 to a package)	

### Solid-State ON DELAY Timer — Side Mounted on Freedom Series NEMA 00 – 2, D15, IEC A – K and C25D, C25E and C25F Frame

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.



**Solid-State Timer**

**Table 49-107. Mounted Timer**

Timing Range	Catalog Number ①②③	Price U.S. \$
0.1 – 1.0 Seconds	<b>C320TDN1_</b>	
1 – 30 Seconds	<b>C320TDN30_</b>	
30 – 300 Seconds	<b>C320TDN300_</b>	
5 – 30 Minutes	<b>C320TDN3000_</b>	

- ① Add operating voltage Suffix to Catalog Number. **A** = 120V, **B** = 240V, **E** = 208V
- ② Rated 0.5 ampere pilot duty — not to be used on larger contactors.
- ③ Terminal connections are quick connects only. Two per side.

### Metal Mounting Plate

Fits all D15 Multipole Relays.



**Table 49-108. Mounting Plate**

Description	Catalog Number	Price U.S. \$
Metal Mounting Plate	<b>C321MP1</b>	

### Mounting Channel (DIN Rail)

Designed for DIN rail mounting of Freedom Series relays.



**DIN Rail**

**Table 49-109. Mounting Channel (DIN Rail)**

Description	Catalog Number	Price U.S. \$
1 Meter Length	<b>XBANS3575P</b>	

### Transient Suppressor Kits

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 – 120V, 208 – 240V or 277 – 480V coils respectively.



**Cat. No. C320TS2**

These devices mount directly to the coil terminals.

**Table 49-110. Transient Suppressor Kits**

Description	Coil Voltage 50/60 Hz ④	Catalog Number	Price U.S. \$
Transient Suppressor	24/120V 208/240V 277/480V	<b>C320TS1</b> <b>C320TS2</b> <b>C320TS3</b>	

- ④ Suppressor is compatible with coil voltages/ ranges as shown, both 50 and 60 Hz.

### DC/AC Interface Module

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



**Cat. No. C320DC**

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 – 100A. It also has provisions for DIN rail mounting.

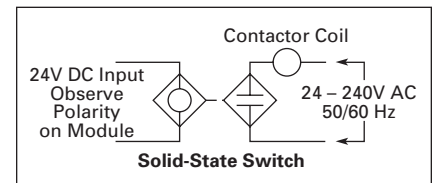
The module will operate coils within the voltage ranges shown in **Table 49-111**.

### Design Characteristics

- DC Input: 24V ±10% at mA nominal
- AC Operating Voltage: 24 – 240V AC ±10% 50/60 Hz
- AC Current Rating: 10A make (inrush), 1A break (sealed)

**Table 49-111. Controller Coil Voltage Ranges**

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



**Figure 49-116. Typical Application**

### Terminal Marking

Relay terminals are identified by a two digit number in accordance with International Standards approved by CEN-ELEC (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.

Example of marking with 2NO and 2NC contacts:

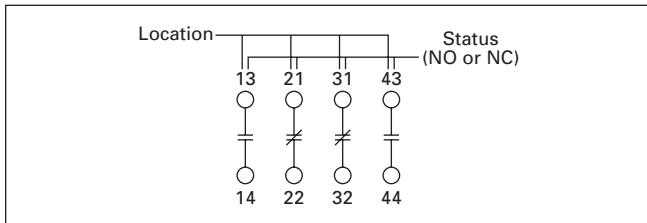


Figure 49-117. Terminal Marking

### Dimensions

Table 49-112. Approximate Dimensions in Inches (mm) and Shipping Weights.

Description	Dimension C in Inches (mm)	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)

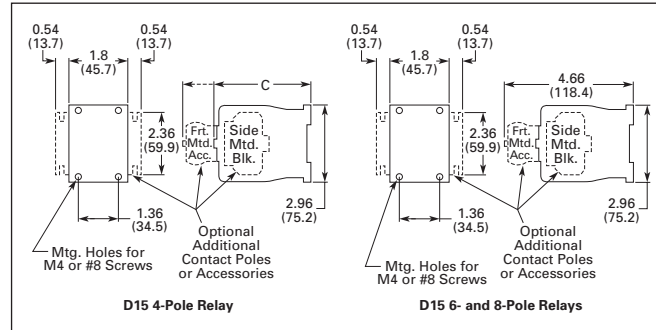
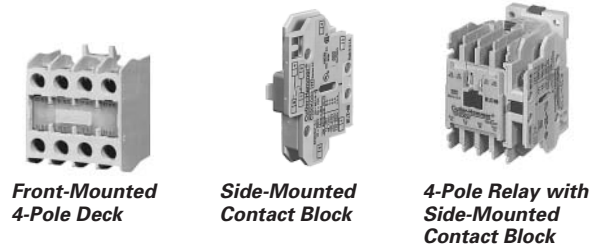


Figure 49-118. Approximate Dimensions in Inches (mm)

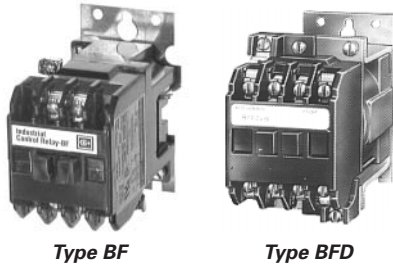


Front-Mounted 4-Pole Deck

Side-Mounted Contact Block

4-Pole Relay with Side-Mounted Contact Block

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



Type BF

Type BFD

**Product Description**

Type BF is AC operated, 300V maximum, and the BFD is DC operated, 250V. Fixed contact relays are available in any combination of NO and NC from two to twelve 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.

**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)

**Technical Data and Specifications**

Table 49-113. 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)				DC Rating — NEMA P300			
Phase	AC Volts		Volts	Maximum Current			Max. Make or Break VA
	115	230		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				Coil Power Requirements			
125V DC: 3A 250V DC: 1.5A				AC: 72 VA open, 22 VA closed DC: 12 watts (nominal), 250V max.			

**Options**

Table 49-114. Options

Description	Code Letter or	Catalog Number	Price U.S. \$
<b>FASTON Push-On Terminals</b> Insert letter <b>F</b> after relay type designation in listed Catalog Number. Example: BFF20F or BFDF20S	<b>F</b>	—	
<b>Overlapping Contacts</b> 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>	—	
<b>NEMA 1 Enclosure for Relay Types</b> BF, AR — all poles BFD — 4 – 8 poles ARD — 4 – 6 poles	—	4977D40G04 4977D40G04 4977D40G04	

**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: BF80V for a 110/60 AC coil.

**Table 49-115. Complete Relay**

Number of Poles	Type of Contact		BF 300V AC Basic Relays 120/60, 110/50 AC Coil		BFD 250V DC Basic Relays 120 DC Coil	
	NO (Form A)	NC (Form B)	Catalog Number	Price U.S. \$	Catalog Number	Price U.S. \$
2	2	0	BF20F		BFD20S	
	1	1	BF11F		BFD11S	
	0	2	BF02F		BFD02S	
3	3	0	BF30F		BFD30S	
	2	1	BF21F		BFD21S ①	
	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	
8	8	0	BF80F		BFD80S	
	7	1	BF71F		BFD71S	
	6	2	BF62F		BFD62S	
	5	3	BF53F		BFD53S	
	4	4	BF44F		BFD44S	
	0	8	BF08F		BFD08S	
10	10	0	BF100F		BFD100S	
	8	2	BF82F		BFD82S ①	
	7	3	BF73F ①		BFD73S	
	6	4	BF64F		BFD64S	
	5	5	BF55F		BFD55S ①	
	4	6	BF46F		BFD46S	
	2	8	BF28F		BFD28S	
12	12	0	BF120F		BFD120S	
	8	4	BF84F		BFD84S	
	7	5	BF75F		BFD75S	
	6	6	BF66F		BFD66S	
	5	7	BF57F		BFD57S	
	4	8	BF48F		BFD48S	

① Consult Customer Support Center for availability.

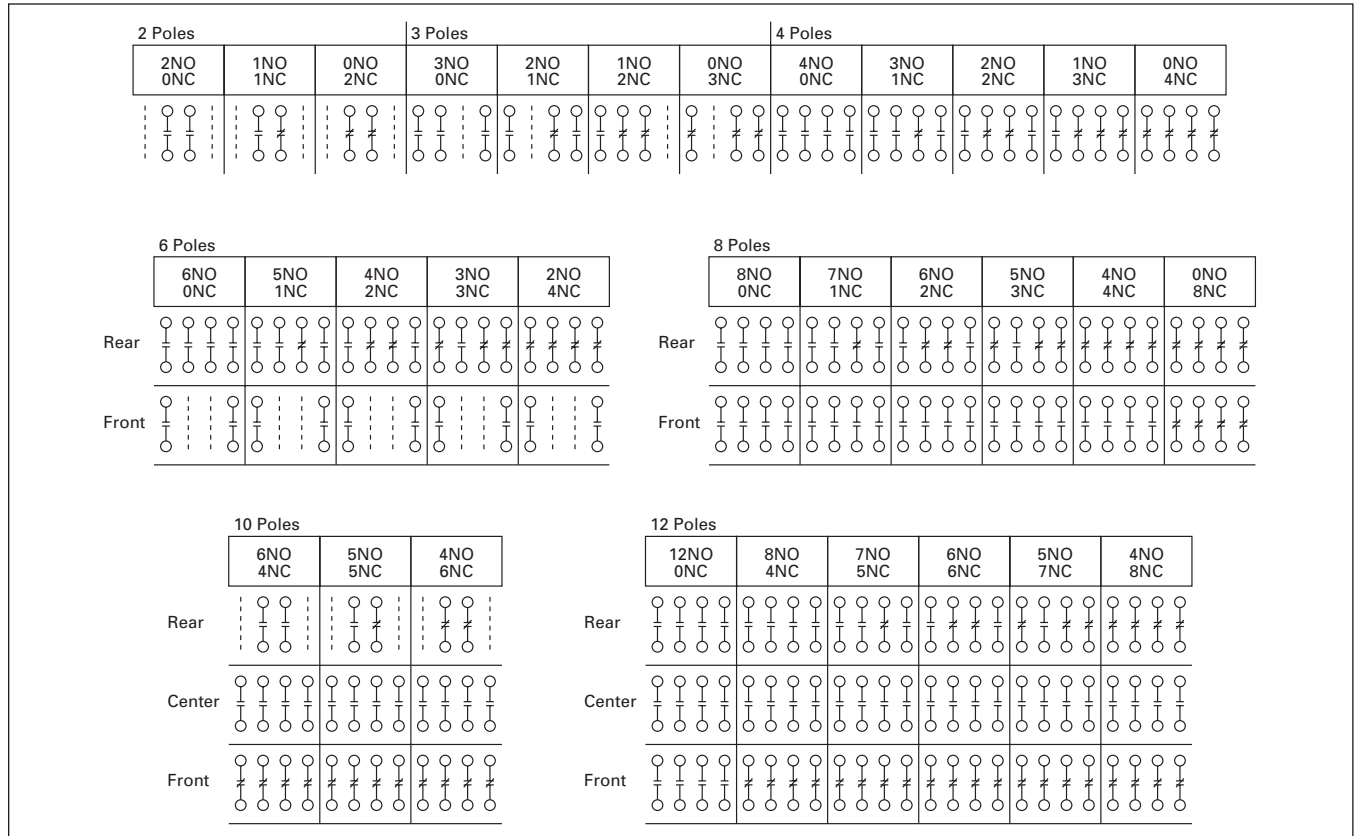
**Note:** Relays listed above with equal number of NO and NC contact poles are specially priced — 1NO and 1NC pole are supplied at no additional charge.

**Table 49-116. Coil Voltage Table**

BF Coils			BFD Coils	
Volts AC	Hz	Suffix Code	Volts DC	Suffix Code
12	60	H	6	C
24	60	I	12	D
48	60	J	24	L
110	60	V	38	N
110/120	50/60	F	48	M
208	60	K	72	E
220/240	50/60	G	95	B
440	60	C	120	S
			130	U
			240	T



**Contact Arrangements**



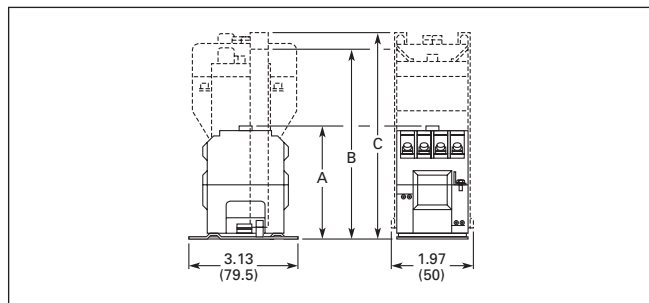
**Figure 49-119. Contact Arrangements for BF, BFD Relays**

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

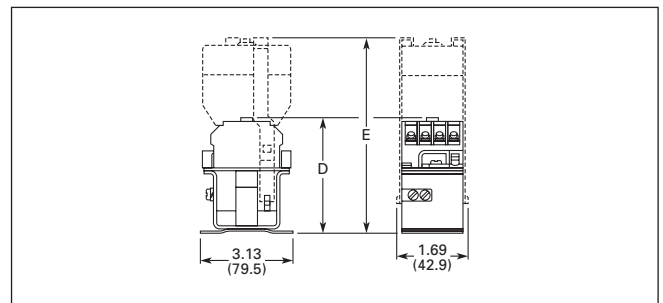
**Dimensions**

**Table 49-117. Dimensions**

Number of Poles	Approximate Dimensions in Inches (mm)				
	A BF Only	B BF with Latch	C BF with Timer	D BFD Only	E BFD with 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)



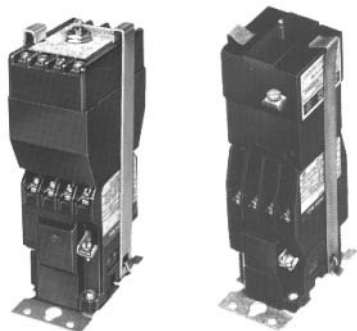
**Figure 49-120. BF Relay with Permanent Magnet Latch and Solid-State Timer — Approximate Dimensions in Inches (mm)**



**Figure 49-121. BFD Relay with Solid-State Timer — Approximate Dimensions in Inches (mm)**

**Enclosures**

See Page 49-86.



*Solid-State Timer, Relay Mounted*     *Permanent Magnet Latch, Relay Mounted*

### Solid-State Timers

- Field-convertible to 48 or 24V DC
- Self-contained units have one NO solid-state contact.

**Table 49-118. Solid-State Timers**

Voltage	Time Delay Range	Catalog Number <sup>①</sup>	Price U.S. \$
<b>ON Delay</b>			
AC	0.1 to 30 Seconds	<b>BST-ON</b>	
AC	30 to 60 Seconds	<b>BST-ONB</b>	
DC	0.1 to 30 Seconds	<b>BSTD-ON</b>	
<b>OFF Delay</b>			
AC	0.1 to 30 Seconds	<b>BST-OFF</b>	
AC	30 to 60 Seconds	<b>BST-OFFB</b>	
DC	0.1 to 30 Seconds	<b>BSTD-OFF</b>	

<sup>①</sup> For panel mount add Suffix F.

**Table 49-119. Options**

Description	Code Letter	Adder U.S. \$
<b>Panel Mounted Timers</b> Add Suffix Code to Catalog Number	<b>P</b> <sup>②</sup>	

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

**Table 49-120. Permanent Magnet Latch**

Coil Volts	Coil Hz	Catalog Number	Price U.S. \$
<b>AC Relays</b>			
24	60	<b>BFMLI</b> <sup>③</sup>	
48	60	<b>BFMLJ</b> <sup>③</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>	

<sup>③</sup> Consult Customer Support Center for availability.

### Application Description

#### Timers Only

- Minimal time-setting drift with age
- Adjustable timing range
- Increased resolution on short time adjustments
- Operation in adverse environments

#### 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 1 relay

#### Permanent Magnet Latch

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

### Specifications

#### Timer

- Input
  - 120/110V AC, 50/60 Hz, ±10%
  - 250, 120, 48, 24V DC, ±10%
- Power required: 2 VA maximum
- Contact ratings
  - BST: will switch 120V AC BF relay
  - BSTD: will switch BFD relays
    - 120V DC: 0.1A
    - 48V DC: 0.25A
    - 24V DC: 0.5A
- Repeatability: ±3% of time setting for ±10% change in line voltage, or 15°C change in ambient temperature
- Ambient temperature range: -20° to 70°C
- Duty cycle: 150 operations/minute maximum
- BST and BSTD reset time:
  - ON delay
    - BST: 50 ms maximum
    - BSTD: 100 ms (independent of time setting and duty cycle)
  - OFF delay
    - instantaneous

#### Permanent Magnet Latch

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

**AR/ARD Series —  
Convertible Contact  
Industrial Control**



*AR 4-Pole*

*AR 6-Pole*

**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.

**Operation**

AR relays are available in either 4- or 6-pole configurations. AR relays are easily converted to 8 or 10 poles simply by adding a 4-pole deck. In addition, mechanical latch and solid-state timer attachments are available with 4- and 6-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

**Technical Data and Specifications**

**Table 49-121. Specifications**

Contact Ratings — 600V AC 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 Make or Break
	Cont.	Make or Break	
125	5	1.10	138
250	5	0.55	138
600	5	0.20	138

Resistive Rating	Coil Power Requirements
125V DC: 3A 250V DC: 1.5A	AC: 96 VA open, 14 VA closed DC: 14 watts open, 250V max.

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

**Options**

**Table 49-122. Options**

Description	Suffix Code	Adder U.S. \$
<b>Convertible Contacts</b> AR and ARD relays listed are supplied with NO contacts which are easily converted to NC. If both NO and NC poles are required, order by Catalog Number. Example: 4-pole relay with 1NO and 3NC contacts, order AR413A.	①	
<b>Screw Terminals</b> For ring-type connectors, add Suffix <b>R</b> to the Catalog Number. Example: AR420AR.	<b>R</b>	
<b>Overlapping Contacts</b> 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: AR402AS. 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	

① Consult Customer Support Center for availability.

**Accessories**

**Four-Pole Top Deck Adder**

- Increases contact capacity from four/six poles to eight/ten poles.
- Mounts on top of basic relay using three screws.
- Will not interfere with wiring, testing or convertible cartridges.



*Four-Pole Top Deck Adder*

- Screw terminals for ring connectors available; to order add Suffix **R** to Catalog Number listed below.

**Table 49-123. Four-Pole Top Deck Adder**

No. of Pole Spaces	Contacts			Catalog Number	Price U.S. \$
	NO	NC	Blank Cavities		
<b>With 600V AC Cartridges</b>					
4	2	0	2	ARA20 ARA40	
	4	0	0		
<b>With 600V DC Cartridges</b>					
4	2	0	2	ARDA20 ARDA40	
	4	0	0		

**AR/ARD Series — Convertible Contact Industrial Control**

**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: AR64V for a 110/60 AC coil.

**Table 49-124. AR/ARD Relays**

Number of Pole Spaces	Contacts			AR 600V AC Relays 120/60, 110/50 AC Coil		ARD 600V DC Relays 120 DC Coil	
	NO	NC	Blank Cavities	Catalog Number	Price U.S. \$	Catalog Number	Price U.S. \$
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	

① Will not accept top-mounted latch or timers.

② Contact Customer Support Center for availability.

**Table 49-125. Coil Voltage Table**

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		

**Table 49-126. Contact Cartridges — 600V**

Type Terminal	Standard Contact Cartridge		Overlap Contact Cartridge	
	Catalog Number <sup>③</sup>	Price U.S. \$	Catalog Number <sup>④</sup>	Price U.S. \$
<b>AC Cartridges</b> With Clamp Terminals With Screw Terminals	ARC ARCR		AROC AROCR	
<b>DC Cartridges</b> With Clamp Terminals With Screw Terminals	ARDC ARDCR		ARDOC ARDOCR	

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.



**Catalog Number  
ARML Permanent  
Magnet Latch for  
AR/ARD Relays**

**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

**Table 49-127. Permanent Magnet Latch**

Operating Volts	Coil Hz	Catalog Number	Price U.S. \$
<b>For AC Control Circuits</b>			
24	60	ARMLI	
48	60	ARMLG	
120	60/50	ARMLA	
240	60/50	ARMLW	
<b>For DC Control Circuits</b>			
24	—	ARMLL	
48	—	ARMLM	
120	—	ARMLS	
240	—	ARMLT	

**Reference Information**

- ART, ARTD: IL 14510, IL 14485



**ART Solid-State  
Timer**

**Solid-State Timer**

- Mounts on basic four- or six-pole relay using two screws
- Has one NO solid-state contact
- ON delay or OFF delay applications
- Will switch 120V AC and DC coils
- ARTD is field convertible to 24 or 48V DC

**Table 49-128. Solid-State Timer**

Volts	Time Delay Seconds	ON Delay		OFF Delay	
		Catalog Number	Price U.S. \$	Catalog Number	Price U.S. \$
AC	0.1 – 30	ART-ON		ART-OF	
AC	30.0 – 60	ART-ONB		ART-OFB	
DC	0.1 – 30	ARTD-ON		ARTD-OF	

**Solid-State Timer Electrical Ratings**

- Input
  - 120V AC, ±10%, 50/60 Hz
  - 120, 48, 24V DC, ±10%
- Power Required: AC, DC: 2 VA max.
- Contact Ratings: AC, 0.2A inductive
  - Inrush: 1.3A max.
- DC will switch 4, 8 and 10-pole ARD relays
  - 48V DC: 0.25A
  - 24V DC: 0.5A
- Repeatability
  - AC ±2% w/10% voltage variation ±7.5% and 15% temperature variation
  - DC ±1% w/10% voltage variation and 15°C temperature variation

**Specifications**

- Ambient Temp. Range: -20° to 70°C
- Duty Cycle
  - AC, DC: 150 operations/minute max.
- Reset Time ART and ARTD
  - ON Delay ART: 50 ms max.
  - ON Delay ARTD: 100 ms independent of time setting and duty cycle
  - OFF Delay: instantaneous



**Catalog Number  
ARSS Surge  
Suppressor for  
AR Relays**

**Surge Suppressor**

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

**Table 49-129. Surge Suppressor**

Catalog Number	Price U.S. \$
ARSS	

Dimensions and Enclosures

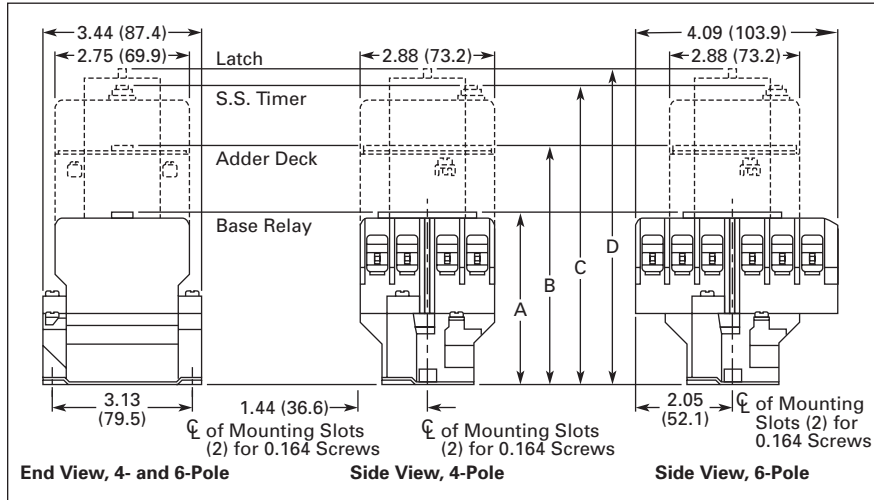


Figure 49-122. 4- and 6-Pole with 4-Pole Adder, Solid-State Timer and Mechanical Latch — Approximate Dimensions in Inches (mm)

Table 49-130. 4- and 6-Pole with 4-Pole Adder, Solid-State Timer and Mechanical Latch

Relay Catalog Number	Approximate Dimensions in Inches (mm)			
	A 4-, 6-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)

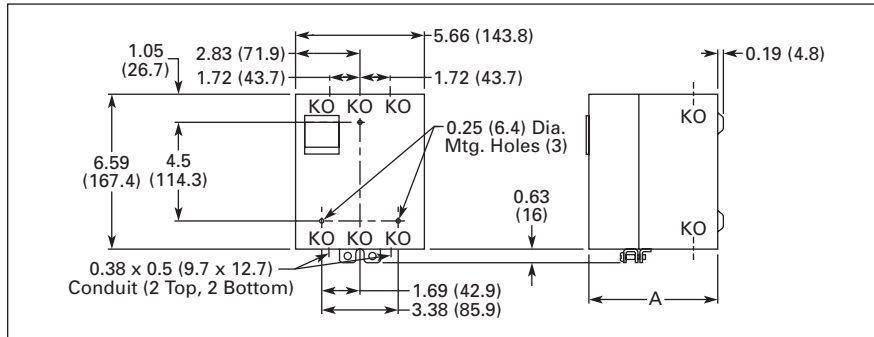
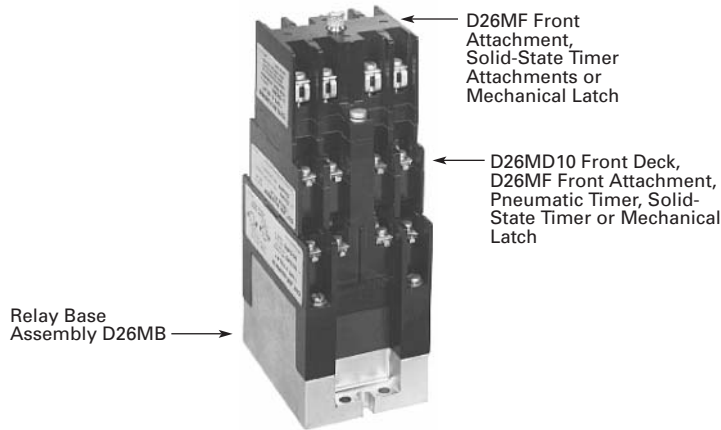


Figure 49-123. Enclosures — NEMA 1 for BF, BFD, AR and DFRD — Approximate Dimensions in Inches (mm)

Table 49-131. Enclosures — NEMA 1 for BF, BFD, AR, ARD

Catalog Number	Poles	Dimension A in Inches (mm) NEMA 1
<b>Relays without Attachments</b>		
BF, AR, ARD	All	5.34 (135.6)
BFD	4 – 8	5.34 (135.6)
BFD	10, 12	7.97 (202.4)
<b>Relays with Attachments</b>		
BF, AR, ARD	All	7.97 (202.4)

**D26 Series — Type M —  
600V AC Multipole with  
Convertible Contacts**



**Relay Component Parts Location**

**Product Description**

Relays can be ordered as complete devices in any pole combination up to a maximum of 12NO or 8NC and 4 NO poles, or can be assembled from components shown on **Pages 49-88 – 49-89**.

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

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.

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

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).

**Standards and Certifications**

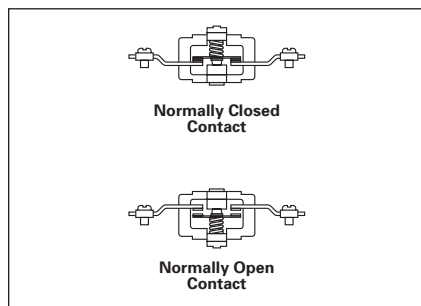
- UL Listed — Class No. NKCR2, File E1230(N).
- CSA Certified — File LR353

**Technical Data and Specifications**

**Table 49-132. Specifications**

Contact Ratings (Amperes) A600						
AC Volts ①	Make and Emergency Interrupting Capacity		Break		Continuous Thermal Rating	
120	60		6		10	
240	30		3		10	
480	15		1.5		10	
600	12		1.2		10	
Coil Power					Operating Time	
Relay	Watts		VA		Milliseconds	
	Inrush	Sealed	Inrush	Sealed		
2- to 12-Pole Latch Coil	95.0	9	155	22	Pick-Up	6 – 13
	18.5	11	41	17	Drop-Out	8 – 26

① For DC contact ratings, see **Page 49-90**.



**Figure 49-124. Mechanical Latch**

D26 Series — Type M, 600V AC Multipole with Convertible Contacts



4-Pole



4-Pole  
with Latch



4-Pole with Pneumatic  
Timer Attachment

Product Selection — 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 120V, 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.

Table 49-133. Complete AC Relays

Number of Contacts	Type of Contacts		Open Type				
	NO	NC	Relay Only		Relay with Mechanical Latch		
			Catalog Number	Price U.S. \$	Catalog Number	Price U.S. \$	
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		
4	0	3	D26MR03		D26MR032		
	4	0	D26MR40		D26MR402		
	3	1	D26MR31		D26MR312		
	2	2	D26MR22		D26MR222		
6	1	3	D26MR13		D26MR132		
	0	4	D26MR04		D26MR042		
	6	0	D26MR60		D26MR602		
	5	1	D26MR51		D26MR512		
8	4	2	D26MR42		D26MR422		
	3	3	D26MR33		D26MR332		
	2	4	D26MR24		D26MR242		
	1	5	D26MR15		D26MR152		
	0	6	D26MR06		D26MR062		
	8	0	D26MR80		D26MR802		
	7	1	D26MR71		D26MR712		
	6	2	D26MR62		D26MR622		
10 - 12	5	3	D26MR53		D26MR532		
	4	4	D26MR44		D26MR442		
	3	5	D26MR35		D26MR352		
	2	6	D26MR26		D26MR262		
	1	7	D26MR17		D26MR172		
	0	8	D26MR08		D26MR082		
	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.						

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

The relays listed below 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 49-89.

Table 49-134. Relay with Pneumatic Timer Attachment

Number of Available Instantaneous Contact Positions (Order Contacts Separately — Catalog Number D26MPR)	Timer Operation			
	ON Delay		OFF Delay	
	Catalog Number ①	Price U.S. \$	Catalog Number ①	Price U.S. \$
4	D26MR005		D26MR006	

① Consult Customer Support Center for availability.

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

Table 49-135. Magnet Coil Selection Table

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

② Consult Customer Support Center for availability.

Product Selection — Component Parts  
Separate Contacts



Front Pole

Rear Pole

Table 49-136. Separate Contacts

Description	Catalog Number	Price U.S. \$
<b>Convertible Contacts</b>		
Rear Pole – NO	D26MPR	
Rear Pole – NC	D26MPR02	
Front Pole – NO	D26MPF	
Front Pole – NC	D26MPF02	
Gold Plated (for low power circuits)		
Rear Pole – NO	D26MPR03	
Front Pole – NO	D26MPF03	
<b>Non-convertible Contacts</b>		
Rear Pole NO Early Closing ③	D26MPS	
Rear Pole NC Late Opening ③	D26MPL	

③ To obtain overlapping contacts, these two special poles must be used in related circuits.





**Relay Base Assembly  
(without Poles)**

Basic 4-pole D26 relay without contacts. Provision for adding one to four poles as needed, **D26MPR**, **D26MPL** and/or **D26MPS** rear pole type.

**Table 49-137. Relay Base Assembly**

Catalog Number	Price U.S. \$
D26MB ①	

① Add Magnet Coil Suffix letter, see **Page 49-88**.  
Example: D26MBA.



**Front Deck  
(Convertible Contact Poles)**

Provides up to 4 additional front pole type D26MPF contacts. Convertible, NO to NC.

**Table 49-138. Front Deck**

Description	Catalog Number	Price U.S. \$
Front Deck with: 1NO Contact Pole 2NO Contact Poles 4NO Contact Poles	<b>D26MD10</b> <b>D26MD20</b> <b>D26MD40</b>	



**Four-Pole Front Attachment  
(4NO Fixed Circuit)**

Can be added to any 2- to 8-pole Type M, D26 relay to provide up to a 12-pole relay. Four NO, non-convertible contacts are included in this assembly.

**Table 49-139. Four-Pole Front Attachment**

Catalog Number	Price U.S. \$
D26MF	



**Relay State Indicating Light**

Light provided with leads and bracket for mounting on 2- to 12-pole relays. May be used to monitor state of magnet coil or relay contact operation.

**Table 49-140. Relay State Indicating Light**

Description	Catalog Number	Price U.S. \$
120V AC, 50/60 Hz 240V AC, 50/60 Hz	<b>D26MAP120</b> <b>D26MAP240</b>	



**Pneumatic Timer Attachment**

Attachment mounts on any 0- to 4-pole D26 relay without latch. Timer unit has DPDT timed contacts (circuits in each pole must be the same polarity). Adjustable timing range — 0.1 to 180 seconds, repeat accuracy ±10%. Units are convertible from OFF delay to ON delay or vice versa.

**Table 49-141. Pneumatic Timer Attachment**

Description	Catalog Number	Price U.S. \$
ON Delay OFF Delay	<b>D26MTE</b> <b>D26MTD</b>	



**Mounting Channel**

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

**Table 49-142. Mounting Channel**

Description	Catalog Number	Price U.S. \$
10" Length for 4 Relays 20" Length for 8 Relays 30" Length for 12 Relays 40" Length for 16 Relays	<b>D26MC4</b> <b>D26MC8</b> <b>D26MC12</b> <b>D26MC16</b>	

**Note:** See Dimensions on **Page 49-92**.

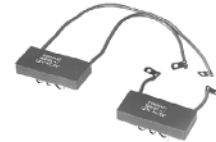


**Manual Test Accessory**

Tool to manually hold relays in the energized position for circuitry testing on completed panel. (10 per box, order in multiples of 10.)

**Table 49-143. Manual Test Accessory**

Catalog Number	Price U.S. \$
D26MTA	



**Transient Suppressor**

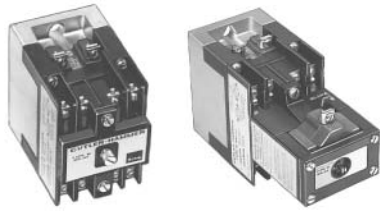
May be mounted on any 120V AC relay magnet coil or latch coil or 120V DC latch coil — connects directly across coil terminals. All DC magnet coils have a built-in varistor for transient suppression. Limits high voltage transients produced in the circuit when power is removed from the coil.

**Table 49-144. Transient Suppressor**

Description	Catalog Number	Price U.S. \$
Magnet Coil Transient Suppressor	<b>D26MAS1</b>	
Latch Coil Transient Suppressor	<b>D26MAS2</b>	

D26 Series — Type M, DC Multipole with Convertible Contacts

D26 Series — Type M —  
DC Multipole with  
Convertible Contacts



3-Pole

3-Pole with Latch

Product Description

Type M, DC multipole relays are physically and mechanically similar to the (D26) Type M AC relays described on **Page 49-87**. 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 pick-up winding of the magnet coil. (Contact is shown as L in **Figure 49-125**.) 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 49-125**.)

**Component parts for these relays** are the same as those listed for the (D26) Type M AC relays on **Pages 49-88** and **49-89**, 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 pick-up position. With the relay coil de-energized, energizing the latch coil will allow the relay to drop out.

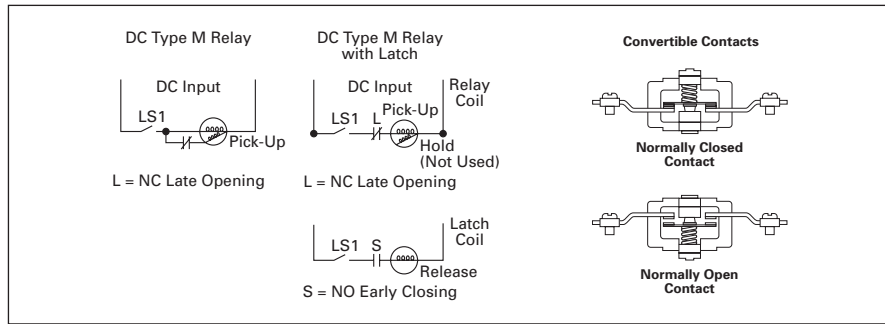


Figure 49-125. Latch Operation

Technical Data and Specifications

Table 49-145. Specifications

Contact Ratings (Amperes) ①				
DC Volts	Inductive Make/Break		Resistive Make/Break	
	28	7.0		10.0
48	2.5		10.0	
120	1.1		2.0	
240	0.2		0.4	
Coil Power			Operating Time	
Relay	Watts		Average Milliseconds	
	Inrush	Sealed	Pick-Up	Drop-Out
2 – 11 Poles	168	13.2		10
Latch Coil	21.6 Intermittent			16

① Contact ratings do not apply to contacts D26MPL and D26MPS. For AC contact ratings, see **Page 49-87**.

Product Selection



3-Pole with Timer Attachment

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

The relays listed below 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 49-89**.

Table 49-146. Relay with Pneumatic Timer Attachment

Number of Available Instantaneous Contact Positions (Order Contacts Separately — Catalog Number D26MPR)	Timer Operation			
	ON Delay		OFF Delay	
	Catalog Number	Price U.S. \$	Catalog Number	Price U.S. \$
3	D26MRD005		D26MRD006	

**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 120V DC coil, order **D26MRD40A1**.

**Table 49-147. Complete DC Relays**

Number of Contacts	Type of Contacts <sup>①</sup>		Open Type			
	NO	NC	Relay Only		Relay with Mechanical Latch	
			Catalog Number	Price U.S. \$	Catalog Number	Price U.S. \$
2	2	0	D26MRD20		D26MRD202	
	1	1	D26MRD11		D26MRD112	
	0	2	D26MRD02		D26MRD022	
3	3	0	D26MRD30		D26MRD302	
	2	1	D26MRD21		D26MRD212	
	1	2	D26MRD12		D26MRD122	
	0	3	D26MRD03		D26MRD032	
4	4	0	D26MRD40		D26MRD402	
	3	1	D26MRD31		D26MRD312	
	2	2	D26MRD22		D26MRD222	
	1	3	D26MRD13		D26MRD132	
	0	4	D26MRD04		D26MRD042	
6	6	0	D26MRD60		D26MRD602	
	5	1	D26MRD51		D26MRD512	
	4	2	D26MRD42		D26MRD422	
	3	3	D26MRD33		D26MRD332	
	2	4	D26MRD24		D26MRD242	
	1	5	D26MRD15		D26MRD152	
7	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		—		
10 – 11	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 D26MRD704A1.					

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

**Table 49-148. Magnet Coil Selection**

Volts DC	Suffix Number	Volts DC	Suffix Number
12	R1	120	A1
24	T1	240	B1
48	W1		

D26 Series — Type M, DC Multipole with Convertible Contacts

AC and DC Dimensions

Table 49-149. AC and DC D26 Relays — Approximate Dimensions in Inches (mm) and Shipping Wts.

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

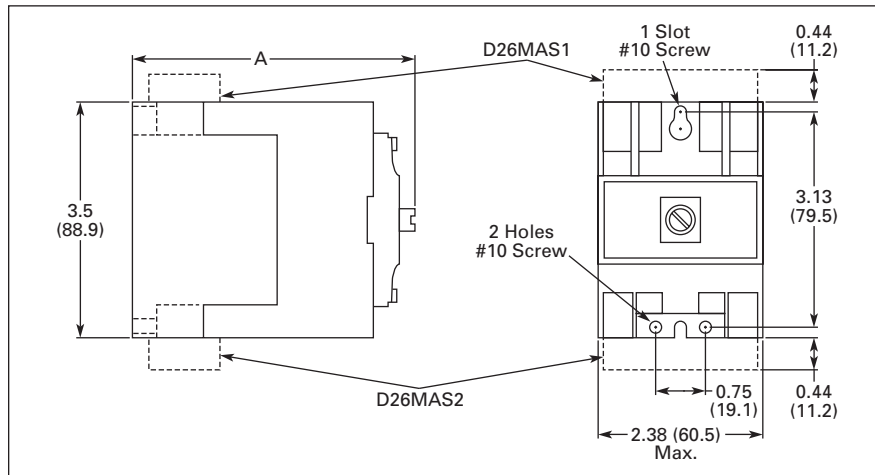


Figure 49-126. Approximate Relay Dimensions in Inches (mm)

Table 49-150. Approximate Mounting Channel Dimensions in Inches (mm)

Catalog Number	A Dim.	B Dim.
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.

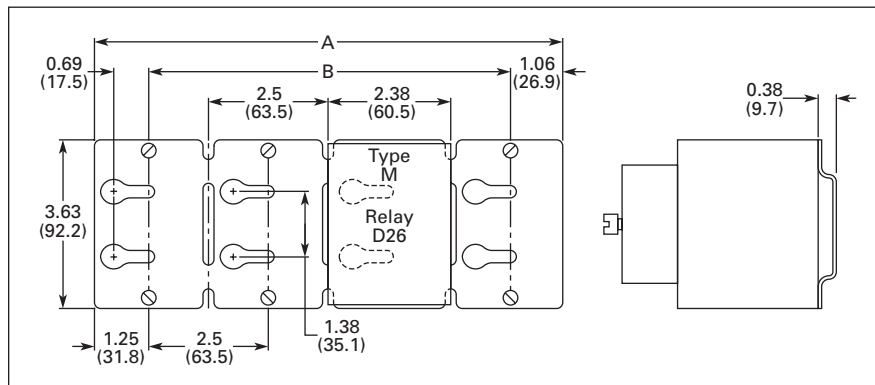


Figure 49-127. Approximate Mounting Channel Dimensions in Inches (mm)

### TMR5 Series



*TMR5 Time Delay Relays*

### 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 in to standard 8- or 11-Pin socket
- 10A DPDT output contacts
- Can be easily customized to meet your needs

### Standards and Certifications



### Technical Data and Specifications

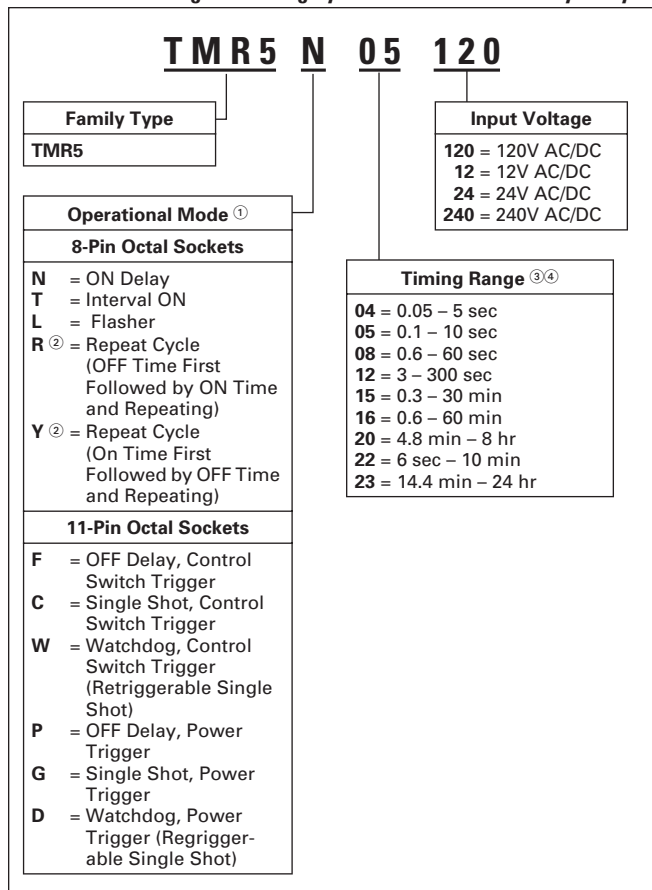
**Table 49-151. TMR5 Time Delay Relays — Technical Data**

Description	Specifications
Voltage Tolerance: AC Operation DC Operation	+10/-15% of nominal at 50/60 Hz +10/-15% of nominal
Load Burden	2 VA
Setting Accuracy: Maximum Setting (Adjustable) Minimum Setting (Adjustable) Fixed Time Delay: < 2 Seconds 0.1 – 2 Seconds	+5%, -0% +0%, -50% +1% ±5%
Repeat Accuracy (constant voltage and temperature): > 2 Seconds Delay 0.1 – 2 Seconds Delay	±0.1% ±2%
Reset Time: On Delay/Interval/Repeat Cycle Off Delay/Single Shot/Watchdog	0.1 Seconds 0.04 Seconds
Start-Up Time (time from when power is applied until unit is timing): 120 and 240V Units 12, 24 and 48V Units	0.05 Seconds 0.08 Seconds
Maintain Function Time (time unit continues to time after power is removed)	0.01 Seconds
Temperature: 12 – 120V Input Voltage 240V Input Voltage	-18° to 150°F (-28° to 65°C) -18° to 122°F (-28° to 50°C)
Insulation Voltage	2,000V
Output Contacts	DPDT 10A @ 240V AC / 30V DC, 1/2 hp @ 120/240V AC (NO contacts) 1/3 hp @ 120/240V AC (NC contacts) B300 and R300; AC-15 and DC-13
Life: Mechanical Full Load	10,000,000 operations 100,000 operations

TMR5 Series

### Catalog Numbering System

Table 49-152. Catalog Numbering System — TMR5 Time Delay Relays



- ① For more information on each operational mode, see Pages 49-95 and 49-96.
- ② 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).
- ③ Any time range can be created as a custom unit. Contact Eaton for details.
- ④ Fixed Time Delay settings are available for orders of 50 pieces or more. Contact EatonCare for additional information at 877-ETN-CARE (386-2273).

### Product Selection

**When Ordering Specify**

- Catalog Number of Timing Relay

Table 49-153. Product Selection — TMR5 Time Delay Relays

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

All configurations from Catalog Numbering System are available.

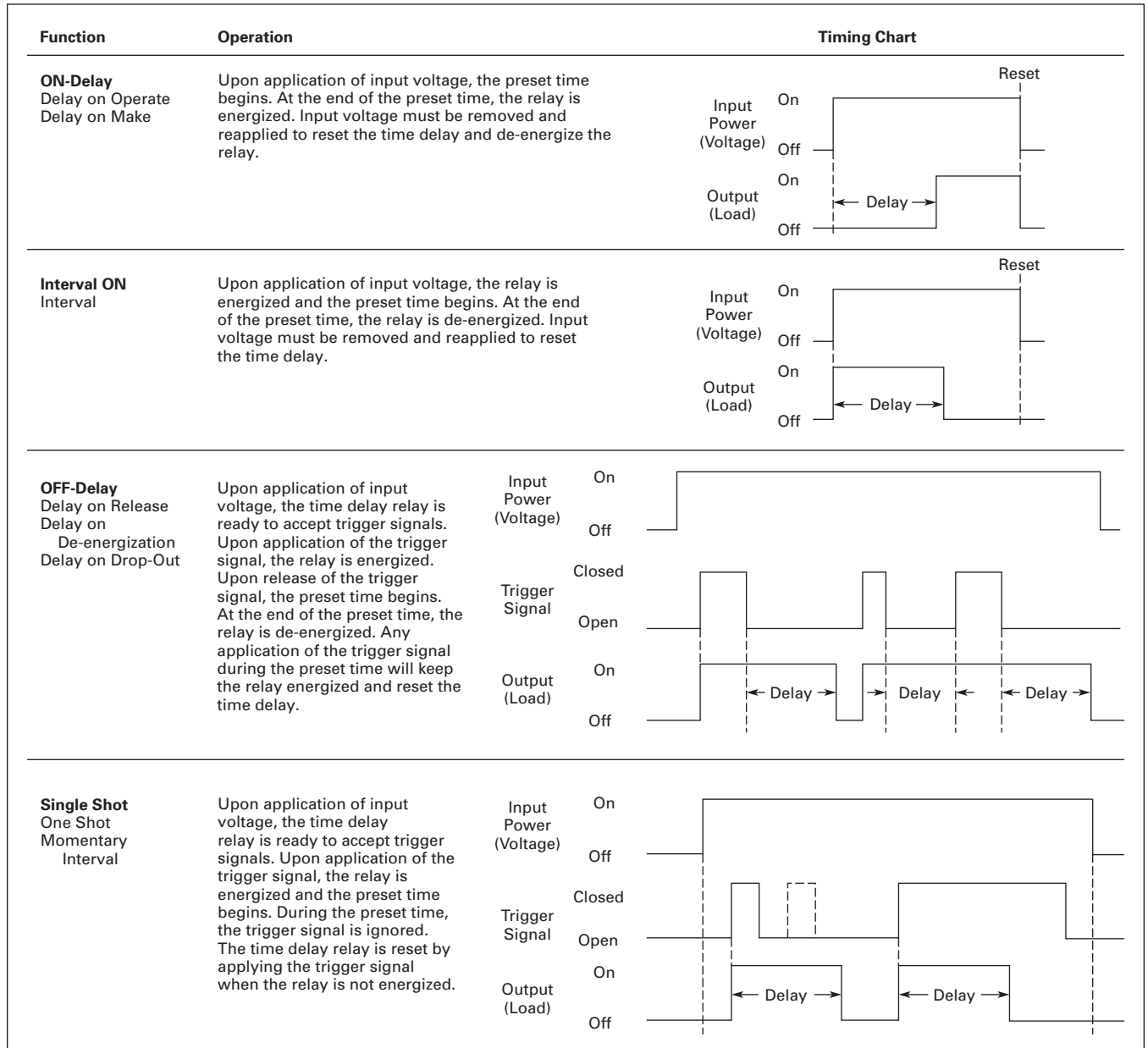
### Accessories

Table 49-154. Accessories for Use with TMR5 Time Delay Relays

Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
11-Pin Socket	10	D3PA3-A2	
Hold Down Spring	10	D65CHDS	

Discount Symbol ..... 1CD1

**Operation**



**Figure 49-128. Operational Figures (1 of 2)**

TMR5 Series

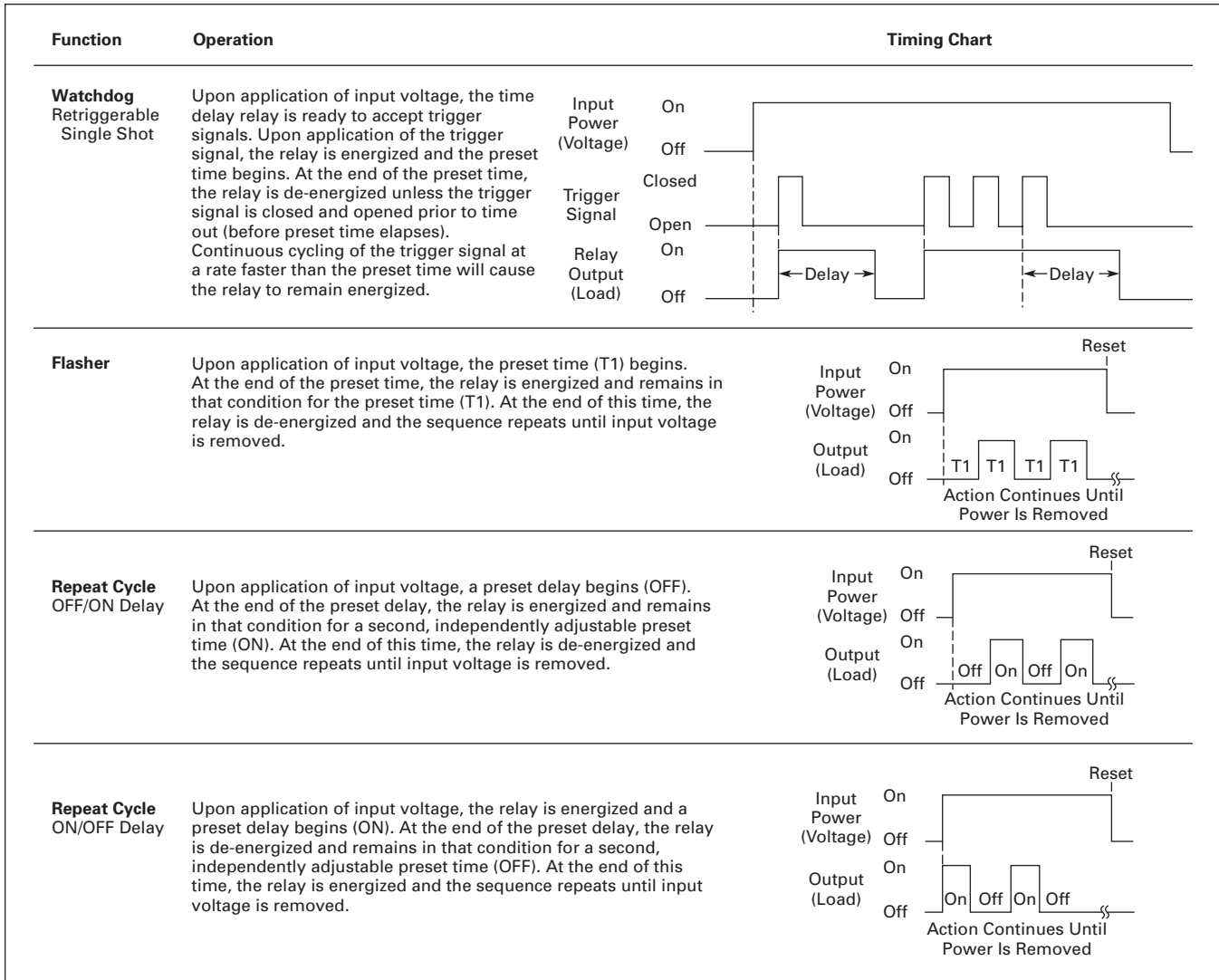
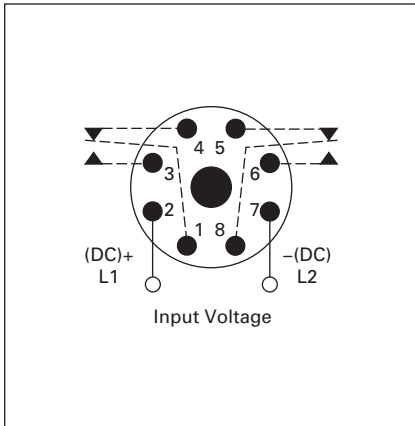


Figure 49-128. Operational Figures (2 of 2)

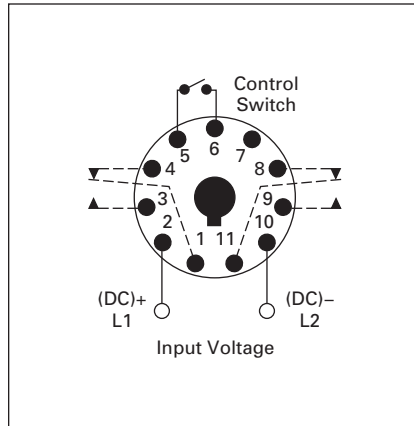


**TMR5 Series**

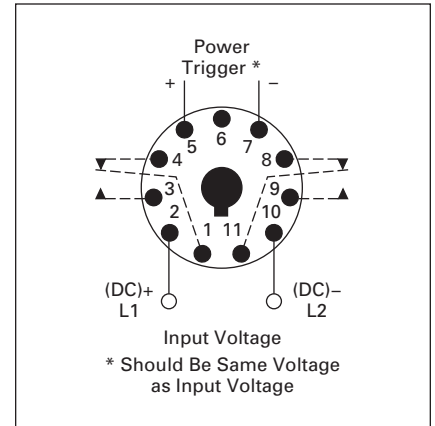
**Wiring Diagrams**



**Figure 49-129. Wiring for 8-Pin Units**

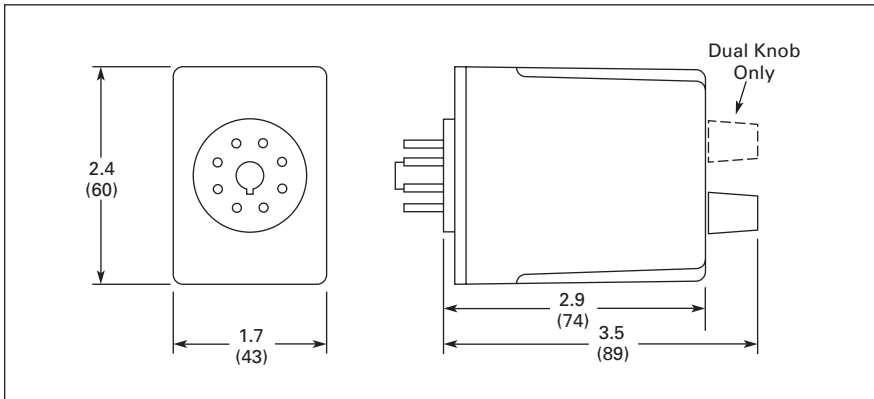


**Figure 49-130. Wiring for 11-Pin Control Switch Trigger Units**

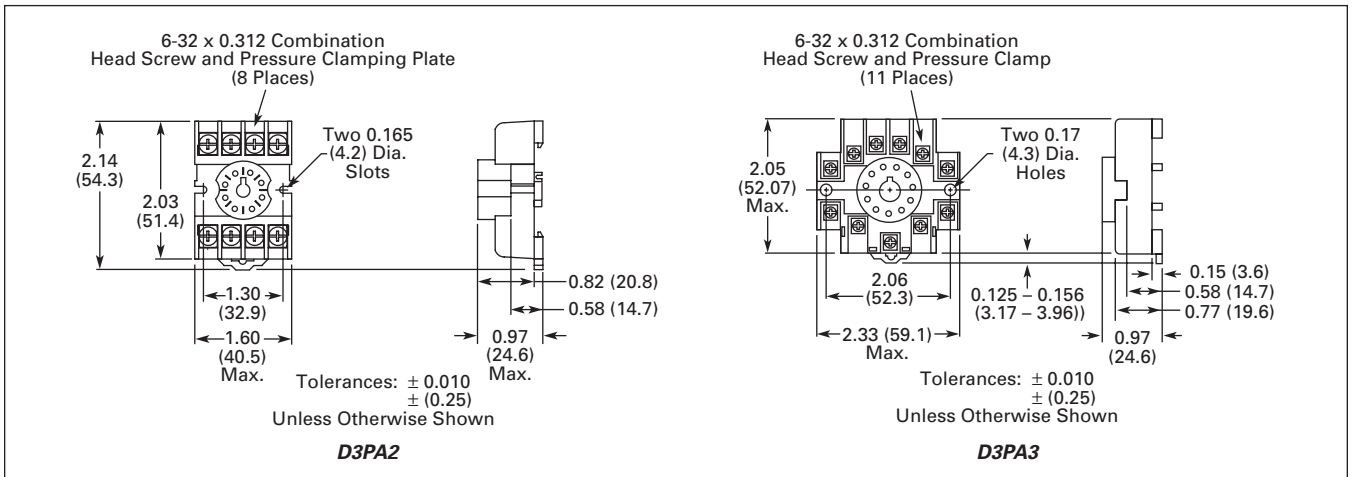


**Figure 49-131. Wiring for 11-Pin Power Trigger Units**

**Dimensions**



**Figure 49-132. TMR5 Approximate Dimensions in Inches (mm)**



**Figure 49-133. D3PA2 and D3PA3 Sockets — Approximate Dimensions in Inches (mm)**

## TR Series

## TR Series



TR Timing Relays

## 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
- 10A Contact Rating

## Standards and Certifications



## Technical Data and Specifications

Table 49-155. Contact Ratings

Item	Specification
Contact Configuration	2 Form C, DPDT (Delayed Output)
Allowable Voltage/Current	240V AC, 30V DC/10A
Max. Permissible Operating Frequency	1800 cycles per hour
Rated Load — Resistive Inductive Horsepower Rating	10A, 240V AC / 30V DC 7A, 240V AC / 30V DC 1/6 hp 120V AC, 1/3 hp 240V AC
Life — Electrical Mechanical	500,000 operations min. (resistive) 50,000,000 operations minimum

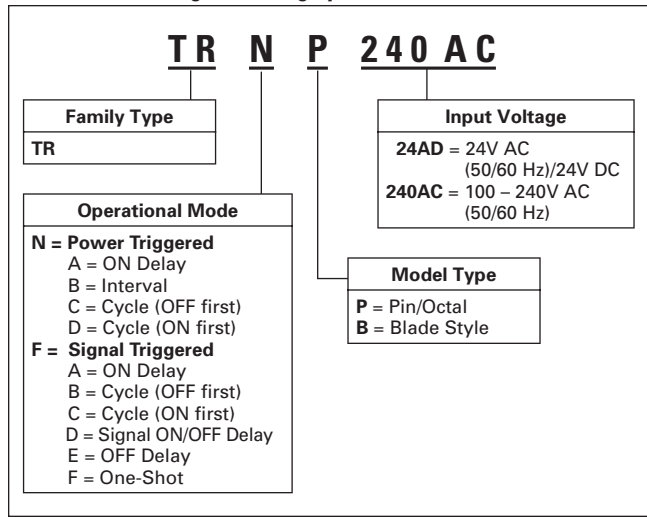
Table 49-156. General Specifications

Item	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 240AC 24AC 12DC	100 – 240V AC (50/60 Hz) 24V AC (50/60 Hz)/24V DC 12V DC
Voltage Tolerance 240AC 24AC 12DC	85 – 264V AC (50/60 Hz) 20.4 – 26.4V AC (50/60 Hz)/21.6 – 26.4V DC 10.8 – 13.2V DC
Input OFF Voltage	Rated Voltage x 10% Minimum
Ambient Operating Temperature	-4 – 149°F (-20 – 65°C)
Reset Time	100 mS maximum
Repeat Error	$\pm 0.2\%$ , $\pm 20$ mS <sup>①</sup>
Voltage Error	$\pm 0.2\%$ , $\pm 20$ mS <sup>①</sup>
Temperature Error	$\pm 0.5\%$ , $\pm 20$ mS <sup>①</sup>
Setting Error	$\pm 10\%$ maximum
Insulation Resistance	100M ohm minimum (500V DC)
Dielectric Strength Between power and output terminals Between contacts of different poles Between contacts of same pole	2000V AC, 1 minute 2000V AC, 1 minute 1000V AC, 1 minute
Vibration Resistance	10 – 55 Hz amplitude 0.5 mm; 2 hrs in each of 3 axes
Shock Resistance Operating extremes Damage limits — TRNP, TRFP TRNB, TRFB	10G 40G (3x in each of 3 axes) 10G (3x in each of 3 axes)
Power Consumption (Approx.) 240AC 120V AC / 60 Hz 240V AC / 60 Hz 24AC (AC/DC) 12DC	6.5 VA TRNP, TRNB/6.6 VA TRFP, TRFB 11.6 VA TRNP, TRNB/12.1 VA TRFP, TRFB 3.4 VA – 1.7W TRNP, TRNB/3.5 VA – 1.7W TRFP, TRFB 1.6W
Dimensions TRNP, TRFP TRNB, TRFB	1.58H x 1.42W x 3.07D in. (40H x 36W x 77.9D mm) 1.58H x 1.42W x 2.95D in. (40H x 36W x 74.9D mm)
Weight	TRNP — 87g; TRFP — 89g; TRNB, TRFB — 85g

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

**Catalog Numbering System**

Table 49-157. Catalog Numbering System



**Product Selection**

*When Ordering Specify*

- Catalog Number of Timing Relay

Table 49-158. TR Plug-In Timing Relays

Coil Voltage	Octal		Blade	
	Catalog Number	Price U.S. \$	Catalog Number	Price U.S. \$
<b>Power Triggered</b>				
24V AC/DC	TRNP24AD		TRNB24AD	
100 – 240V AC	TRNP240AC		TRNB240AC	
<b>Signal Triggered</b>				
24V AC/DC	TRFP24AD		TRFB24AD	
100 – 240V AC	TRFP240AC		TRFB240AC	

Operation

TRNP, TRNB

A: ON-Delay 1 (Power Start)

Set timer for desired delay, apply power to coil. Contacts transfer after preset time has elapsed, and remain in transferred position until timer is reset. Reset occurs with removal of power.

Item	Terminal No.	Operation
Power	(1) 2-7 (2) A-B	[Timing diagram showing power pulse]
Delayed Contact	(1) 1-4, 5-8 (NC) (2) 1-7, 3-9 (NO)	[Timing diagram showing delayed contact transition]
Indicator	PWR	[Timing diagram showing PWR indicator pulse]
	OUT	[Timing diagram showing OUT indicator pulse]
Set Time		T

B: Interval (Power Start)

Set timer for desired delay, apply power to coil. Contacts transfer immediately, and return to original position after preset time has elapsed. Reset occurs with removal of power.

Item	Terminal No.	Operation
Power	(1) 2-7 (2) A-B	[Timing diagram showing power pulse]
Delayed Contact	(1) 1-4, 5-8 (NC) (2) 1-7, 3-9 (NO)	[Timing diagram showing immediate contact transition]
Indicator	PWR	[Timing diagram showing PWR indicator pulse]
	OUT	[Timing diagram showing OUT indicator pulse]
Set Time		T

C: Cycle 1 (Power Start, OFF First)

Set timer for desired delay, apply power to coil. First transfer of contacts occurs after preset delay has elapsed, after the next elapse of preset delay contacts return to original position. The timer now cycles between on and off as long as power is applied (Duty Ratio 1:1).

Item	Terminal No.	Operation
Power	(1) 2-7 (2) A-B	[Timing diagram showing power pulse]
Delayed Contact	(1) 1-4, 5-8 (NC) (2) 1-7, 3-9 (NO)	[Timing diagram showing cyclical contact transitions]
Indicator	PWR	[Timing diagram showing PWR indicator pulse]
	OUT	[Timing diagram showing OUT indicator pulse]
Set Time		T

D: Cycle 3 (Power Start, ON First)

Functions in same manner as Mode C, with the exception that first transfer of contacts occurs as soon as power is applied. The ratio is 1:1. Time On = Time Off.

Item	Terminal No.	Operation
Power	(1) 2-7 (2) A-B	[Timing diagram showing power pulse]
Delayed Contact	(1) 1-4, 5-8 (NC) (2) 1-7, 3-9 (NO)	[Timing diagram showing cyclical contact transitions]
Indicator	PWR	[Timing diagram showing PWR indicator pulse]
	OUT	[Timing diagram showing OUT indicator pulse]
Set Time		T

Note: T=Set Time, Ta=Shorter Than Set Time,  
(1):TRNP, (2): TRNB, (A): TRFP, (B): TRFB

Internal Connections

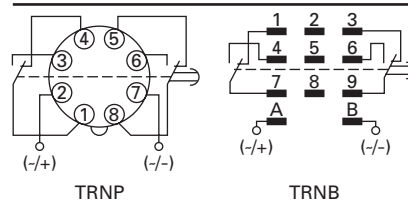
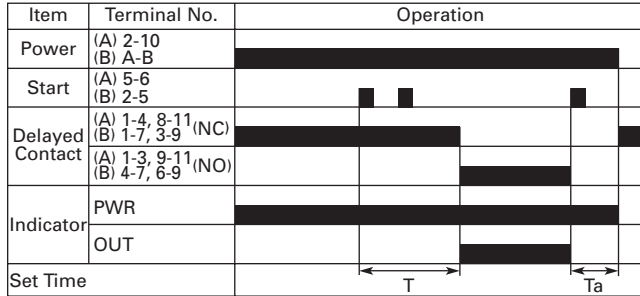


Figure 49-134. Operational Figures (1 of 2)

**TRFP, TRFB**

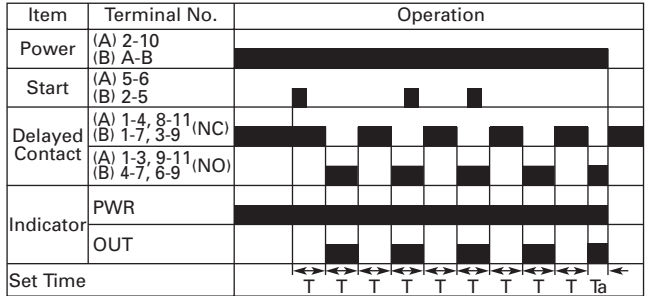
**A: ON-Delay 2 (Signal Start)**

When a preset time has elapsed after the start input turned on while power is on, the NO output contact goes on.



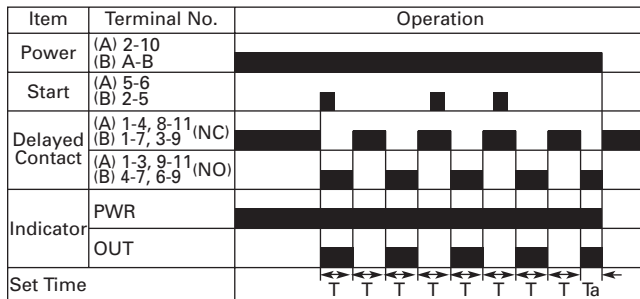
**B: Cycle 2 (Signal Start, OFF First)**

When the start input turns on while power is on, the output oscillates at a preset cycle (Duty Ratio 1:1), starting while the NO contact off.



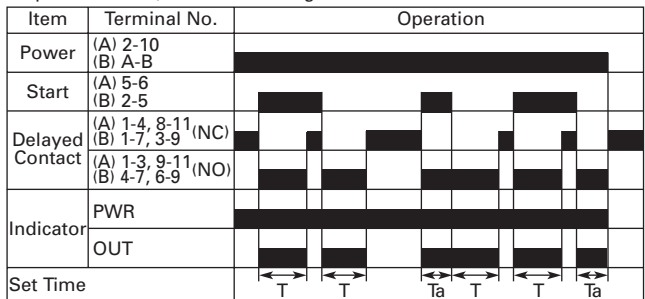
**C: Cycle 4 (Signal Start, ON First)**

When the start input turns on while power is on the NO output contact goes on. The output oscillates at a preset cycle (Duty Ratio 1:1).



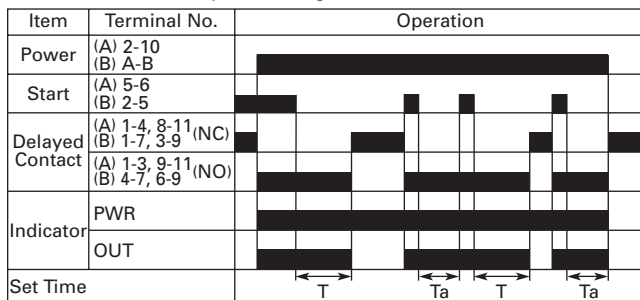
**D: Signal ON/OFF-Delay**

When the start input turns on while power is on, the NO output contact goes on. When a preset time has elapsed while the start input remains on, the output contact goes off. When the start input turns off, the NO contact goes on again. When a preset time has elapsed after the start input turned off, the NO contact goes off.



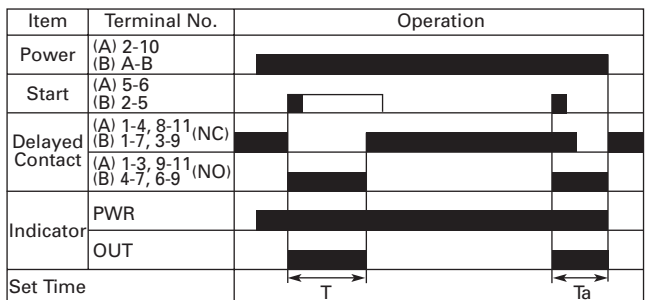
**E: Signal OFF-Delay**

When power is turned on while the start input is on, the NO output contact goes on. When a preset time has elapsed after the start input turned off, the NO output contact goes off.



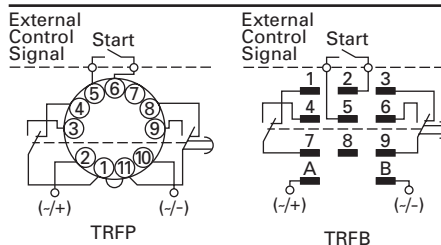
**F: One-Shot (Signal Start)**

When the start input turns on while power is on, the NO output contact goes on. When a preset time has elapsed, the output contact goes off.



Note: T=Set Time, Ta=Shorter Than Set Time,  
(1):TRNP, (2): TRNB, (A): TRFP, (B): TRFB.

**Internal Connections**



**Figure 49-134. Operational Figures (2 of 2)**

TR Series

Accessories

Table 49-159. Sockets for Use with TR Timers — Standard Pack of 10

Timing Relay	Terminal Style	Catalog Number	Price U.S. \$
TRNP	8-Pin Octal	D3PA2	
TRFP	11-Pin Octal	D3PA3	
TRNB, TRFB	0.187" solder/QC terminals (Blade style)	D5PA2	

Dimensions

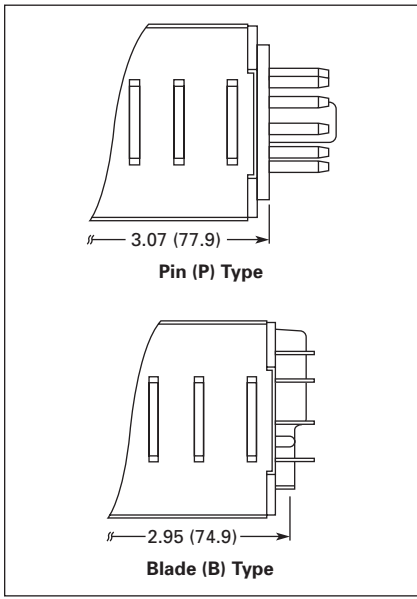
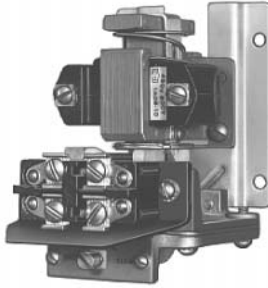


Figure 49-135. Approximate Dimensions in Inches (mm)

**D80 Series — Pneumatic Timers**



Catalog Number D80ND1A



Catalog Number D80JD12A

**Product Description**

Type D80 Timers are supplied only as complete devices with Switch Block(s) and Solenoid assembled. The Solenoids and Switch Blocks listed in **Tables 49-163** and **49-164** can be used for replacement or conversion of D80 Timers.

**Design Characteristics**

- Adjustable Timing Range: 0.5 to 180 seconds
- Repeat Accuracy: +10%
- Minimum Reset Time: 0.05 seconds

**Standards and Certifications**

- UL listed — File #E1230, Guide #NKCR
- CSA certified

**Technical Data and Specifications**

**Table 49-160. Contact Ratings**

	AC Pilot Duty — Amperes A600				DC Pilot Duty — Amperes B600		
	120V	240V	480V	600V	120V	240V	600V
<b>1NO-1NC</b>							
Make	40.	20.	10.	8.	—	—	—
Break	15.	10.	6.	5.	0.5	0.2	0.02
<b>2NO-2NC</b>							
Make	30.	15.	8.	6.	—	—	—
Break	3.	1.5	1.	0.8	0.2	0.1	—

**Product Selection**

**When Ordering Specify**

- Catalog Number of Timer plus Suffix Letter for solenoid volts and hertz.
- Catalog Number of Enclosure (if required).

**Table 49-161. Pneumatic Timers**

Timed Contacts	Instantaneous Contacts	ON Delay — Time Delay After Energizing Timer Coil. Convertible to OFF Delay <sup>②</sup>	OFF Delay — Time Delay After De-energizing Timer Coil. Convertible to ON Delay <sup>②</sup>	Price U.S. \$
		Catalog Number <sup>①</sup>	Catalog Number <sup>①</sup>	
1NO-1NC	N/A <sup>③</sup> None 1NO-1NC 2NO-2NC	D80NE1_ D80JE10_ D80JE11_ D80JE12_	D80ND1_ D80JD10_ D80JD11_ D80JD12_	
2NO-2NC	N/A <sup>③</sup> NONE 1NO-1NC 2NO-2NC	D80NE2_ D80JE20_ D80JE21_ D80JE22_	D80ND2_ D80JD20_ D80JD21_ D80JD22_	

<sup>①</sup> Must be ordered with solenoid assembly. Add Suffix letter from table below.  
<sup>②</sup> ON or OFF Delay Timers are field convertible from ON to OFF or OFF to ON Delay by rotating the solenoid assembly 180° — timing function is shown on mounting plate.  
<sup>③</sup> These timers will not accept instantaneous contacts.

**Table 49-162. Solenoid Suffix Selection Table**

Volts/Hertz	Suffix	Volts/Hertz	Suffix
12 – 50/60 <sup>④</sup>	R	240/60 – 220/50	B
24 – 50/60	T	380/50 <sup>④</sup>	L
120/60 – 110/50	A	480/60 – 440/50	C
208 – 220/60 <sup>④</sup>	E	600/60 – 550/50 <sup>④</sup>	D

<sup>④</sup> Consult Customer Support Center for availability.

**Table 49-163. Solenoids – Can Be Used for Replacement or to Convert Above Items for Different Volts/Hertz Applications**

Volts/Hertz	Catalog Number	Price U.S. \$	Volts/Hertz	Catalog Number	Price U.S. \$
12 – 50/60	D80AMR		240/60 – 220/50	D80AMB	
24 – 50/60	D80AMT		380/50	D80AML	
120/60 – 110/50	D80AMA		480/60 – 440/50	D80AMC	
208 – 220/60	D80AME		600/60 – 550/50	D80AMD	

**Table 49-164. Switch Blocks – Can Be Used for Either Timed or Instantaneous Contacts**

Circuit	Type of Contacts	Catalog Number	Price U.S. \$
SPDT	1NO-1NC	D80AS1	
DPDT	2NO-2NC	D80AS2	

**Contents**

<i>Description</i>	<i>Page</i>
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Phase Loss and Reversal . . . . .	49-108
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**Product Family Overview**

The D65 Series Phase Monitoring Relays provide protection against premature equipment failure caused by voltage faults on three-phase systems. All D65 phase monitoring relays are compatible with most Wye or Delta systems. In Wye systems, a connection to neutral is not required. Phase Monitoring relays protect against single-phasing regardless of any regenerative voltages.

**Standards and Certifications**

**D65VMC, D65PLR and D65PAR Series**



**D65VMPLP Series**



**D65VMMLS Series**



**Product Family Selection**

Table 49-165. D65 Product Family Selection

Catalog Number	Mounting Style	Phase Loss	Phase Reversal	Phase Unbalance	Under-voltage	Over-voltage	Time Delay on Undervoltage
D65VMC	Plug-In ①		✓				
D65PLR	Plug-In ①	✓	✓				
D65PAR	Plug-In ①	✓	✓		✓ (adj.)		50 mS fixed
D65VMPLP	Plug-In ①	✓	✓	✓	✓ (adj.)	✓ (fixed)	0.1 – 20 sec
D65VMMLS	Surface	✓	✓	✓	✓ (adj.)	✓ (fixed)	0.1 – 20 sec

① In addition to the above approvals, all Plug-In Products are also UL Listed when used with the appropriate Eaton socket.



**Application Description**

**Protection**

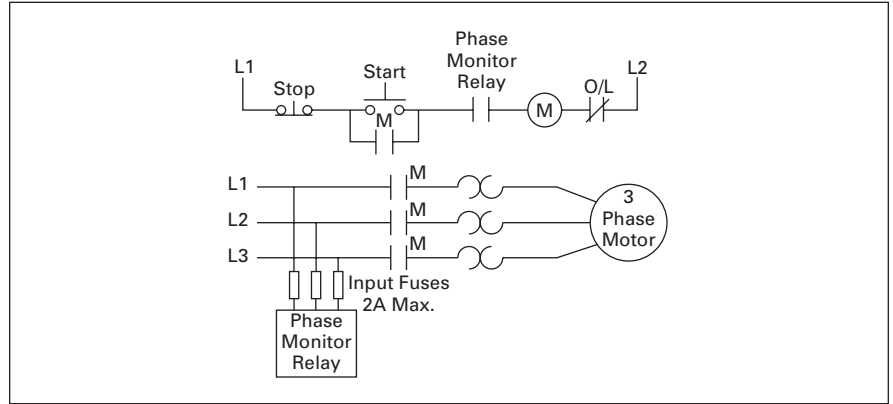
Depending on the unit selected, it will protect three-phase equipment against:

- **Phase Loss** — total loss of one or more of the three phases. Also known as “single phasing”. Typically caused by a blown fuse, broken wire or worn contact. This condition would result in a motor drawing locked rotor current during start-up. In addition, a three-phase motor will continue to run after losing a phase, resulting in possible motor burn-out.
- **Phase Reversal** — reversing any two of the three phases will cause a three-phase motor to run in the opposite direction. This may cause damage to driven machinery or injury to personnel. The condition usually occurs as a result of mistakes made during routine maintenance or when modifications are made to the circuit.
- **Phase Unbalance** — unbalance of a three-phase system occurs when single-phase loads are connected such that one or two of the lines (phases) carry more or less of the load. This could cause motors to run at temperatures above published ratings.
- **Undervoltage** — when voltage in all three lines of a three-phase system drop simultaneously.
- **Overvoltage** — when voltage in all three lines of a three-phase system increase simultaneously.

**Typical Connections**

**Line Side Monitoring**

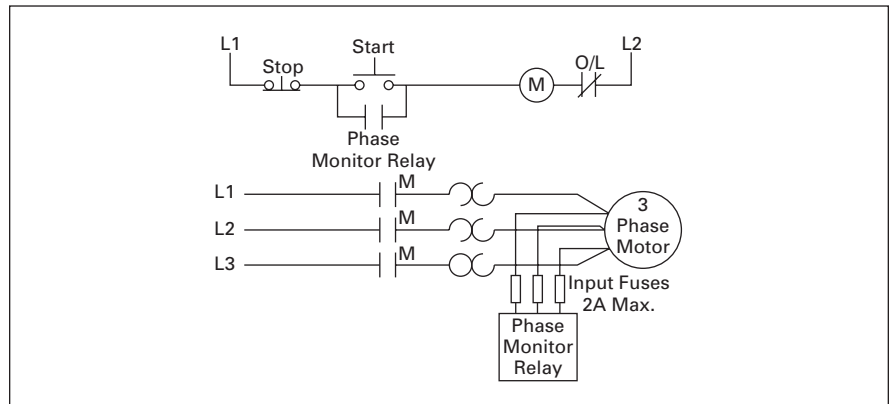
With the relay connected before the motor starter, the motor can be started in the reverse direction. However, the motor is unprotected against phase failures between the relay and the motor.



**Figure 49-136. Line Side Monitoring**

**Load Side Monitoring**

With the relay connected directly to the motor, the total feed lines are monitored. This connection should not be used with reversing motors.



**Figure 49-137. Load Side Monitoring**

## Phase Reversal



*D65VMC Series  
Phase Reversal*

## Product Description

The D65VMC Series Monitoring Relays provide protection against phase reversal in a compact plug-in design. One version will work on any three-phase system from 208V to 480V (a separate 120V-only version is also available). These devices are designed to be compatible with most Wye or Delta systems. In Wye systems, a connection to a neutral is not required.

The relay is energized and the LED on when the sequence is correct. Any fault will de-energize the relay and turn off the LED. Re-energization is automatic upon correction of the fault condition.

## Features

- Protects against phase reversal
- One version works on 208 – 480V three-phase systems
- LED indicates both normal and fault conditions
- Compact plug-in case utilizing industry-standard 8-pin octal socket
- 10A SPDT output contacts

## Standards and Certifications



When used with appropriate Eaton socket.



## Product Selection

Table 49-166. Product Selection — D65VMC Series

Mounting Style	Nominal Voltage 50/60 Hz	Catalog Number	Price U.S. \$
Plug-in	120V	D65VMC120	
Plug-in	208 – 480V	D65VMC480 ①	

① Requires a 600V rated socket when used on system voltages greater than 300V.

## Accessories

Table 49-167. Accessories — D65VMC Series

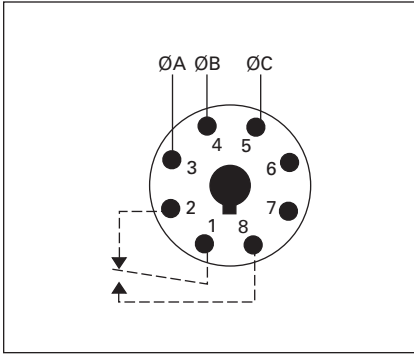
Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
Hold Down Spring	10	D65CHDS	

## Technical Data and Specifications

Table 49-168. Technical Data — D65VMC Series, Phase Reversal

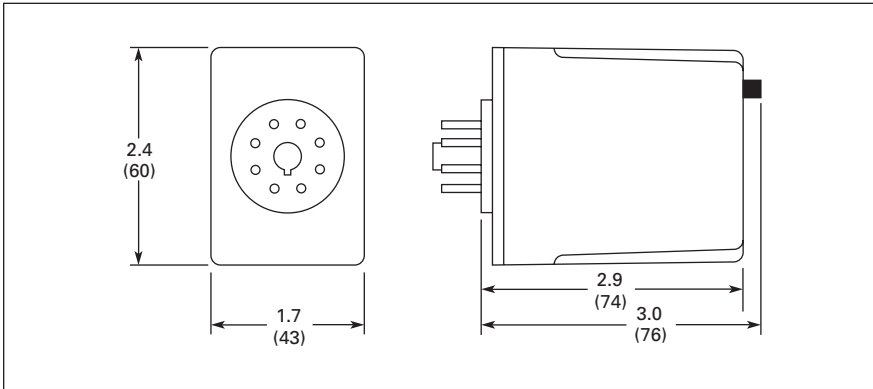
Description	Specifications
Phase Reversal	Unit trips if sequence of the three phases is anything other than A-B-C
Output Contacts	10A SPDT @ 240V AC, 1/3 hp @ 240V AC (NO), 1/6 hp @ 240V AC (NC)
Life	Full Load — 100,000 operations
Response Times:	
Operate	50 mS
Release	50 mS
Load (Burden)	3 VA
Temperature	-20° to 150°F (-28° to 65°C)
Transient Protection	10,000 volts for 20 microseconds
Mounting	Uses an 8-pin octal socket. Requires a 600V rated socket when used on system voltages greater than 300V
Indicator LED	Red LED on when all conditions are normal, and off when a fault condition has occurred
Reset	Automatic upon correction of fault

**Schematic**



**Figure 49-138. Wiring for 8-Pin Socket**

**Dimensions**



**Figure 49-139. D65VMC Series — Approximate Dimensions in Inches (mm)**

## Phase Loss and Reversal



*D65PLR Series  
Phase Loss and Reversal*

## Product Description

The D65PLR Series Monitoring Relays provide protection against phase loss and phase reversal in a compact plug-in design. These devices are designed to be compatible with most Wye or Delta systems. In Wye systems, a connection to a neutral is not required. Phase monitoring relays protect against single-phasing regardless of any regenerative voltages.

The relay is energized and the LED on when all three phases are present and in the correct sequence. Any fault will instantaneously de-energize the relay and turn off the LED. Re-energization is automatic upon correction of the fault condition.

## Features

- Protects against phase loss and phase reversal
- LED indicates both normal and fault conditions
- Compact plug-in case utilizing industry-standard 8-pin octal socket
- 10A SPDT output contacts

## Standards and Certifications



When used with appropriate Eaton socket.



## Product Selection

**Table 49-169. Product Selection — D65PLR Series**

Mounting Style	Nominal Voltage 50/60 Hz	Catalog Number	Price U.S. \$
Plug-in	120V	D65PLR120	
Plug-in	208V	D65PLR208	
Plug-in	240V	D65PLR240	
Plug-in	400V	D65PLR400 ①	
Plug-in	480V	D65PLR480 ①	

① Requires a 600V rated socket when using on system voltages greater than 300V.

## Accessories

**Table 49-170. Accessories — D65PLR Series**

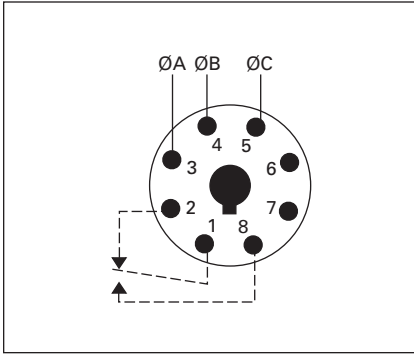
Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
Hold Down Spring	10	D65CHDS	

## Technical Data and Specifications

**Table 49-171. Technical Data — D65PLR Series, Phase Loss and Reversal**

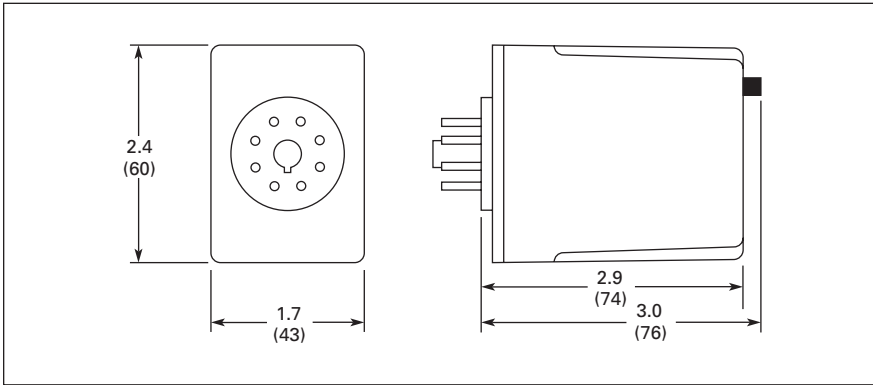
Description	Specifications
Phase Loss	Unit trips on loss of any Phase A, B or C
Phase Reversal	Unit trips if sequence of the three phases is anything other than A-B-C
Output Contacts	10A SPDT @ 240V AC, 1/3 hp @ 240V AC (NO), 1/6 hp @ 240V AC (NC)
Life	Full Load — 100,000 operations
Response Times: Operate Release	50 mS 50 mS
Load (Burden)	3 VA
Temperature	-20° to 150°F (-28° to 65°C)
Transient Protection	10,000 volts for 20 microseconds
Mounting	Uses an 8-pin octal socket. Requires a 600V rated socket when used on system voltages greater than 300V
Indicator LED	Red LED on when all conditions are normal, and off when a fault condition has occurred
Reset	Automatic upon correction of fault

**Schematic**



**Figure 49-140. Wiring for 8-Pin Socket**

**Dimensions**



**Figure 49-141. D65PLR Series — Approximate Dimensions in Inches (mm)**

## Phase Loss, Reversal and Undervoltage



**D65PAR Series**  
Phase Loss, Reversal and Undervoltage

### Product Description

The D65PAR Series Monitoring Relays provide protection against phase loss, phase reversal and undervoltage in a compact plug-in design. These devices are designed to be compatible with most Wye or Delta systems. In Wye systems, a connection to a neutral is not required. Phase monitoring relays protect against single-phasing regardless of any regenerative voltages.

The relay is energized and the LED on when all three phases are present in the correct sequence at a voltage level above the undervoltage setting. The undervoltage drop-out can be set at 75 – 95% of operating voltage. Any fault will instantaneously de-energize the relay and turn off the LED. Re-energization is automatic upon correction of the fault condition.

### Features

- Protects against phase loss, phase reversal and undervoltage
- Undervoltage setting is adjustable from 75 – 95% of nominal
- LED indicates both normal and fault conditions
- Compact plug-in case utilizing industry-standard 8-pin octal socket
- 10A SPDT output contacts

### Standards and Certifications



When used with appropriate Eaton socket.



## Product Selection

**Table 49-172. Product Selection — D65PAR Series**

Mounting Style	Nominal Voltage 60 Hz	Undervoltage Range	Catalog Number	Price U.S. \$
Plug-in	120V	90 – 115V	D65PAR120	
Plug-in	208V	156 – 198V	D65PAR208	
Plug-in	240V	180 – 230V	D65PAR240	
Plug-in	400V	300 – 380V	D65PAR400 ①	
Plug-in	480V	360 – 460V	D65PAR480 ①	

① Requires a 600V rated socket when using on system voltages greater than 300V.

## Accessories

**Table 49-173. Accessories — D65PAR Series**

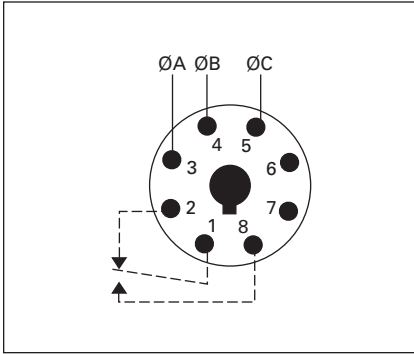
Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
Hold Down Spring	10	D65CHDS	

## Technical Data and Specifications

**Table 49-174. Technical Data — D65PAR Series, Phase Loss, Reversal and Undervoltage**

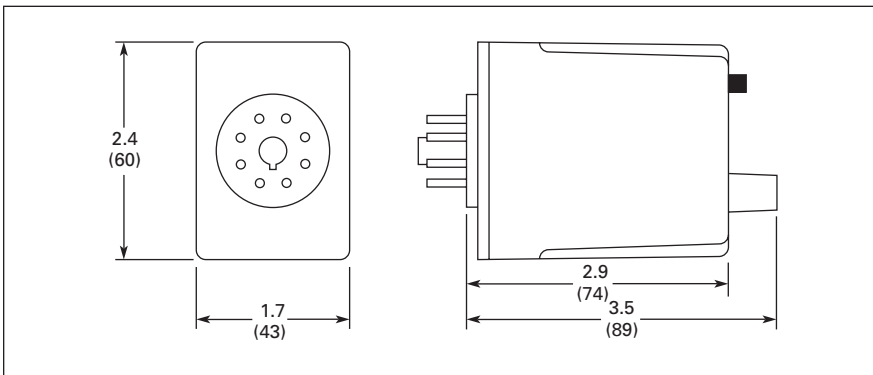
Description	Specifications
Phase Loss	Unit trips on loss of any Phase A, B or C
Phase Reversal	Unit trips if sequence of the three phases is anything other than A-B-C
Undervoltage	Adjustable over a range per product selection table. Unit trips when the average of all three lines is less than the adjusted set point.
Output Contacts	10A SPDT @ 240V AC, 1/3 hp @ 240V AC (NO), 1/6 hp @ 240V AC (NC)
Life	Full Load — 100,000 operations
Response Times:	
Operate	50 mS
Release	50 mS
Load (Burden)	3 VA
Temperature	-20° to 150°F (-28° to 65°C)
Transient Protection	10,000 volts for 20 microseconds
Mounting	Uses an 8-pin octal socket. Requires a 600V rated socket when used on system voltages greater than 300V
Indicator LED	Red LED on when all conditions are normal, and off when a fault condition has occurred
Reset	Automatic upon correction of fault

**Schematic**



**Figure 49-142. Wiring for 8-Pin Socket**

**Dimensions**



**Figure 49-143. D65PAR Series — Approximate Dimensions in Inches (mm)**

## Phase Loss, Reversal, Unbalance and Under/Overvoltage



D65 Series

### Product Description

The Cutler-Hammer® D65 Phase Monitoring Relay from Eaton's electrical business protects distribution systems supplying motor feeder or branch circuits against premature equipment failure caused by voltage faults on three-phase systems — wye or delta connected. Phase monitoring relays protect against voltage imbalance and single-phasing regardless of any regenerative voltages. The relay is energized when the phase sequence and all voltages are correct. Any of five abnormal conditions (phase loss, phase reversal, overvoltage, under-voltage or phase imbalance) will de-energize the relay. As standard, re-energization is automatic upon correction of the fault condition. The D65 can also be wired for manual reset.

### Application Description

#### Protective Functions

The D65 Series Relay makes separate trip decisions based on the status of the three-phase voltage inputs. Control power is derived from the three-phase voltage inputs. Separate control power is not required. The device will trip in response to any combination of the following conditions:

- **Undervoltage** — When voltage in all three lines of a three-phase system drops simultaneously. Undervoltage drop-out can be set at 80 – 95% of operating voltage. Unit trips when the average of all three lines is less than the adjusted set point for a period longer than the adjustable time delay drop-out (0.1 – 20 seconds). This time delay eliminates nuisance tripping caused by momentary voltage fluctuation.
- **Overvoltage** — Fixed at 110% of nominal, unit trips when the average of all three lines is greater than the fixed set point for a period longer than the time delay drop-out.
- **Phase Imbalance** — Imbalance of a three-phase system occurs when single-phase loads are connected such that one or two of the lines (phases) carry more or less of the load. This could cause motors to run at temperatures above published ratings. Unit trips when any one of the three lines is more than the adjusted set point below the average of all three lines. The percent phase imbalance is adjustable from 2 – 10% and also has a Disable setting for applications where poor voltage conditions could cause nuisance tripping.

- **Phase Loss (Single-Phasing)** — Total loss of one or more of the three phases. Typically caused by a blown fuse, broken wire or worn contact. This condition would result in a motor drawing locked rotor current during start-up. In addition, a three-phase motor will continue to run after losing a phase, resulting in potential motor burn-out. Unit trips on loss of any phase.
- **Phase Reversal** — Reversing any two of the three phases will cause a three-phase motor to run in the opposite direction. This may cause damage to machinery or injury to personnel. Unit trips if rotation (sequence) of the three phases is anything other than A-B-C.

### Features

- Universal voltage range of 208 – 480V provides the flexibility to cover a variety of applications. 120V and 600V units also available.
- Automatic or manual reset after the fault condition is corrected.
- Multi-color LED indicates normal condition and defines fault type for simpler troubleshooting.
- D65VMLS can be either mounted directly on 35 mm DIN rail with no additional parts or to a back-panel with two screws. No socket required. D65VMPLP will plug into D3PA2 socket and mount on 35 mm DIN rail.
- Small, compact size.
- User-adjustable settings include nominal voltage, percent phase imbalance, undervoltage drop-out, time delay on undervoltage and time delay on restart after fault.



**Operation**

The D65 provides protection against premature equipment failure caused by voltage faults on three-phase systems. The D65 is designed to be compatible with most wye or delta systems. In wye systems, a connection to a neutral is not required. D65 Phase Monitoring Relays protect against unbalanced voltages or single-phasing regardless of any regenerative voltages. The relay is energized when the phase sequence and all voltages are correct. Any one of five fault conditions will de-energize the relay. Re-energization is automatic upon correction of the fault condition. Manual reset is available if a NC switch is wired to the appropriate terminals. A multi-color LED indicates normal condition and also provides specific fault indication to simplify troubleshooting. The percent phase imbalance is adjustable from 2 – 10%, and the undervoltage drop-out can be set at 80 – 95% of operating voltage. The adjustable time delay drop-out on undervoltage (0.1 – 20 sec.) eliminates nuisance tripping caused by momentary voltage fluctuations.

**Table 49-175. LED Operation**

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

**Standards and Certifications**

CE (Low Voltage + EMC Directive EN60947-5-1)

UL<sub>us</sub> (D65VMLS only)

UL<sub>us</sub> (D65VMLP only)

ROHS COMPLIANT

UL When used with accompanying Eaton Socket. (D65VMLP only)

**Product Selection**

**When Ordering Specify**

- Catalog Number

**Table 49-176. Phase Monitoring Relay** ④

Mounting Style	Operating Voltage, 50/60 Hz	Catalog Number	Price U.S. \$
Surface-Mount (DIN Rail or Panel)	120V 208 – 480V 600V	<b>D65VMLS120</b> <b>D65VMLS480</b> <b>D65VMLS600</b>	
Plug-In (DIN Rail)	120V 208 – 480V	<b>D65VMLP120</b> <b>D65VMLP480</b> ①	
8-pin Socket	—	<b>D3PA2</b> ②	
8-pin IP20 Rated Socket	—	<b>D3PA6</b> ③	

① Requires a 600V-rated socket when used on system voltages greater than 300V. The D3PA2 socket is rated 10A, 600V.

② For Dimensions, see **Page 49-46**.

③ For Dimensions, see **Page 49-47**.

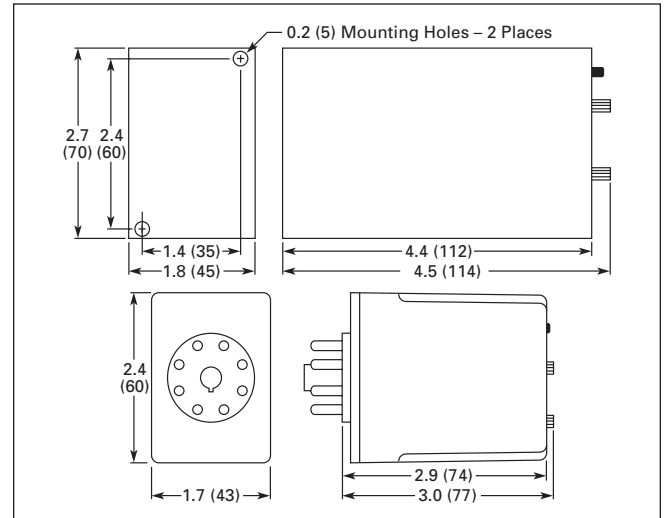
④ Additional models available. Please visit our website for the latest offering.

**Technical Data and Specifications**

**Table 49-177. D65 Series Specifications**

Description	Specifications
Nominal Voltages (50 – 60 Hz)	120V, 208 – 480V, 575V
Connections	3-wire wye or delta
Output Contacts for D65VMLS	SPDT and SPNC (surface mount version only) NO: 10A Resistive @ 240V AC / 30V DC, 1/2 hp @ 240V AC NC: 10A Resistive @ 240V AC / 30V DC, 1/3 hp @ 240V AC
Output Contacts for D65VMLP	SPDT: 10A Resistive @ 240V AC / 30V DC; 1/2 hp @ 120/240V AC
Dielectric	1000V + (2 * Nominal Voltage Rating) between input terminals and case or active circuitry
Operating Temp.	-20° – 150°F (-28° – 65°C)
Response Time	
Power Up	1 – 300 seconds adjustable
Restart after Fault	1 – 300 seconds adjustable
Drop-out due to Fault	100 mS fixed on phase loss and phase reversal; 2 seconds fixed on phase imbalance; 0.1 – 20 sec. adjustable on undervoltage only; inverse time curve for overvoltage
Mechanical Life	10,000,000 operations
Electrical Life	100,000 operations
Power Consumption	3 VA
Net Weight	10.3 oz. (292g) D65VMLS 6.4 oz. (181g) D65VMLP
Hysteresis	2 – 3%

**Dimensions**



**Figure 49-144. Surface-Mount and Plug-In — Approximate Dimensions in Inches (mm)**

## Wiring Diagrams

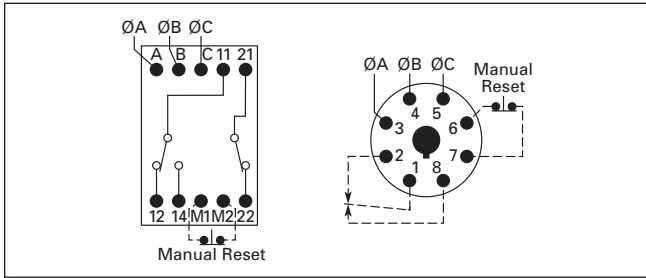


Figure 49-145. Surface-Mount and Plug-In Wiring Diagrams

## Typical Connections

### Line Side Monitoring

With the relay connected before the motor starter, the motor can be started in the reverse direction. However, the motor is unprotected against phase failures between the relay and the motor.

### Load Side Monitoring

With the relay connected directly to the motor, the total feed lines are monitored. This connection should not be used with reversing motors.

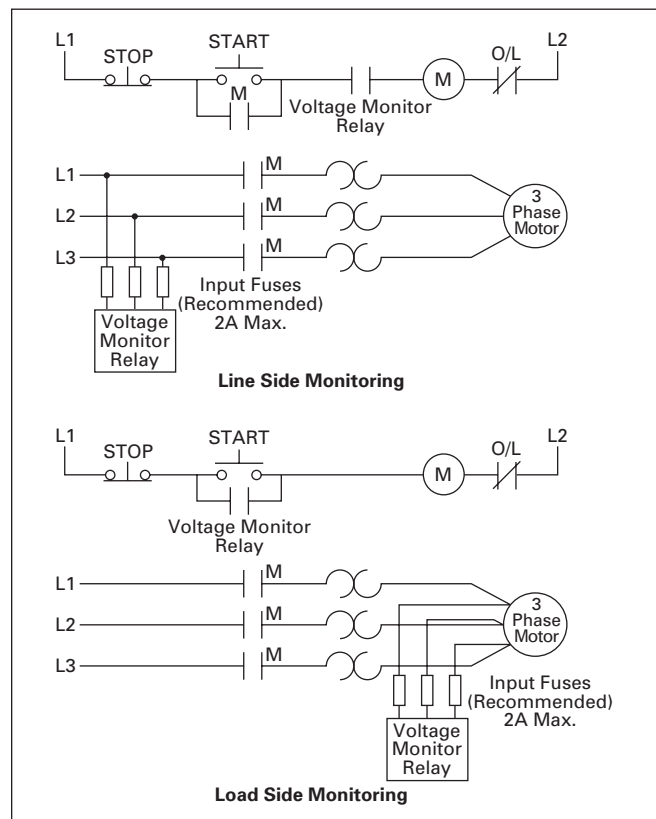


Figure 49-146. Line Side and Load Side Monitoring

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**Current Monitoring Relays**

**Product Family Overview**

The D65C Series Current Monitoring Relays monitor AC single-phase currents for over- or undercurrent conditions in three current ranges: 0.1 – 1A, 0.5 – 5A, and 1 – 10A. An external current transformer may be used to extend the range of the product. A separate 24V or 120V AC input (supply) voltage is required to power the unit. All versions are available in a compact plug-in case utilizing industry standard 8- or 11-pin octal sockets.

**Standards and Certifications**



When used with accompanying Eaton socket.  
Listed



**Product Family Selection**

**Standard**

Fixed time delay on both pick-up and drop-out current settings.

**Table 49-178. D65C Product Family Selection — Standard Function**

Series	Pick-Up		Drop-Out		Page
	Setting	Time Delay	Setting	Time Delay	
D65CE	Adjustable (Across Monitored Range)	Fixed 100 mS <sup>①</sup>	Fixed (-5% Pick-Up)	Fixed 100 mS <sup>①</sup>	49-116
D65CEK			Adjustable (50 – 95% Pick-Up)		

<sup>①</sup> Fixed time delay eliminates nuisance tripping due to short current surges or drops.

**Overcurrent**

Adjustable time delay on pick-up and fixed time delay on drop-out current settings.

**Table 49-179. D65C Product Family Selection — Overcurrent Function**

Series	Pick-Up		Drop-Out		Page
	Setting	Time Delay	Setting	Time Delay	
D65CH	Adjustable (Across Monitored Range)	0.1 – 10 sec Adjustable	Fixed (-5% Pick-Up)	Fixed 100 mS <sup>②</sup>	49-118
D65CHK			Adjustable (50 – 95% Pick-Up)		

<sup>②</sup> Fixed time delay eliminates nuisance tripping due to short current surges or drops.

**Undercurrent**

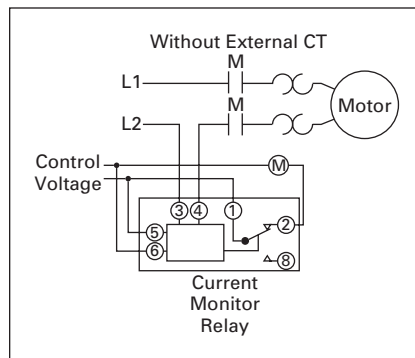
Fixed time delay on pick-up and adjustable time delay on drop-out current settings.

**Table 49-180. D65C Product Family Selection — Undercurrent Function**

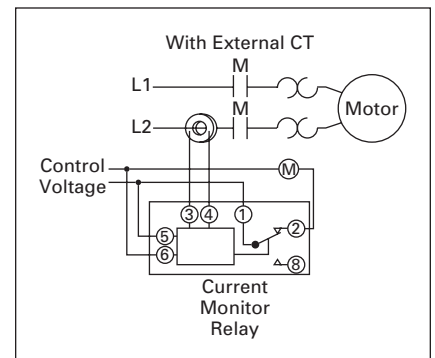
Series	Pick-Up		Drop-Out		Page
	Setting	Time Delay	Setting	Time Delay	
D65CL	Fixed (+5% Drop-Out)	Fixed 100 mS <sup>③</sup>	Adjustable (Across Monitored Range)	0.1 – 10 sec Adjustable	49-120

<sup>③</sup> Fixed time delay eliminates nuisance tripping due to short current surges or drops.

**Typical Installations**



**Figure 49-147. Typical Installation without External CT**



**Figure 49-148. Typical Installation with External CT**

D65C Series — Standard Current Monitors

Standard Current Monitors



D65C Series  
Standard Current Monitors

Product Description

The D65CE Series Standard Current Monitors are used to detect either an overcurrent or undercurrent condition. The pick-up current setting is user-adjustable within three ranges (0.1 – 1A), (0.5 – 5A), or (1 – 10A). The range can be extended beyond 10A with the use of an external current transformer. Choose between a fixed drop-out current setting at 95% of the selected pick-up setting or an adjustable drop-out current setting of 50 – 95% of the selected pick-up setting. The relay will energize when the monitored AC current is above the pick-up setting, and will de-energize when the monitored AC current is below the drop-out setting. The time delay on both pick-up and drop-out is fixed at 100 ms. Adjustable time delays are available with the D65CH and D65CL Series.

Features

- Monitors AC single-phase currents
- Three separate current monitoring ranges covering 0.1 – 10 amperes
- External CT can be used to extend ranges
- Adjustable pick-up setting with either fixed or adjustable drop-out setting
- LED indicates output relay status
- Choice of compact 8-pin SPDT or 11-pin DPDT plug-in case
- 10A output contacts

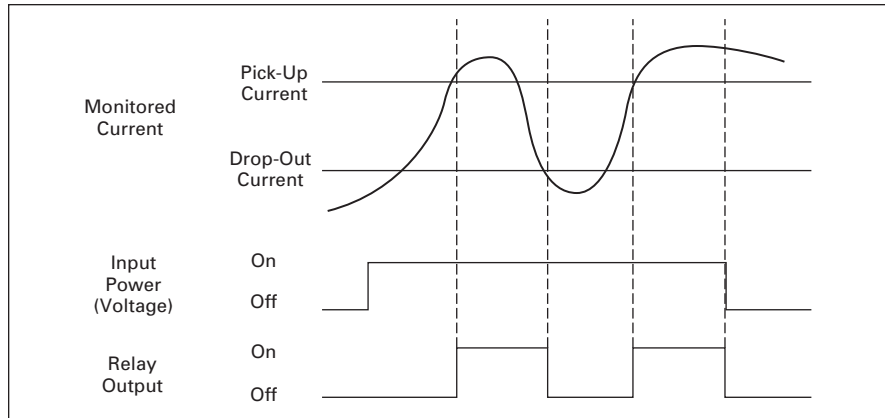


Figure 49-149. Standard Current Monitoring

Product Selection

Table 49-181. Product Selection — D65C Series, Standard Current Monitors

Pick-Up Setting	Drop-Out Setting	Input Voltage	Current Range Monitored	Catalog Number	Price U.S. \$
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SPDT — 8-Pin Plug-In

Adjustable	Fixed (At 95% of Pick-Up)	24V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CE1C01T D65CE1C5T D65CE1C10T	
		120V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CE1C01A D65CE1C5A D65CE1C10A	
Adjustable	Adjustable (From 50- 95% of Pick-Up)	24V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CEK1C01T D65CEK1C5T D65CEK1C10T	
		120V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CEK1C01A D65CEK1C5A D65CEK1C10A	

DPDT — 11-Pin Plug-In

Adjustable	Fixed (At 95% of Pick-Up)	24V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CE2C01T D65CE2C5T D65CE2C10T	
		120V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CE2C01A D65CE2C5A D65CE2C10A	
Adjustable	Adjustable (From 50- 95% of Pick-Up)	24V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CEK2C01T D65CEK2C5T D65CEK2C10T	
		120V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CEK2C01A D65CEK2C5A D65CEK2C10A	

Accessories

Table 49-182. Accessories — D65CE Current Monitors

Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
11-Pin Socket	10	D3PA3-A2	
Hold Down Spring	10	D65CHDS	

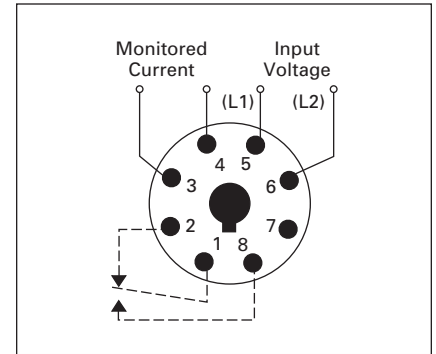
Discount Symbol .....1CD1

**Technical Data and Specifications**

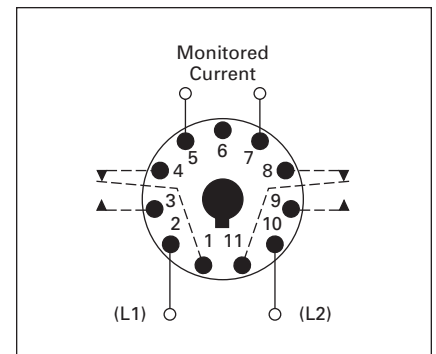
**Table 49-183. Technical Data — D65C Series, Standard Current Monitors**

Description	Specifications
Input Voltage Tolerance	AC Operation: +10/-15% of nominal voltage at 50/60 Hz
Load (Burden)	Less than 5 VA
Current Settings: Pick-Up Drop-Out	Adjustable throughout current range monitored Fixed at 95% of pick-up setting for D65CE Adjustable from 50 – 95% of pick-up setting for D65CEK
Temperature	-20 to 131°F (-28 to 55°C)
Response Times: Pick-Up Drop-Out	100 mS 100 mS
Output Contacts	10A Resistive @240V AC / 30V DC 1/2 hp @ 240V AC (NO); 1/3 hp @ 240V AC (NC)
Mechanical Life	10,000,000 operations
Electrical Life	100,000 operations
Indicator LED	Green when input voltage is applied; Red when relay is energized
Reset	Automatic
Mounting	Requires an 8- or 11-pin socket

**Schematics**

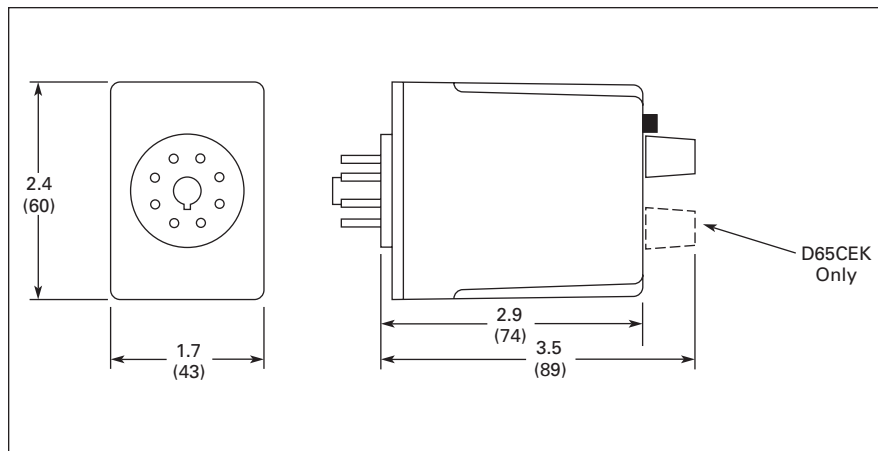


**Figure 49-152. Wiring for 8-Pin Socket**

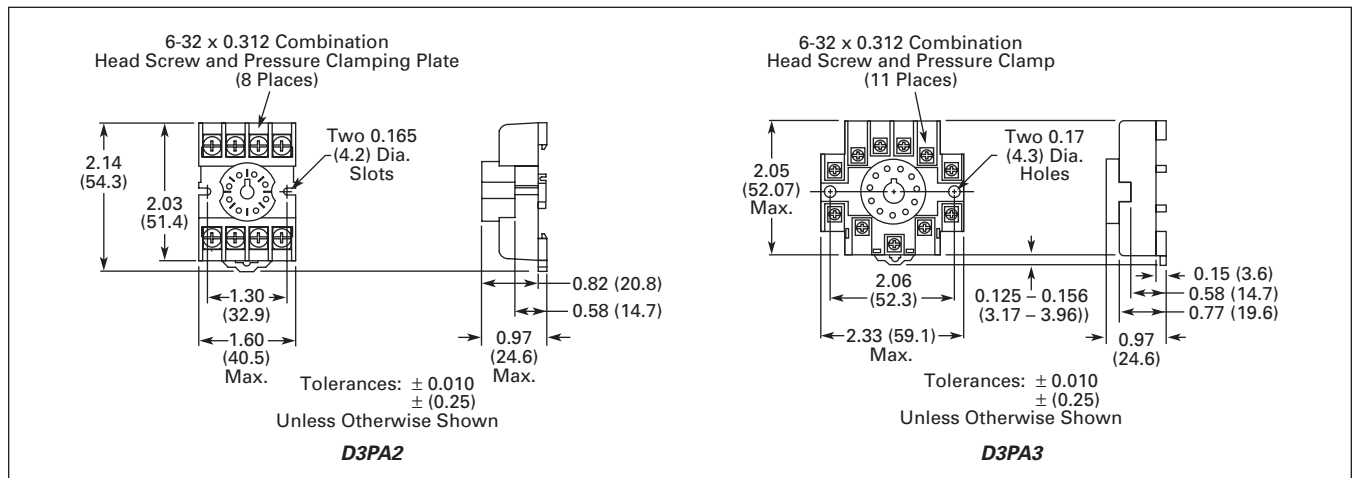


**Figure 49-153. Wiring for 11-Pin Socket**

**Dimensions**



**Figure 49-150. D65CE Series — Approximate Dimensions in Inches (mm)**



**Figure 49-151. D3PA2 and D3PA3 Sockets — Approximate Dimensions in Inches (mm)**

D65C Series — Overcurrent Monitors

Overcurrent Monitors



D65C Series  
Overcurrent Monitors

Product Description

The D65C Series Overcurrent Monitoring Relays are used to detect an overcurrent condition. The pick-up current setting is user-adjustable within one of three ranges as shown in product selection table. An external current transformer can be used to extend the range beyond 10A. Users may select a fixed drop-out current setting (95% of the selected pick-up setting) or an adjustable drop-out setting (50 – 95% of the selected pick-up setting). The relay will energize when the monitored AC current is above the pick-up setting for a period longer than the adjustable time delay of 0.1 – 10 seconds. This delay prevents nuisance tripping caused by inrush currents. It will de-energize when the monitored AC current is below the drop-out setting.

Features

- Monitors AC single-phase currents for overcurrent conditions
- Three separate current monitoring ranges covering 0.1 – 10 amperes
- External CT can be used to extend ranges
- Adjustable pick-up setting with either fixed or adjustable drop-out setting
- Adjustable time delay of 0.1 – 10 seconds on pick-up
- LED indicates output relay status
- Choice of compact SPDT (8-pin) or DPDT (11-pin) plug-in case
- 10A output contacts

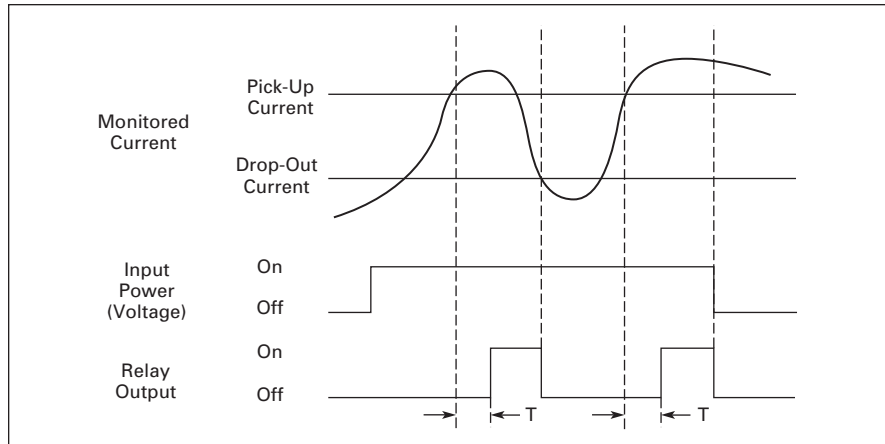


Figure 49-154. Overcurrent Monitoring

Product Selection

Table 49-184. Product Selection — D65C Series, Overcurrent Monitors

Pick-Up Setting	Drop-Out Setting	Input Voltage	Current Range Monitored	Catalog Number	Price U.S. \$
<b>SPDT — 8-Pin Plug-In</b>					
Adjustable	Fixed (At 95% of Pick-Up)	24V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CH1C1T D65CH1C5T D65CH1C10T	
		120V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CH1C1A D65CH1C5A D65CH1C10A	
Adjustable	Adjustable (From 50- 95% of Pick-Up)	24V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CHK1C1T D65CHK1C5T D65CHK1C10T	
		120V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CHK1C1A D65CHK1C5A D65CHK1C10A	
<b>DPDT — 11-Pin Plug-In</b>					
Adjustable	Fixed (At 95% of Pick-Up)	24V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CH2C1T D65CH2C5T D65CH2C10T	
		120V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CH2C1A D65CH2C5A D65CH2C10A	
Adjustable	Adjustable (From 50- 95% of Pick-Up)	24V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CHK2C1T D65CHK2C5T D65CHK2C10T	
		120V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CHK2C1A D65CHK2C5A D65CHK2C10A	

Accessories

Table 49-185. Accessories — D65CH Overcurrent Monitors

Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
11-Pin Socket	10	D3PA3-A2	
Hold Down Spring	10	D65CHDS	

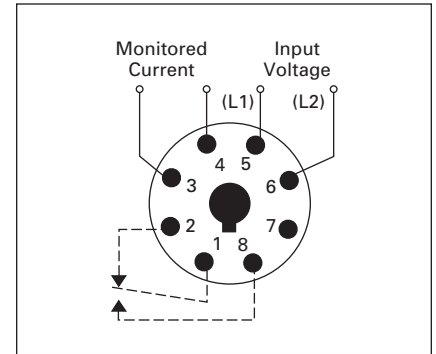
Discount Symbol .....1CD1

**Technical Data and Specifications**

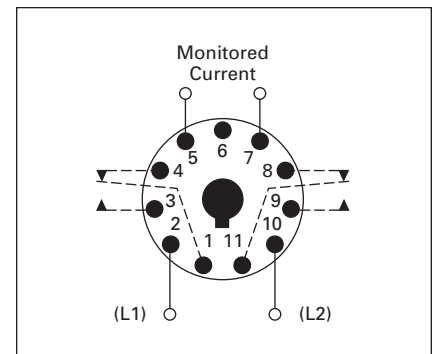
**Table 49-186. Technical Data — D65C Series, Overcurrent Monitors**

Description	Specifications
Input Voltage Tolerance	AC Operation: +10/-15% of nominal voltage at 50/60 Hz.
Load (Burden)	Less than 5 VA
Current Settings: Pick-Up Drop-Out	Adjustable throughout current range monitored Fixed at 95% of pick-up setting for D65CH Adjustable from 50 – 95% of pick-up setting for D65CHK
Temperature	-20 to 131°F (-28 to 55°C)
Response Times: Pick-Up Drop-Out	Adjustable 0.1 – 10 seconds Fixed at 100 mS
Output Contacts	10A Resistive @240V AC / 30V DC 1/2 hp @ 240V AC (NO); 1/3 hp @ 240V AC (NC)
Mechanical Life	10,000,000 operations
Electrical Life	100,000 operations
Indicator LED	Green when input voltage is applied; Red Flashing when in time delay; Red Steady when relay is energized
Reset	Automatic
Mounting	Requires an 8- or 11-pin socket

**Schematics**

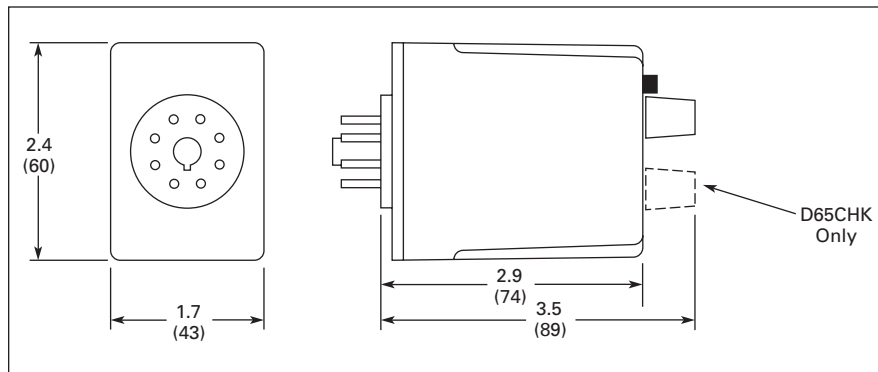


**Figure 49-157. Wiring for 8-Pin Socket**

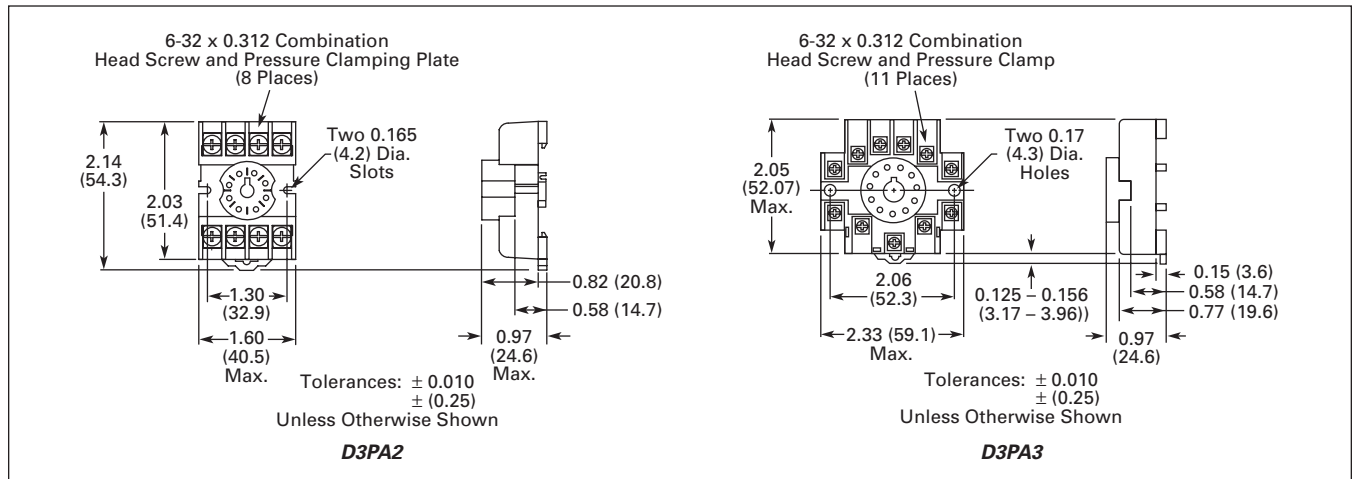


**Figure 49-158. Wiring for 11-Pin Socket**

**Dimensions**



**Figure 49-155. D65CH Series — Approximate Dimensions in Inches (mm)**



**Figure 49-156. D3PA2 and D3PA3 Sockets — Approximate Dimensions in Inches (mm)**

D65C Series — Undercurrent Monitors

### Undercurrent Monitors



D65C Series  
Undercurrent Monitors

### Product Description

The D65CL Series is designed to detect an undercurrent condition. The drop-out current setting is user-adjustable within one of three ranges shown below. An external current transformer can be used to extend the range beyond 10A. The pick-up current setting is fixed at +5% of the selected drop-out setting. The relay will energize when the monitored AC current is above the pick-up setting. It will de-energize when the monitored AC current is below the drop-out setting for a period longer than the adjustable time delay of 0.1 – 10 seconds. This delay prevents nuisance tripping caused by momentary line dips. The relay will energize when the current rises 5% above the drop-out setting.

### Features

- Monitors AC single-phase currents for undercurrent conditions
- Three separate current monitoring ranges covering 0.1 – 10 amperes
- External CT can be used to extend ranges
- Adjustable drop-out setting with fixed pick-up setting
- Adjustable time delay of 0.1 – 10 seconds on drop-out
- LED indicates output relay status
- Choice of compact SPDT (8-pin) or DPDT (11-pin) plug-in case
- 10A output contacts

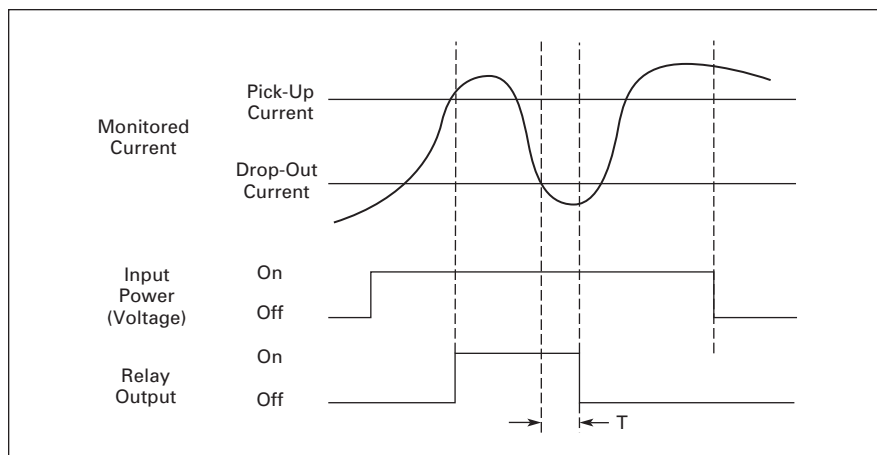


Figure 49-159. Undercurrent Monitoring

### Product Selection

Table 49-187. Product Selection — D65C Series, Undercurrent Monitors

Pick-Up Setting	Drop-Out Setting	Input Voltage	Current Range Monitored	Catalog Number	Price U.S. \$
<b>SPDT — 8-Pin Plug-In</b>					
Fixed (At 5% of Drop-Out)	Adjustable	24V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CL1C1T D65CL1C5T D65CL1C10T	
		120V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CL1C1A D65CL1C5A D65CL1C10A	
<b>SPDT — 11-Pin Plug-In</b>					
Fixed (At 5% of Drop-Out)	Adjustable	24V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CL2C1T D65CL2C5T D65CL210T	
		120V AC	0.1 – 1A 0.5 – 5A 1 – 10A	D65CL2C1A D65CL2C5A D65CL2C10A	

### Accessories

Table 49-188. Accessories — D65CL Undercurrent Monitors

Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
11-Pin Socket	10	D3PA3-A2	
Hold Down Spring	10	D65CHDS	

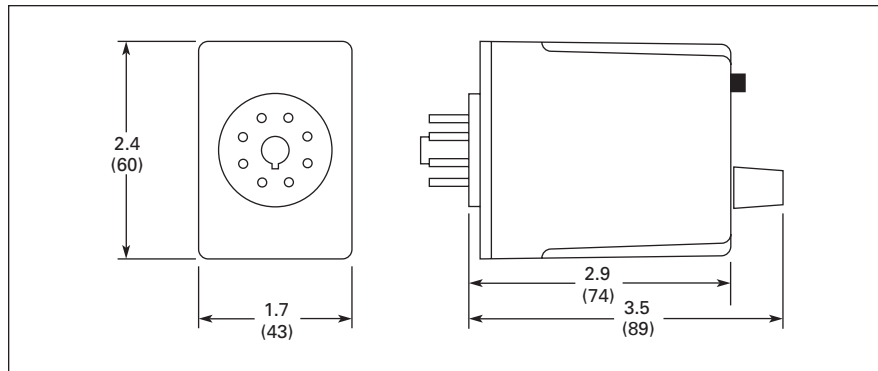


**Technical Data and Specifications**

**Table 49-189. Technical Data — D65C Series, Undercurrent Monitors**

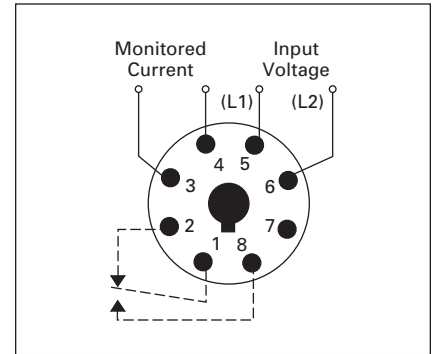
Description	Specifications
Input Voltage Tolerance	AC Operation: +10/-15% of nominal voltage at 50/60 Hz.
Load (Burden)	Less than 5 VA
Current Settings: Pick-Up Drop-Out	Fixed at 5% above adjustable drop-out setting Adjustable throughout current range monitored
Temperature	-20 to 131°F (-28 to 55°C)
Response Times: Pick-Up Drop-Out	Fixed at 100 mS Adjustable 0.1 – 10 seconds
Output Contacts	10A Resistive @240V AC / 30V DC 1/2 hp @ 240V AC (NO); 1/3 hp @ 240V AC (NC)
Mechanical Life	10,000,000 operations
Electrical Life	100,000 operations
Indicator LED	Green when input voltage is applied; Red Flashing when in time delay; Red Steady when relay is energized
Reset	Automatic
Mounting	Requires an 8- or 11-pin socket

**Dimensions**

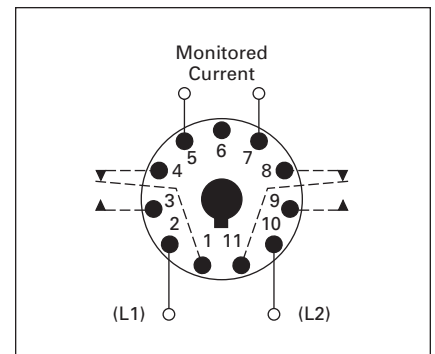


**Figure 49-160. D65CL Series — Approximate Dimensions in Inches (mm)**

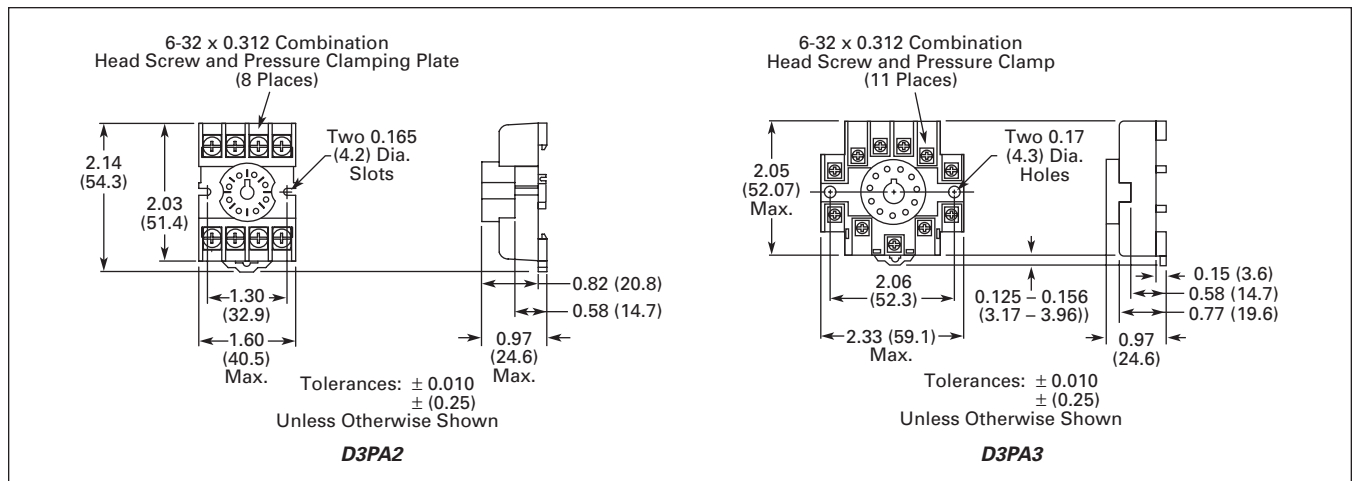
**Schematics**



**Figure 49-162. Wiring for 8-Pin Socket**



**Figure 49-163. Wiring for 11-Pin Socket**



**Figure 49-161. D3PA2 and D3PA3 Sockets — Approximate Dimensions in Inches (mm)**

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## Product Family Overview

Voltage Monitoring Relays monitor either AC single-phase (50/60 Hz) or DC voltages to protect equipment against voltage fault conditions. No separate supply (input) voltage is required. All versions are available in a compact plug-in case utilizing an 8-pin octal socket.

There are two styles of Voltage Monitoring Relays —

- Over/Undervoltage Relays
- Voltage Band Relays

## Standards and Certifications



When used with accompanying Eaton socket.



## Product Family Selection

### Over/Undervoltage Relays

Over/Undervoltage Relays provide protection to equipment where either an over- or undervoltage condition is potentially damaging. Each relay can be used as either an overvoltage or an undervoltage relay, depending on the output contact used. When used as an undervoltage relay, it provides protection to equipment that is required to operate above a minimum voltage. When used as an overvoltage relay, it protects equipment against excessive voltage conditions. Over/undervoltage relays are designed to operate when the operating voltage reaches a preset value and drop out when the operating voltage drops to a level below the preset value.

**Table 49-190. D65V Product Family Selection — Over/Undervoltage Relays**

Series	Pick-Up Voltage	Drop-Out Voltage	Time Delay Drop-Out	Page
D65VMP	Adjustable 85 – 115% Nominal	Fixed at 95% of Pick-Up	Fixed 500 mS <sup>①</sup>	49-123
D65VMKP		Adjustable 75 – 95% of Pick-Up		49-123
D65VAP		Fixed at 95% of Pick-Up	Adjustable 0.5 – 10 seconds	49-124
D65VAKP		Adjustable 75 – 95% of Pick-Up		49-124

<sup>①</sup> Fixed time delay eliminates nuisance tripping due to short voltage surges or drops.

### Voltage Band Relays

Voltage Band Relays provide protection to equipment that is required to operate within an upper and lower voltage limit. As long as the operating voltage remains within an over- and undervoltage range, the internal relay stays energized. If the operating voltage falls outside this range, the relay will drop out.

**Table 49-191. D65V Product Family Selection — Voltage Band Relays**

Series	Pick-Up Voltage	Drop-Out Voltage	Time Delay Drop-Out	Page
D65VWP	Adjustable 100 – 125% Nominal	Adjustable 75 – 100% of Nominal	Fixed 500 mS <sup>②</sup>	49-126
D65VWKP			Adjustable 0.5 – 10 seconds	49-126

<sup>②</sup> Fixed time delay eliminates nuisance tripping due to short voltage surges or drops.

**Fixed Time Delay for Over/Undervoltage**



*D65VMP & D65VMKP Series  
Over/Undervoltage Relays*

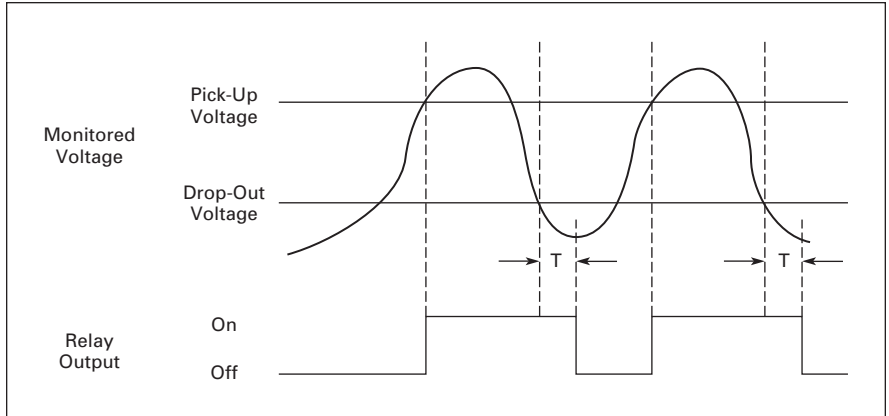
**Product Description**

The D65VMRP & D65VMKP Over/Undervoltage Relays provide protection to equipment where either an over- or undercurrent condition is potentially damaging. They are designed to operate when the operating voltage reaches a preset value and drop out when the operating voltage drops to a level below the preset value.

The pick-up voltage setting is user-adjustable from 85 – 115% of the nominal voltage rating. As standard, the D65VMRP Series has a drop-out voltage setting fixed at 95% of the pick-up voltage setting. An adjustable drop-out setting of 75 – 95% of the pick-up setting is available on the D65VMKP Series. The relay energizes when the monitored voltage is above the pick-up setting. The relay de-energizes when the monitored voltage is below the drop-out setting for a period longer than the drop-out time delay, which is fixed at 500 mS. An adjustable time delay on drop-out of 0.5 – 10 seconds is available.

**Features**

- Monitors AC single-phase and DC voltages
- Wide range of user-adjustable pick-up and drop-out settings
- Fixed time delay on drop-out of 500 mS
- LED indicates output relay status
- Compact plug-in case utilizing industry standard 8-pin socket
- 10A DPDT output contacts



**Figure 49-164. Fixed Time Delay Over/Undervoltage**

**Product Selection**

**Table 49-192. Product Selection — D65VMP & D65VMKP Series, Over/Undervoltage Relays ③**

Nominal Voltage	Voltage Range		Catalog Number	Price U.S. \$
	Pick-Up	Drop-Out		

**Adjustable Pick-Up, Fixed Drop-Out Settings ①**

24V AC	21 – 27V AC	20 – 26V AC	D65VMRPT D65VMRPA	
120V AC	102 – 138V AC	97 – 131V AC		
12V DC	10 – 14V DC	9 – 13V DC	D65VMRPR1 D65VMRPT1 D65VMRPW1 D65VMRPA1	
24V DC	21 – 27V DC	20 – 26V DC		
48V DC	41 – 55V DC	39 – 52V DC		
110V DC	94 – 126V DC	89 – 121V DC		

**Adjustable Pick-Up and Drop-Out Settings ②**

24V AC	21 – 27V AC	16 – 26V AC	D65VMKPT D65VMKPA	
120V AC	102 – 138V AC	77 – 131V AC		
12V DC	10 – 14V DC	8 – 13V DC	D65VMKPR1 D65VMKPT1 D65VMKPW1 D65VMKPA1	
24V DC	21 – 27V DC	16 – 26V DC		
48V DC	41 – 55V DC	32 – 52V DC		
110V DC	94 – 126V DC	71 – 121V DC		

① Drop-out voltage is fixed at 95% of the adjusted Pick-Up Setting.

② Drop-out voltage is adjustable from 75 – 95% of the adjusted Pick-Up Setting.

③ Time delay on drop-out fixed at 500 mS.

**Accessories**

**Table 49-193. Accessories — Over/Undervoltage Relays**

Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
Hold Down Spring	10	D65CHDS	

D65V Series — Adjustable Time Delay Over/Undervoltage Relays

### Adjustable Time Delay for Over/Undervoltage



D65VAP & D65VAKP Series  
Over/Undervoltage Relays

### Product Description

The D65VAP & D65VAKP Over/Undervoltage Relays provide protection to equipment where either an over- or undercurrent condition is potentially damaging. They are designed to operate when the operating voltage reaches a preset value and drop out when the operating voltage drops to a level below the preset value.

The pick-up voltage setting is user-adjustable from 85 – 115% of the nominal voltage rating. As standard, the D65VAP Series has a drop-out voltage setting fixed at 95% of the pick-up voltage setting. An adjustable drop-out setting of 75 – 95% of the pick-up setting is available on the D65VAKP Series. The relay energizes when the monitored voltage is above the pick-up setting. The relay de-energizes when the monitored voltage is below the drop-out setting for a period longer than the drop-out time delay, which is adjustable from 0.5 – 10 seconds. A fixed time delay of 500 mS is available with the D65VMP Series.

### Features

- Monitors AC single-phase and DC voltages
- Wide range of user-adjustable pick-up and drop-out settings
- Adjustable time delay on drop-out of 0.5 – 10 seconds
- LED indicates output relay status
- Compact plug-in case utilizing industry standard 8-pin socket
- 10A DPDT output contacts

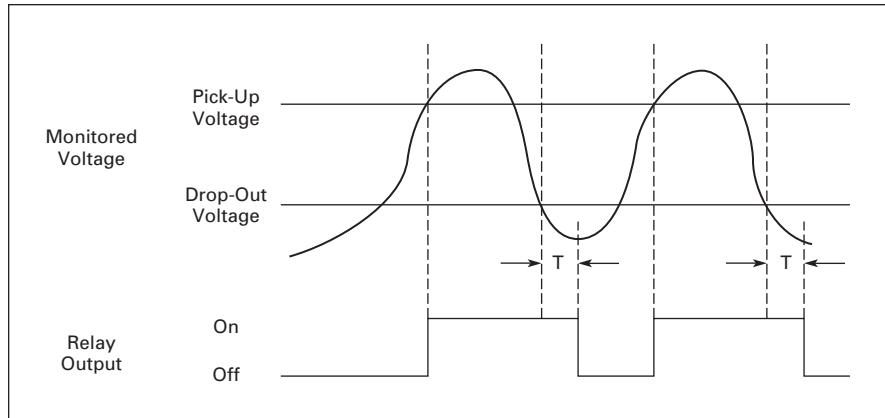


Figure 49-165. Adjustable Time Delay Over/Undervoltage

### Product Selection

Table 49-194. Product Selection — D65VAP & D65VAKP Series, Over/Undervoltage Relays ③

Nominal Voltage	Voltage Range		Catalog Number	Price U.S. \$
	Pick-Up	Drop-Out		
24V AC 120V AC	21 – 27V AC 102 – 138V AC	20 – 26V AC 97 – 131V AC	D65VAPT D65VAPA	
12V DC 24V DC 48V DC 110V DC	10 – 14V DC 21 – 27V DC 41 – 55V DC 94 – 126V DC	9 – 13V DC 20 – 26V DC 39 – 53V DC 89 – 121V DC	D65VAPR1 D65VAPT1 D65VAPW1 D65VAPA1	

Adjustable Pick-Up, Fixed Drop-Out Settings ①

Adjustable Pick-Up and Drop-Out Settings ②

24V AC 120V AC	21 – 27V AC 102 – 138V AC	16 – 26V AC 77 – 131V AC	D65VAKPT D65VAKPA	
12V DC 24V DC 48V DC 110V DC	10 – 14V DC 21 – 27V DC 41 – 55V DC 94 – 126V DC	8 – 13V DC 16 – 26V DC 32 – 52V DC 71 – 121V DC	D65VAKPR1 D65VAKPT1 D65VAKPW1 D65VAKPA1	

① Drop-out voltage is fixed at 95% of the adjusted Pick-Up Setting.

② Drop-out voltage is adjustable from 75 – 95% of the adjusted Pick-Up Setting.

③ Adjustable time delay on drop-out from 0.5 – 10 seconds.

### Accessories

Table 49-195. Accessories — Over/Undervoltage Relays

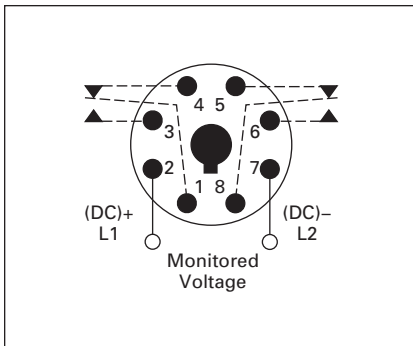
Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
Hold Down Spring	10	D65CHDS	

**Technical Data and Specifications**

**Table 49-196. Technical Data — D65VMP, D65VMKP, D65VAP & D65VAKP Series, Over/Undervoltage Relays**

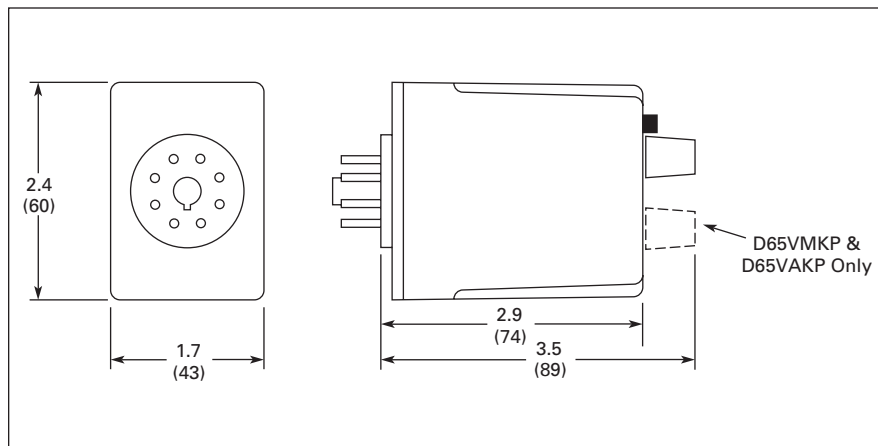
Description	Specifications
Voltage Tolerance	+25%/-50% of nominal voltage; AC voltages are 50/60 Hz; No supply (input) voltage is required
Load (Burden)	Less than 3VA
Voltage Settings: Pick-Up Drop-Out	Adjustable from 85 – 115% of nominal voltage Fixed at 95% of the pick-up setting for D65VMP and D65VAP Adjustable from 75 – 95% of the pick-up setting for D65VMKP and D65VAKP
Temperature	-20 to 131°F (-28 to 55°C)
Response Times: Operate Release	500 mS Fixed 500 mS for D65VMP and D65VMKP Adjustable 0.5 – 10 seconds for D65VAP and D65VAKP
Output Contacts	10A Resistive @240V AC / 30V DC, 1/2 hp @ 240V AC (NO), 1/3 hp @ 240V AC (NC)
Mechanical Life	10,000,000 operations
Electrical Life	100,000 operations
Indicator LED	Red Steady when relay is energized; Green when relay is off
Transient Protection	10,000 volts for 20 microseconds
Reset	Automatic
Mounting	Requires an 8-pin socket

**Schematics**



**Figure 49-166. Wiring for 8-Pin Socket**

**Dimensions**



**Figure 49-167. D65V Series — Approximate Dimensions in Inches (mm)**

**Application Description**

Each relay can be used as either an overvoltage or an undervoltage relay, depending on the output contact used.

**Overvoltage Relay**

Provides protection to equipment that cannot handle excess voltages. Uses a normally closed contact (NC). As long as the monitored voltage remains below the maximum voltage the equipment can withstand (Pick-Up Setting), the relay remains energized and the NC contact remains closed, keeping the load energized. If the operating voltage increases beyond the maximum rating of the equipment, the relay energizes and the NC contact opens, turning off the load. When the voltage falls below the Drop-Out Settings (hysteresis), the relay de-energizes and the NC contact re-closes, turning on the load.

**Undervoltage Relay**

Provides protection to equipment that is required to operate above a certain minimum voltage. Uses a normally open contact (NO). As long as the monitored voltage is above the minimum value required (Pick-Up Setting), the relay will energize and the NO contact closes, turning on the load. If the voltage drops below the Drop-Out Setting (the minimum voltage required minus hysteresis), the relay will de-energize and the NO contact will re-open, turning off the load.

D65V Series — Voltage Band Relays

Voltage Band



D65VW Series  
Voltage Band Relays

Product Description

The D65VWP & D65VWKP Series Voltage Band Relays provide protection to equipment that is required to operate within an upper and lower voltage limit. As long as the operating voltage remains within an over- and undervoltage range, the internal relay stays energized. If the operating voltage falls outside this range, the relay will drop out.

When nominal operating voltage is applied, the internal relay will energize (pick up). If the operating voltage falls outside the preset over trip point (adjustable 100 – 125% of nominal), or under trip point (adjustable 75 – 100% of nominal), for a period longer than the drop-out time delay, the relay will de-energize (drop out). When the voltage returns to normal (within the preset over- and undervoltage trip points), the unit automatically resets and the relay energizes. Choose between a unit with fixed drop-out time of 500 mS or one with an adjustable 0.5 – 10 seconds drop-out time.

Features

- Monitors AC single-phase and DC voltages
- Provides voltage band (window) protection
- Wide range of user-adjustable over-voltage and undervoltage settings
- Fixed or adjustable time delay on drop-out
- LED indicates output relay status
- Compact plug-in case utilizing industry standard 8-pin octal socket
- 10A DPDT output contacts

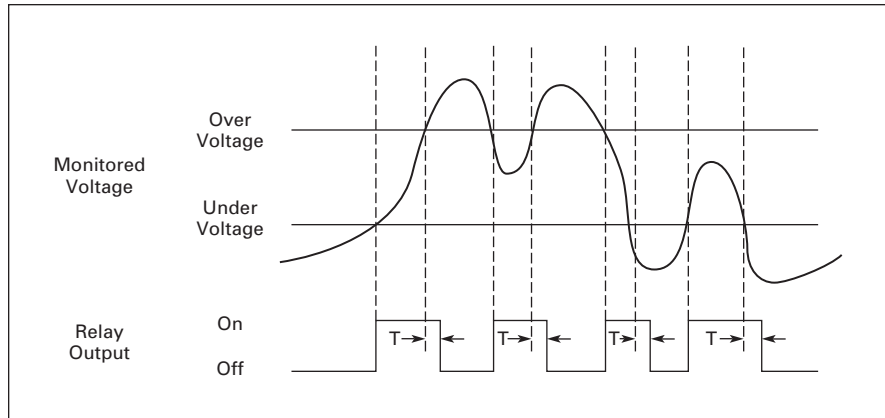


Figure 49-168. Voltage Band Relays

Product Selection

Table 49-197. Product Selection — D65VWP & D65VWKP Series, Voltage Band Relays

Nominal Voltage	Voltage Range		Catalog Number	Price U.S. \$
	Over	Under		
<b>Fixed Drop-Out Time Delay, 500 mS</b>				
24V AC 120V AC	24 – 30V AC 120 – 150V AC	18 – 24V AC 90 – 120V AC	D65VWPT D65VWPA	
12V DC 24V DC 48V DC 110V DC	12 – 15V DC 24 – 30V DC 48 – 60V DC 110 – 137V DC	9 – 12V DC 18 – 24V DC 36 – 48V DC 83 – 110V DC	D65VWPR1 D65VWPT1 D65VWPW1 D65VWPA1	
<b>Adjustable Drop-Out Time Delay (0.5 – 10 Seconds)</b>				
24V AC 120V AC	24 – 30V AC 120 – 150V AC	18 – 24V AC 90 – 120V AC	D65VWKPT D65VWKPA	
12V DC 24V DC 48V DC 110V DC	12 – 15V DC 24 – 30V DC 48 – 60V DC 110 – 137V DC	9 – 12V DC 18 – 24V DC 36 – 48V DC 83 – 110V DC	D65VWKPR1 D65VWKPT1 D65VWKPW1 D65VWKPA1	

Accessories

Table 49-198. Accessories — Voltage Band Relays

Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
Hold Down Spring	10	D65CHDS	

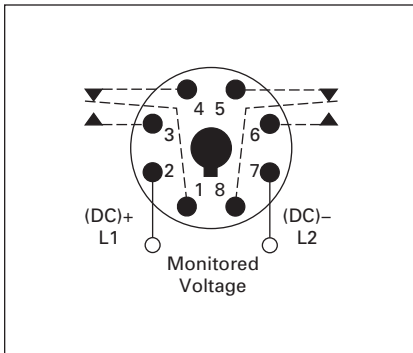
Discount Symbol .....1CD1

**Technical Data and Specifications**

**Table 49-199. Technical Data — D65VWP & D65VWPK Series, Voltage Band Relays**

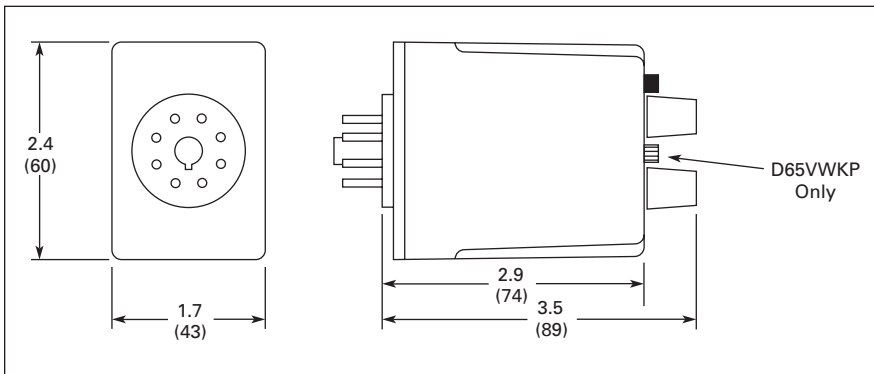
Description	Specifications
Voltage Tolerance	+25%/-50% of nominal voltage; AC voltages are 50/60 Hz; No separate supply (input) voltage is required.
Load (Burden)	Less than 3 VA
Voltage Settings: Overvoltage Undervoltage	100 – 125% of nominal voltage 75 – 100% of nominal voltage
Temperature	-20° to 131°F (28° to 55°C)
Indicator LED	Red steady when relay is energized; Green when relay is OFF
Reset	Automatic. Contact Eaton for information on how to order a unit with Manual Reset.
Response Times: Operate Release	500 mS Fixed 500 mS (D65VWP Series) Adjustable 0.5 – 10 seconds (D65VWKP Series)
Output Contacts	10A Resistive @ 240V AC / 30V DC, 1/2 hp @ 240V AC (NO), 1/3 hp @ 240V AC (NC)
Life: Mechanical Electrical	10,000,000 operations 100,000 operations
Transient Protection	10,000 volts for 20 microseconds

**Schematic**



**Figure 49-169. Wiring for 8-Pin Socket**

**Dimension**



**Figure 49-170. D65V Series — Approximate Dimensions in Inches (mm)**

VSR Series — Solid-State, Single-Phase

VSR Series — Solid-State,  
Single-Phase Voltage Sensing



Catalog Number VSR Voltage Sensitive Relay

Product Description

The Catalog Number VSR voltage sensing relays are highly accurate, solid-state, AC voltage sensing devices available in both overvoltage and undervoltage types. They include built-in locking shaft potentiometers for voltage and differential adjustment. Relay circuit boards are conformal contact for environment-free operation. Input is transformer isolated from solid-state output contact. Mounting dimensions are the same as Catalog Number BF relays.

Features

- Same base plate as Catalog Number BF relay, mounts in same area
- Captive, pressure clamp terminals — accept 1 or 2 solid or stranded 14 AWG or smaller wires
- Adjustment potentiometer with locking shafts — provides shock-proof adjustment
- Conformal coated printed circuit board — protects relay against shock, moisture, dirt and other environmental hazards
- Built-in surge protection — protects internal solid-state contact from damage due to load and line transients

Technical Data and Specifications

Electrical Ratings

- Operating Voltage Range: 70 – 140V AC, 200 – 280V AC 3 VA burden
- Variable Differential Range: see curves at right
- Repeatability: ±0.5V AC of setting
- Solid-State Contacts: 2A continuous maximum inductive or resistive, 132V AC maximum

Note: Can initiate a Size 4 motor starter.

Note: 12A RMS maximum inrush for 3 cycles. If inrush current is greater than 12A and relay is operated more than 30 times per minute, derating may be necessary. If surge current is 12A or less, no derating is necessary. If currents exceeding these ratings could occur, a series fuse having an I<sup>2</sup>t rating equal to 3A squared seconds is recommended.

- Ambient Temperature Range: -20° to 60°C

Note: For operation in a higher ambient temperature, derating may be necessary.

- Open Contact Leakage Current: 3 mA maximum
- Closed Contact Voltage Drop: 3V AC maximum

Product Selection

When Ordering Specify

- Catalog Number of Basic Relay.

Table 49-200. Voltage Sensing Relays

Description	Voltage Range	Catalog Number	Price U.S. \$
Undervoltage Relay	70 – 120V AC 200 – 280V AC	VSRUA VSRUB	
Overvoltage Relay	100 – 140V AC 200 – 280V AC	VSROA VSROB	

Operating Curves

Undervoltage Relay

Solid-state NO contact closes when voltage exceeds upper limit set by voltage adjustment potentiometer. Contact remains closed until voltage drops below the value set with differential adjustment. Contact will not reclose until voltage once again exceeds upper limit.

Overvoltage Relay

Providing a minimum of 60V input is present, solid-state contact is NC. Differential adjustment sets upper limit where contact will open. After opening, contact will remain open until voltage drops below value set with voltage adjustment potentiometer.

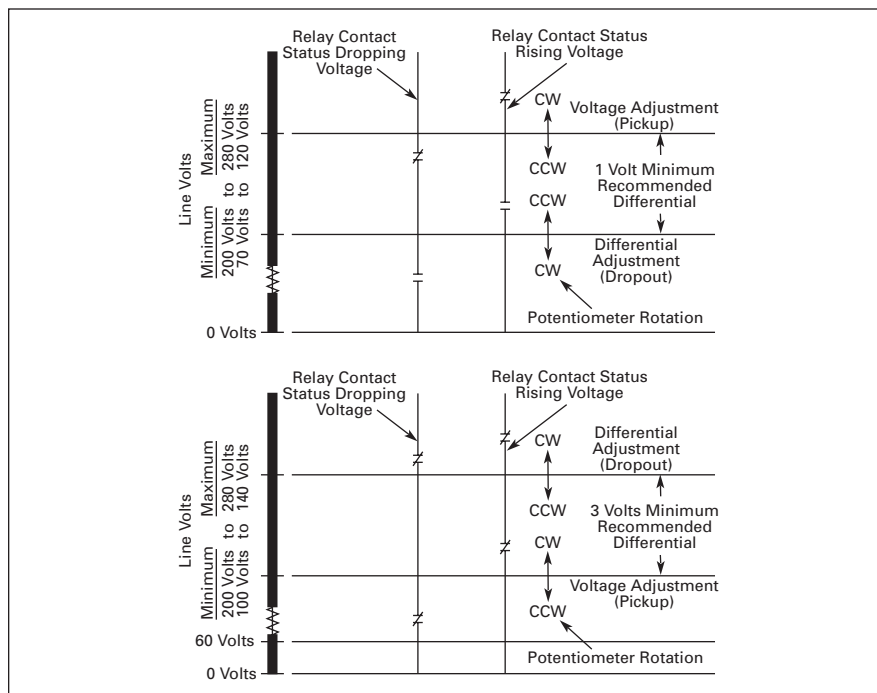
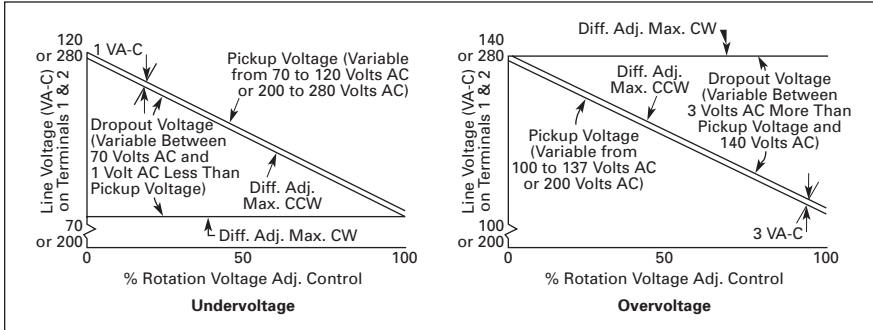


Figure 49-171. Operating Curves

Discount Symbol ..... 1CD1

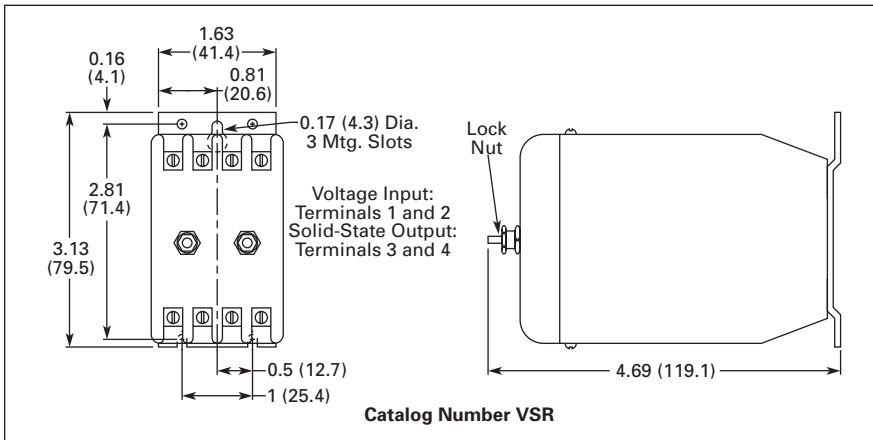


**Voltage Ranges**



**Figure 49-172. Relay Pick-Up and Drop-Out Voltage Ranges**

**Dimensions**



**Figure 49-173. Approximate Dimensions in Inches (mm)**

## D85 Series

## D85 Series — Alternating Relays

D85 Series  
Alternating Relays

## Product Description

Alternating relays are used in applications where the optimization of load usage is required by equalizing the run time of two loads. They are also used where additional capacity is required in case of excess load requirements. This alternating action is initiated by a control switch — such as a float switch, manual switch, timing relay, pressure switch or other isolated contact. Each time the initiating switch is opened, the output relay contacts will change state, thus alternating the two loads. Two LED indicators show the status of the output relay.

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

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

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

## Features

- For duplex loads
- Works with 1-, 2-, or 3-switch applications

- Compact plug-in design utilizing industry standard sockets
- 10A SPDT or DPDT output configurations
- Optional low profile selector switch to lock in one sequence
- 2 LEDs indicate relay status
- D853 Series replaces separate components in duplex panel — saving space and reducing labor

## Standards and Certifications



## Product Selection

Table 49-201. Product Selection — D85 Series ①

Output Contacts	Control Voltage	Socket	Catalog Number	Price U.S. \$
SPDT	12V AC	8-Pin	D851NR	
SPDT	24V AC	8-Pin	D851NT	
SPDT	120V AC	8-Pin	D851NA	
SPDT	240V AC	8-Pin	D851NB	
SPDT w/Selector Switch	12V AC	8-Pin	D851LR	
SPDT w/Selector Switch	24V AC	8-Pin	D851LT	
SPDT w/Selector Switch	120V AC	8-Pin	D851LA	
SPDT w/Selector Switch	240V AC	8-Pin	D851LB	
DPDT	12V AC	11-Pin	D852NR	
DPDT	24V AC	11-Pin	D852NT	
DPDT	120V AC	11-Pin	D852NA	
DPDT	240V AC	11-Pin	D852NB	
DPDT w/Selector Switch	12V AC	11-Pin	D852LR	
DPDT w/Selector Switch	24V AC	11-Pin	D852LT	
DPDT w/Selector Switch	120V AC	11-Pin	D852LA	
DPDT w/Selector Switch	240V AC	11-Pin	D852LB	
DPDT Cross-Wired	12V AC	8-Pin	D852XNR	
DPDT Cross-Wired	24V AC	8-Pin	D852XNT	
DPDT Cross-Wired	120V AC	8-Pin	D852XNA	
DPDT Cross-Wired	240V AC	8-Pin	D852XNB	
DPDT Cross-Wired w/Selector Switch	12V AC	8-Pin	D852XLR	
DPDT Cross-Wired w/Selector Switch	24V AC	8-Pin	D852XLT	
DPDT Cross-Wired w/Selector Switch	120V AC	8-Pin	D852XLA	
DPDT Cross-Wired w/Selector Switch	240V AC	8-Pin	D852XLB	

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

## Accessories

Table 49-202. Accessories — D85 Series

Description	Standard Pack	Catalog Number	Price U.S. \$
8-Pin Socket	10	D3PA2	
11-Pin Socket	10	D3PA3-A2	
Hold Down Spring	10	D65CHDS	

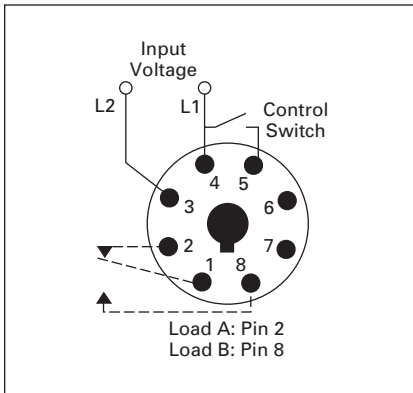
Discount Symbol .....1CD1

**Technical Data and Specifications**

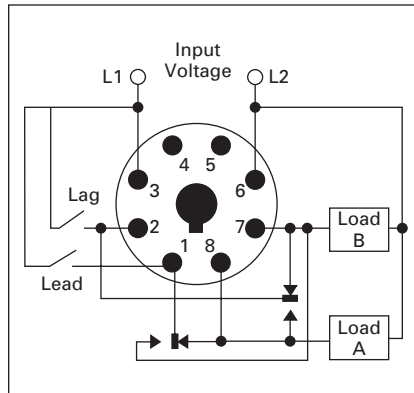
**Table 49-203. Technical Data — D85 Series**

Description	Specifications
Voltage Tolerance	+10%/-15% of control voltage at 50/60 Hz
Load (Burden)	Less than 3 VA
Output Contacts	10A Resistive @ 240V AC / 30V DC, 1/2 hp @ 120/240V AC (NO), 1/3 hp @ 120/240V AC (NC)
Life:	
Mechanical	10,000,000 operations
Electrical	100,000 operations
Temperature	-20° 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

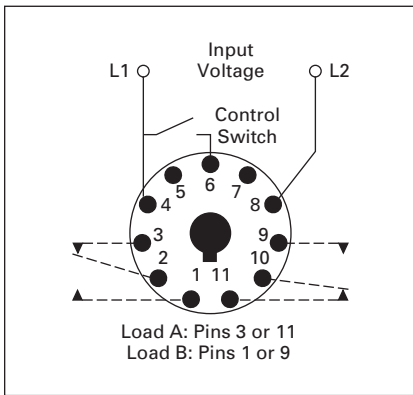
**Schematics**



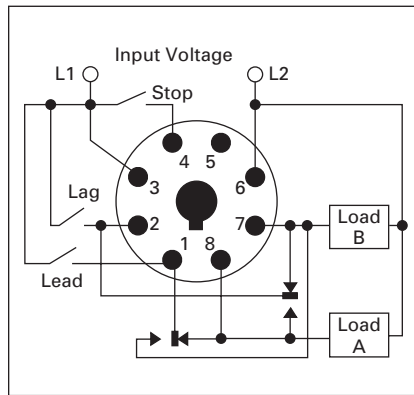
**Figure 49-174. Wiring for D851 Series Relays, SPDT**



**Figure 49-176. Wiring for D852X Series Relays, DPDT Cross-Wired**



**Figure 49-175. Wiring for D852 Series Relays, DPDT**



**Figure 49-177. Wiring for D853 Series Relays, Three-Switch Applications**

D85 Series

### Dimensions

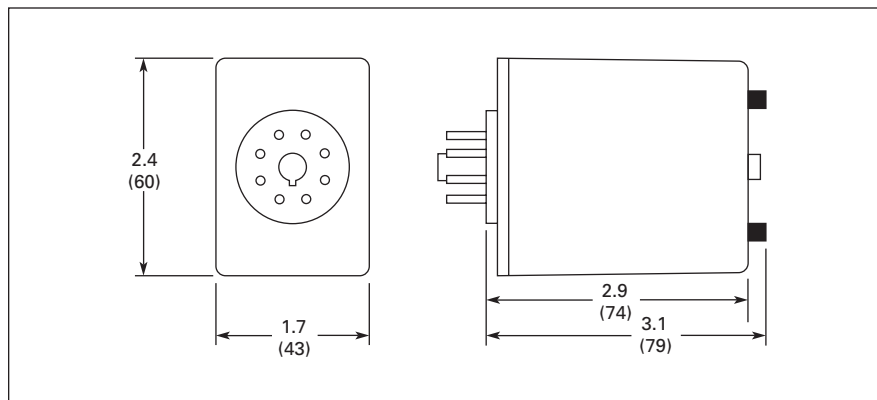


Figure 49-178. D85 Series — Approximate Dimensions in Inches (mm)

### Typical Installations

#### SPDT and DPDT Alternating Relays

In the OFF state (Standard Installation), the Control Switch is open, the Alternating Relay is in the LOAD A position, and both loads (M1 & 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. 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.

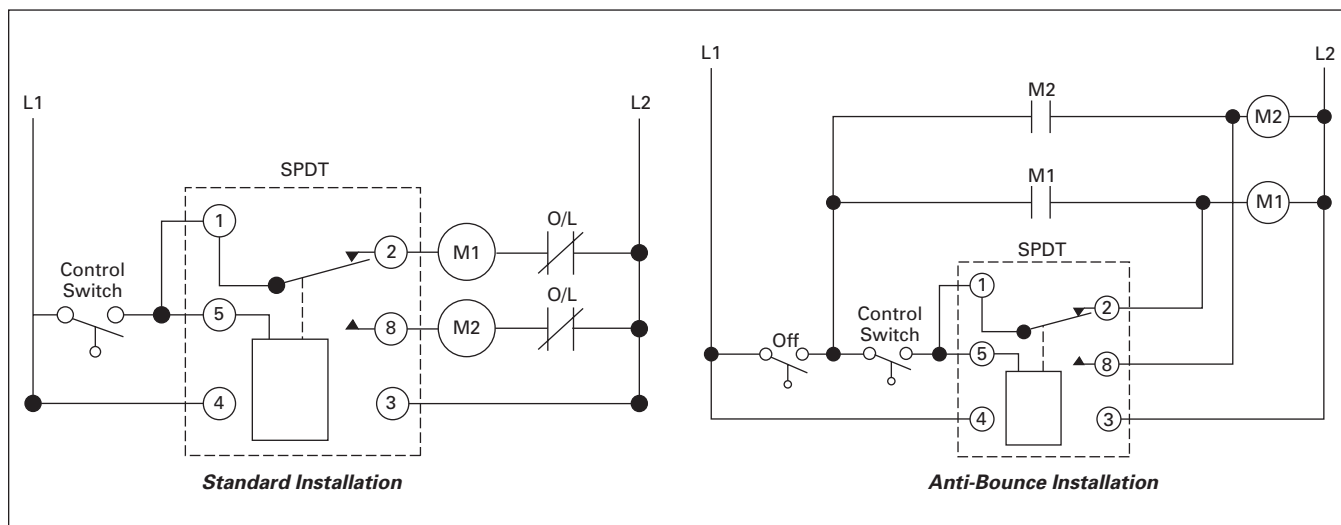


Figure 49-179. Typical Installations for SPDT and DPDT Alternating Relays

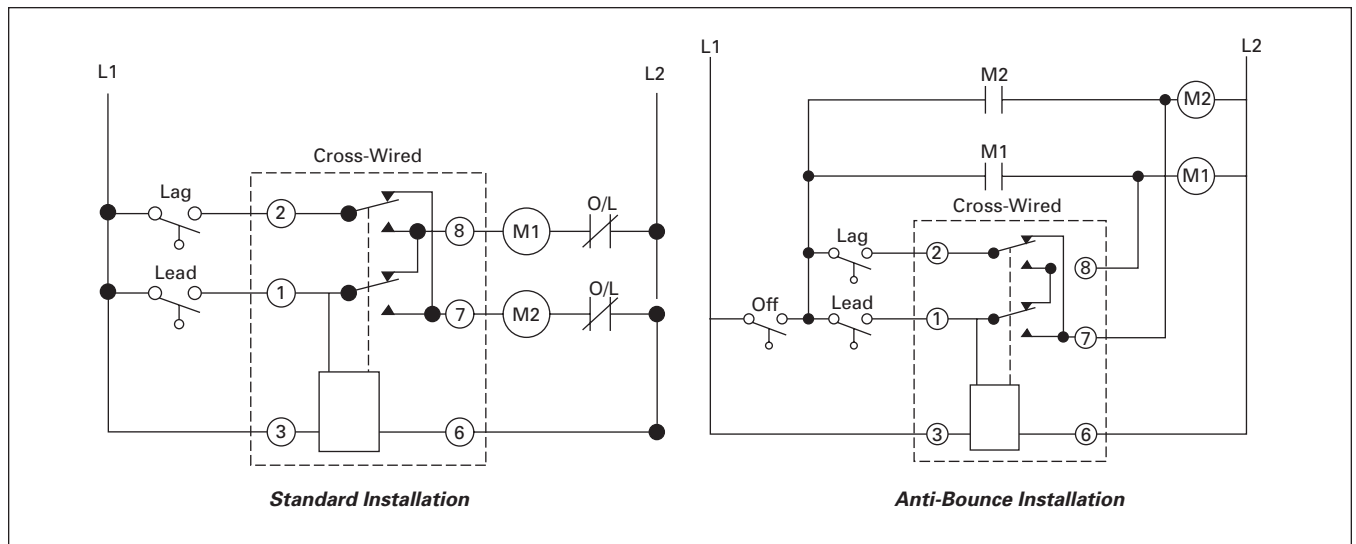
**DPDT Cross-Wired Alternating Relays**

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. 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.



**Figure 49-180. Typical Installations for DPDT Cross-Wired Alternating Relays**

D85 Series

**DPDT Cross-Wired 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.

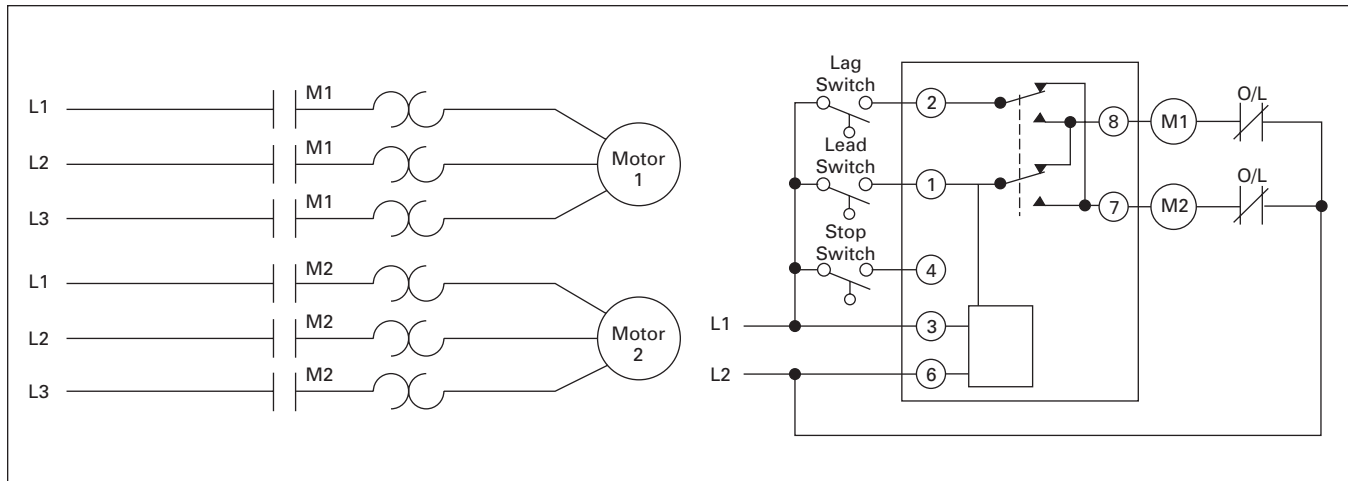


Figure 49-181. Typical Installations for DPDT Cross-Wired Relays for Three-Switch Applications

**D64R Series — Digital Ground Fault Relays**



**D64RPB100 – Digital Ground Fault Relay with Built-In Current Sensor or Zero-Sequence CT**

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**Product Description**

The new D64R digital ground fault relays are microprocessor-based and replace the previous generation of analog-based devices.

Microprocessor-based D64R GFRs combine more selectable features into a single model, which makes easier model selection and reduces spares inventory requirements.

These devices are designed to provide reliable detection of ground fault conditions on three-phase AC resistance grounded or solidly grounded electrical distribution systems.

**Application Description**

D64R ground fault relays feature adjustable trip settings for both trip current and trip time. This allows the user to set the ground fault trip current just above the “charging” current of the system. This prevents nuisance tripping and provides meaningful protection of additional ground fault leakage currents.

Every system has a “charging” current that can cause nuisance tripping if the trip current is set too low. The “charging” current is caused by the capacitance-to-ground effect of phase conductors in a system and will vary depending on:

- the overall length of the cables
- the types of loads
- the quality of the insulation on the phase conductors
- the surrounding equipment grounding, cable trays, junction boxes, etc.
- the type and size of transformer

A “rule-of-thumb” for systems 600V and lower: the “charging” current is 0.5A per 1000 kVA of transformer capacity.

**Features**

**Standard Models**

- Built-in current sensor (zero sequence CT)
  - Run and trip indicating LEDs
  - Built-in harmonic filtering for variable frequency drives or standard 50/60 Hz applications (see **Table 49-204** for frequency response range)
  - DIN rail or panel mounting
  - Rugged epoxy encapsulated construction
  - Pull-apart terminal block connectors
  - Form “Z” (4 terminal) NO and NC output contacts, 5 Amps at 250V AC
  - Pulsed (trip) auto reset mode
- The pulsed (trip) auto reset mode is designed for applications where the output relay is operating a shunt trip device. The D64R relay resets automatically, three seconds after the ground fault current is interrupted by the tripping action of the circuit breaker. This opens the output contact wired to the shunt trip coil and prevents damage to the internal mechanism of the circuit breaker in the event that the operator tries to reset the circuit breaker.
- Suitable for use on 600V systems — may be applied on higher voltages by using separate CTs with power conductors insulated for the system voltage

- Built-in test circuitry — no external power or additional wiring is necessary — tests trip time and current settings
- Communications port (standard RJ-10 jack) for connection to optional remote display (D64D1) and door mounted units (on D64RPB100 models only)
- Failsafe selectable mode (on D64RPB100 models only)

In the failsafe mode, the relay is energized when control voltage is applied and will trip when either:

- a ground fault trip is detected or,
- there is a loss of control power.

**Service Protection Models**

- Service protection models require C311CT 10,000:1 ratio CTs
- Trip current range of 50 to 1200A
- Green LED indicates “Power On”
- Circuit breaker toggle position indicates “Normal” or “Tripped” condition
- Form “C” (3 terminal) NO-NC output contacts, 3 Amps at 250V AC
- Frequency response range of 40 to 200 Hz
- Zone interlocking feature with green LED to indicate “Grading Input Active” and DIP switch array for zone grading backup delay and block signal override (on D64RPBH15 model only)
- Test button to invoke test at 20A trip current — tests external CT, electronics and circuit breaker trip
- Failsafe selectable mode (see above for description)
- Inhibit selectable mode — this allows the relay to differentiate between normal ground fault trip levels and short circuit conditions

The trip inhibit function is useful when the relay is being used to trip a contactor or motor starter on a solidly grounded system. Under a bolted fault condition, the relay would trip and could cause the contactor or motor starter to interrupt the high fault current with harmful results. By inhibiting the trip, the ground fault relay will not trip on bolted faults and will allow the upstream protective device to clear the fault instead.

- Through-the-door or rear panel mounting

## Technical Data and Specifications

Table 49-204. Technical Data Specifications

Catalog Number	Control Power (Volts)	Frequency Response (Hz)	Trip Current Range		Trip Time Delay Range		Built-In Current Sensor	External Current Transformer		Test/Reset Provision	
			Min.	Max.	Min.	Max.		Required	Ratio	Pushbutton on Cover	Remote
D64RP18	24 – 240V AC/DC Non-isolated	45 – 450 Hz	30 mA	6A	20 ms	500 ms	1.1"	Optional	500:1	No	Pushbutton
D64RPB100	24 – 240V AC/DC Isolated	45 – 450 Hz	30 mA	9A	20 ms	5 Sec	2.0"	Optional	500:1	Yes	Pushbutton or RJ-11 Communications Port
			3A	900A				Required	500:5		
			30A	9000A				Required	5000:5		
D64RPBH13	120V AC	45 – 200 Hz	50A	1200A	35 ms	1 Sec	None	Required	10000:1	Yes	Pushbutton
D64RPBH15 ①	120V AC	40 – 200 Hz	50A	1200A	35 ms	1 Sec	None	Required	10000:1	Yes	Pushbutton

① With Zone interlocking feature.

## Standards and Certifications

- UL 1053
  - Ground Fault Sensing and Relaying Equipment, Class 1 (UL File # E195341)
- CSA C22.2 No. 144-M91
  - Ground Fault Circuit Interrupters (CSA File # 700103)
- CE Mark — Declaration of Conformity
- IEC 60755
  - General Requirements for residual current operated protective devices
- EN 50081-1
  - Electromagnetic compatibility (radiated emission), "household" directive

D64R ground fault relays are UL listed as Class 1 devices designed to protect electrical equipment against extensive damage from arcing ground faults.

## Factory Options

- Other ranges of trip currents and times
- Fixed trip current and times
- Other control voltages
- Custom packaging for volume OEM requirements
- Separate outputs for alarming vs trip
- Relays for neutral grounding resistance monitoring
- Relays for ground fault detection on DC power systems
- Other sizes of current transformers



Sample D64R Ground Fault Relay in Custom Packaging for OEM

## Accessories



C311CT9

### Zero Sequence Current Transformers

- A complete size range of zero sequence CTs designed specifically for use with D64R relays provide excellent coupling to the monitored circuit. This means accurate ground fault leakage current detection over the full setting range of the relay with no saturation.
- Built-in back-to-back zeners across the output terminals of all 500:1 and 10,000:1 CTs provide personnel safety should the secondary circuit be opened.
- Rectangular split core CTs make retro-fitting easy.
- All CTs are epoxy potted, panel mounted and come with either secondary screw terminals or threaded studs.
- The core is very high grade silicon iron to give superior coupling characteristics and to withstand high shock and vibration.
- All CTs are 600 Volt class. They may be used on higher voltage circuits provided that power conductors are insulated for the system voltage.

Table 49-205. Zero Sequence Current Transformers for D64RP18 & D64RPB100 Relays ③④⑤

Description/Window Size	Ratio 500:1 CTs ②	
	Catalog Number	Price U.S. \$

#### Toroidal Zero Sequence CT

1.1 inch (28 mm)	C311CT8	
1.8 inch (46 mm)	C311CT1	
2.5 inch (65 mm)	C311CT9	
3.5 inch (90 mm)	C311CT2	
5.7 inch (144 mm)	C311CT5	
9.5 inch (240 mm)	C311CT6	

#### Split Core (Rectangular/Square) Zero Sequence CT

5.9 x 6.7 inch (150 x 170 mm)	C311CT3	
4.0 x 13.8 inch (100 x 350 mm)	C311CT4	
11.8 x 11.8 inch (300 x 300 mm)	C311CT7	

- ② The maximum allowable continuous current through CTs is 1000A.
- ③ D64RP18 relays use 500:1 ratio CTs if needed.
- ④ D64RPB100 relays can use 500:1 ratio CTs when needed for 30 mA – 9A, 500:5 ratio for 3A – 900A and 5000:5 ratio for 30A – 9000A trip current ranges.
- ⑤ For 500:5 or 5000:5 ratio CTs, select any commercially available 5 Amp secondary CT with the same ratio.

Discount Symbol.....1CD1



**D64R Series, Digital Ground Fault Relays**

**Table 49-206. Zero Sequence Current Transformers for D64RPBH13 and D64RPBH15 Relays**

Description	Ratio 10,000:1 CTs ①	
	Catalog Number	Price U.S. \$

**Toroidal Zero Sequence CT**

Window —	Catalog Number	Price U.S. \$
2.5 inch (65 mm)	<b>C311CT11</b>	
5.7 inch (144 mm)	<b>C311CT12</b>	
9.5 inch (240 mm)	<b>C311CT13</b>	

① The maximum allowable continuous current through 10,000:1 ratio CTs is 10,000A.

**D64D1 Digital Display Unit**



**D64D1**

The D64D1 digital display unit is connected to the D64RPB100 by up to 30 feet (10m) of standard 4-wire telephone type cable. It is supplied with door mounting hardware. It provides the following remote indications and functions:

- Continuous reading of actual ground fault current, employing auto ranging
- Display of the pre-trip ground fault current, after a trip has occurred (flashing display)
- Display of the trip current setting, after a Test Trip has been activated
- Green RUN LED, Red TRIP LED
- TEST and RESET pushbuttons. The RESET button must be held pressed before the TEST is pressed to invoke the test procedure. The function of this button can be enabled/disabled by inserting the interconnecting cable from the D64RPB100 relay into one of two sockets, TEST ON or TEST OFF, on the right side of the display.
- Pushing VERIFY pushbutton shows if D64RPB100 tripped due to a ground fault prior to loss of its control voltage — red TRIP LED lights, or if there was no ground fault trip — green RUN LED lights. This indication will remain available for at least ten hours.

- The Numerical LCD window displays actual ground fault current in Amps. When a 5000:5 ratio interposing CT is used, all displayed values are to be interpreted as kAmps rather than Amps.

**Table 49-207. Remote Display Unit for D64RPB100**

Description	Catalog Number	Price U.S. \$
Remote Digital Display with Numerical LCD, RUN & TRIP LEDs, TEST, RESET and VERIFY Pushbuttons: C/W 3 ft. (1m) of cable	<b>D64D1</b>	

**Product Selection**

**When Ordering Specify**

- Catalog Number of relay from tables
- Catalog Number of zero sequence current transformers, if or when required, remote digital display or remote indicator units

**Standard Models**



**D64RPB100 Full-Featured Ground Fault Relay**



**D64RP18 without Plug-In**

**Table 49-208. Ground Fault Relay with Built-In Current Sensor**

Control Power	Catalog Number	Price U.S. \$	Trip Current Range	Current Transformer Selection
24 – 240V AC/DC	<b>D64RP18</b>		30 mA – 6A	Built-in 1.1" CT. ② If external CT is required for specific application, select 500:1 ratio CT. ④
24 – 240V AC/DC	<b>D64RPB100</b>		30 mA – 9A	Built-in 2.0" CT. ③ If external CT is required for specific application, select 500:1 ratio CT ④
			3A – 900A	Select 500:5 ratio CT ⑤
			30A – 9000A	Select 5000:5 ratio CT ⑤

② Maximum allowable continuous current through built-in CT is 100 Amps.  
 ③ Maximum allowable continuous current through built-in CT is 200 Amps.  
 ④ For 500:1 ratio CTs, select from **Table 49-205**.  
 ⑤ For 500:5 or 5000:5 ratio CTs, select any commercially available 5 Amp secondary CT with the same ratio.

**Service Protection Models**



**D64RPBH15 Ground Fault Relay with Zone Interlocking**

**Table 49-209. Ground Fault Relay**

Control Power	Catalog Number	Price U.S. \$	Zone Interlocking Feature	Trip Current Range	Current Transformer Selection
120V AC	<b>D64RPBH13</b>		No	50A – 1200A	Select 10,000:1 ratio CT ⑥
120V AC	<b>D64RPBH15</b>		Yes	50A – 1200A	Select 10,000:1 ratio CT ⑥

⑥ For 10,000:1 ratio CTs, select from **Table 49-206**.

D64R Series, Digital Ground Fault Relays

Typical Connection Diagrams

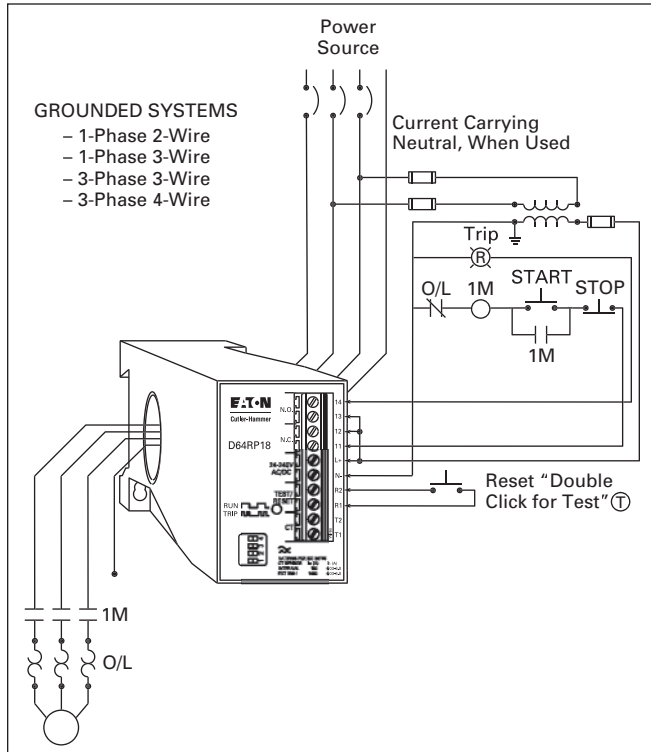


Figure 49-182. Typical Field Connection of D64RP18 Using Built-In Current Transformer

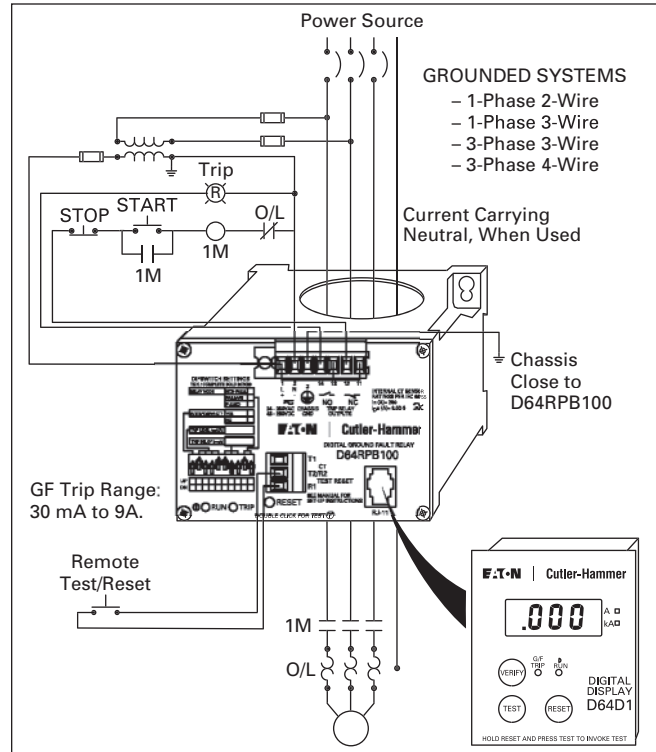


Figure 49-184. Typical Field Connection of D64RPB100 Using Built-In Current Transformer and Remote Test/Reset

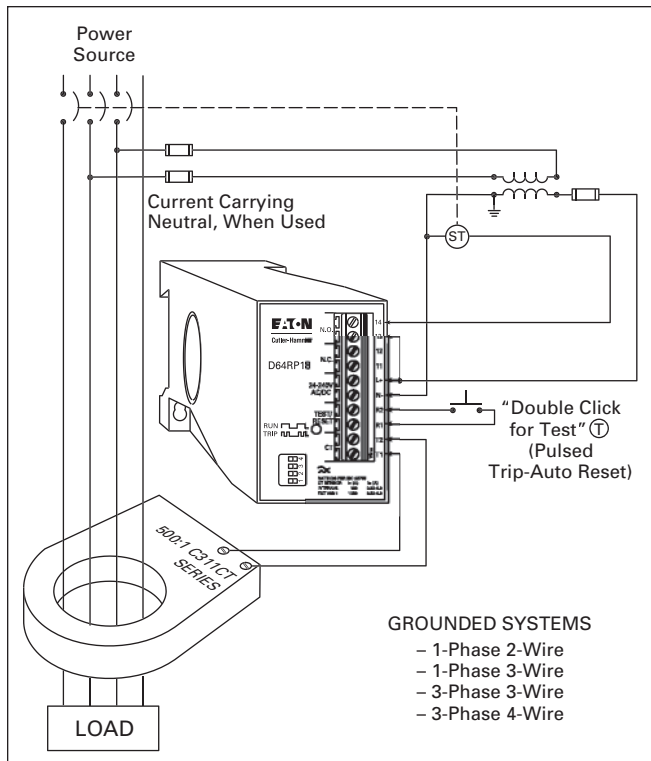


Figure 49-183. Typical Field Connection of D64RP18 with External 500:1 Current Transformer and Pulsed Trip-Auto Reset

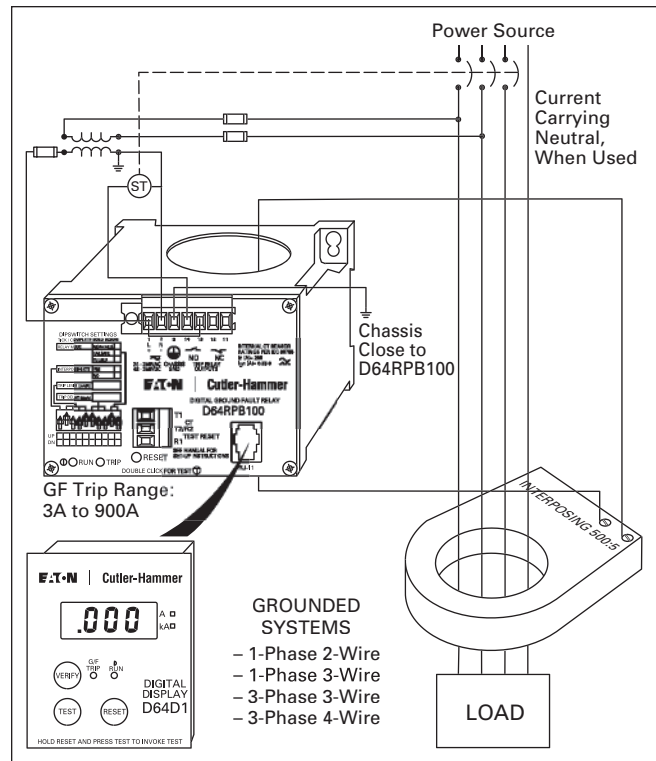
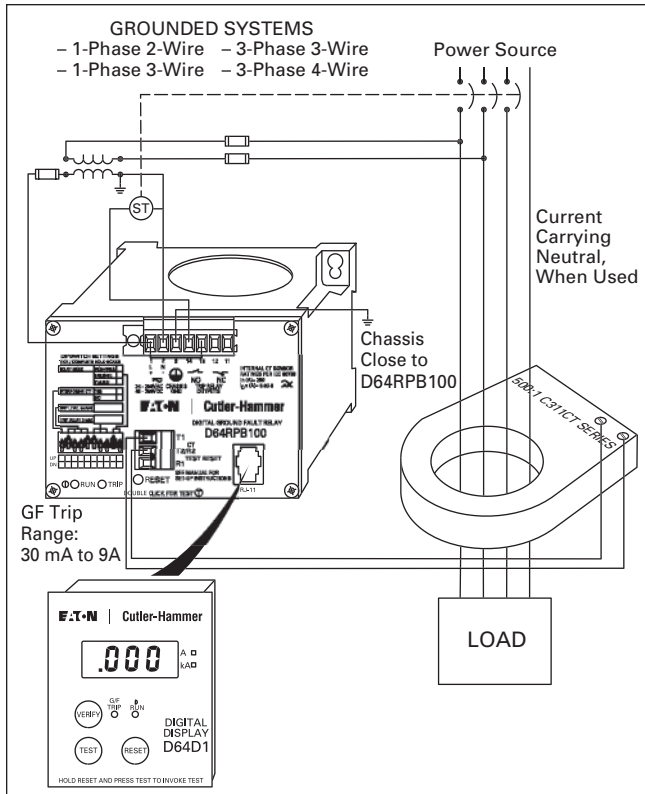
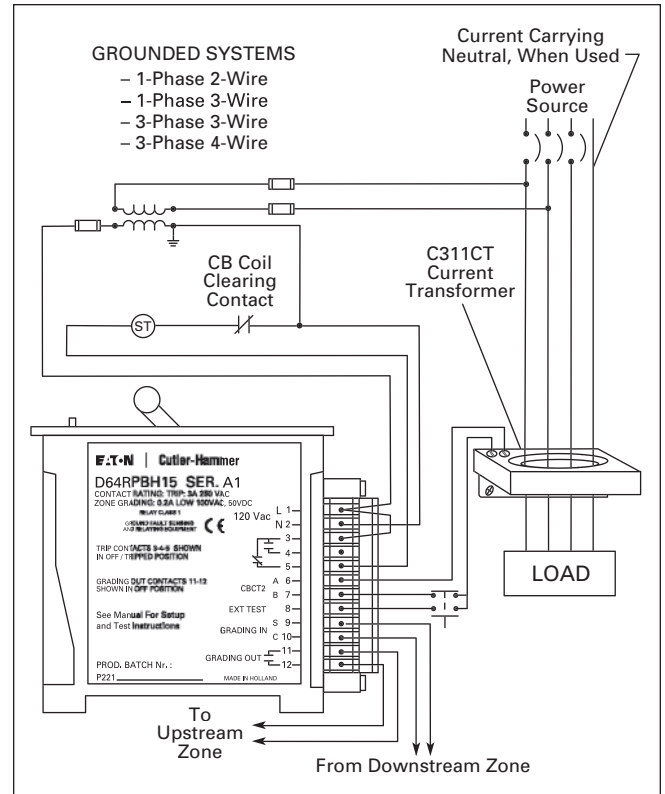


Figure 49-185. Typical Field Connection of D64RPB100 with Interposing 500:5 Current Transformer, Pulsed Trip-Auto Reset for Shunt Trip Breaker

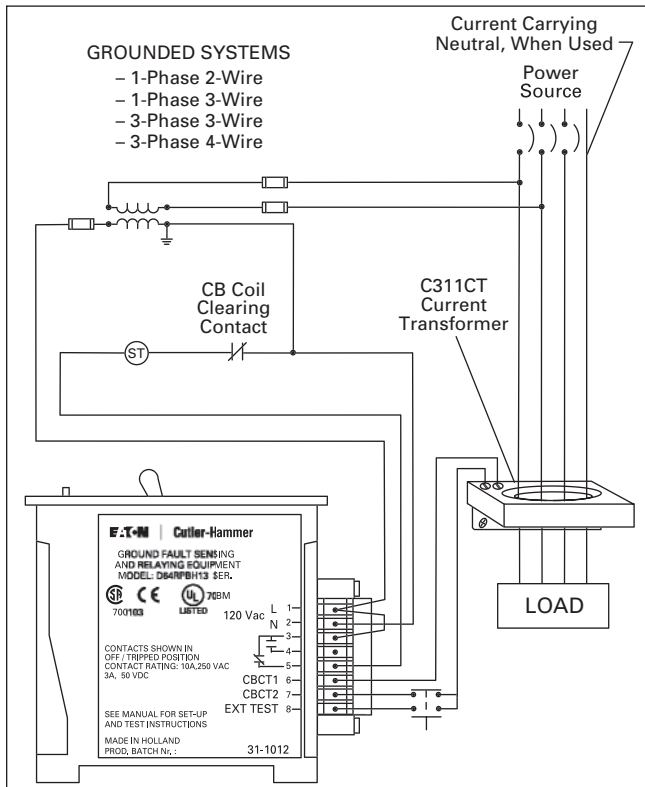
**D64R Series, Digital Ground Fault Relays**



**Figure 49-186. Typical Field Connection of D64RPB100 with External 500:1 Current Transformer (C311CT Series) Pulsed Trip-Auto Reset for Shunt Trip Breaker**



**Figure 49-188. D64RPBH15 Typical Field Connection**



**Figure 49-187. D64RPBH13 Typical Field Connections**

D64R Series, Digital Ground Fault Relays

Dimensions

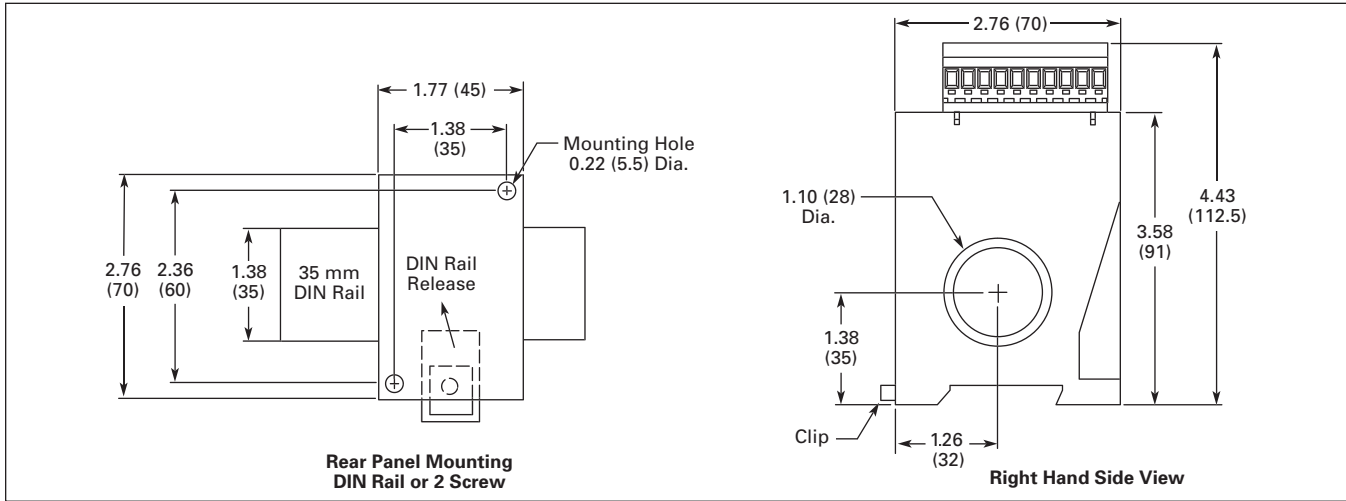


Figure 49-189. D64RP18 — Approximate Dimensions in Inches (mm)

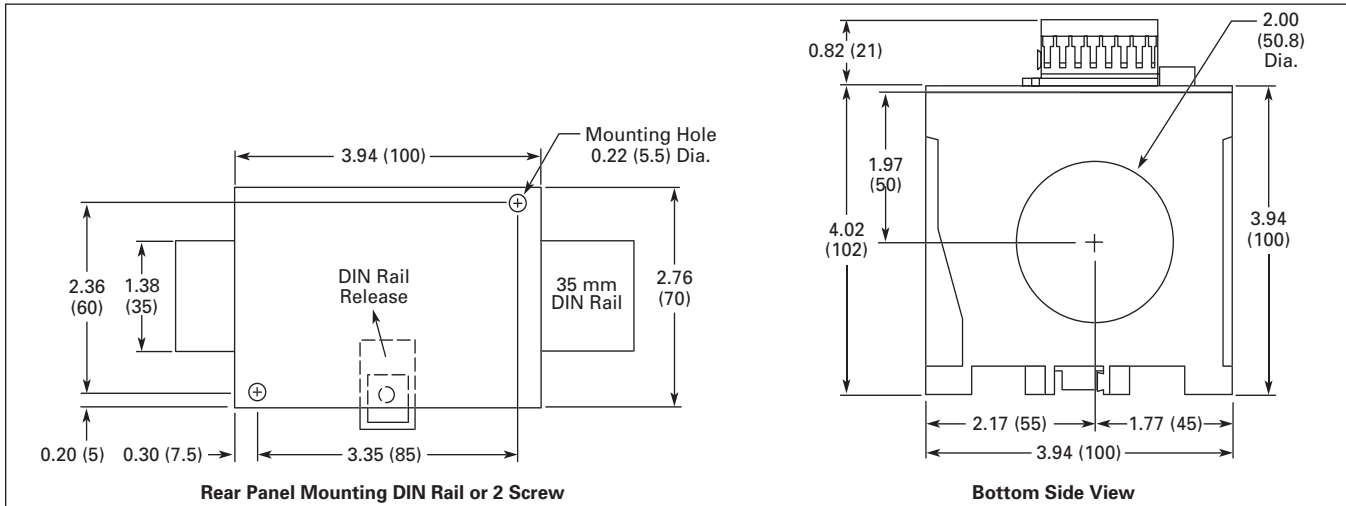


Figure 49-190. D64RPB100 — Approximate Dimensions in Inches (mm)

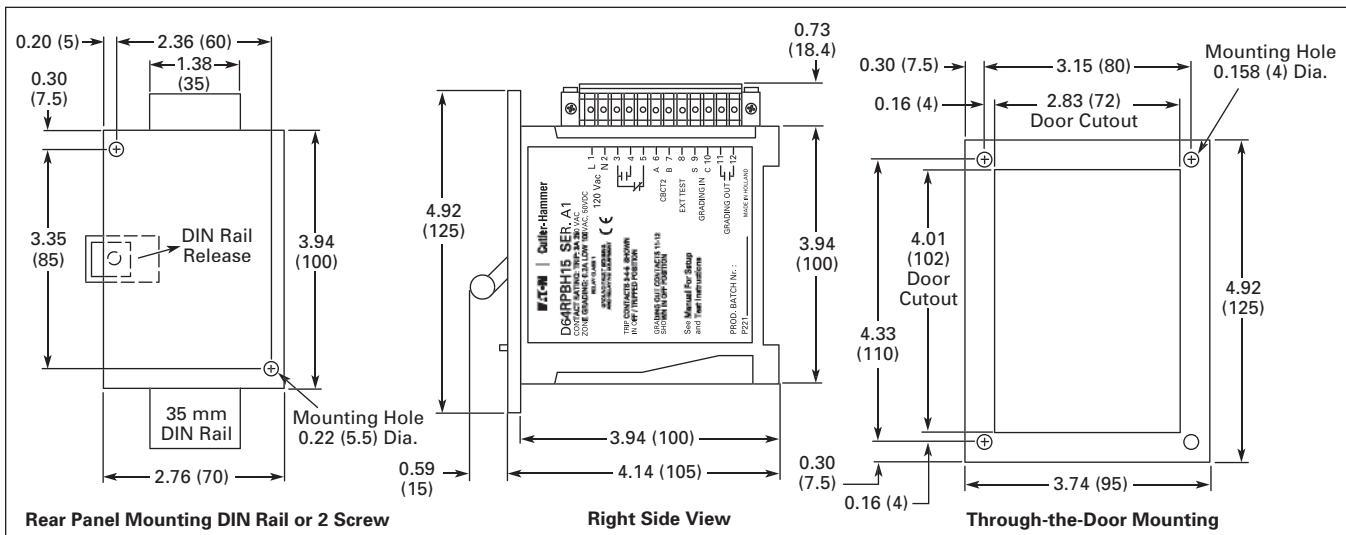
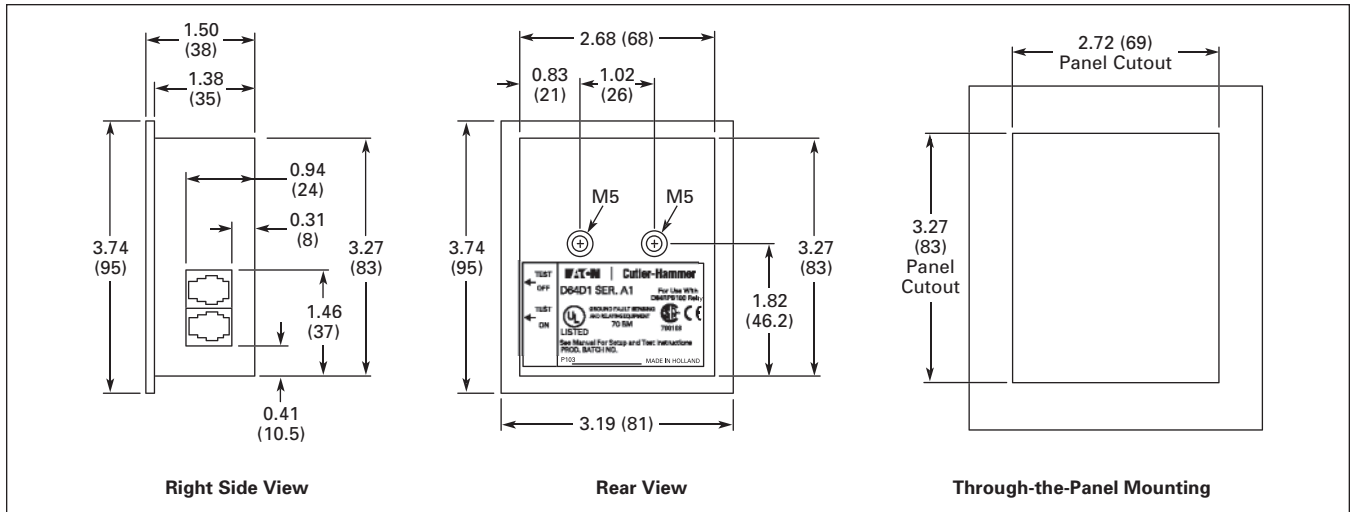


Figure 49-191. D64RPBH13 and D64RPBH15 — Approximate Dimensions in Inches (mm)

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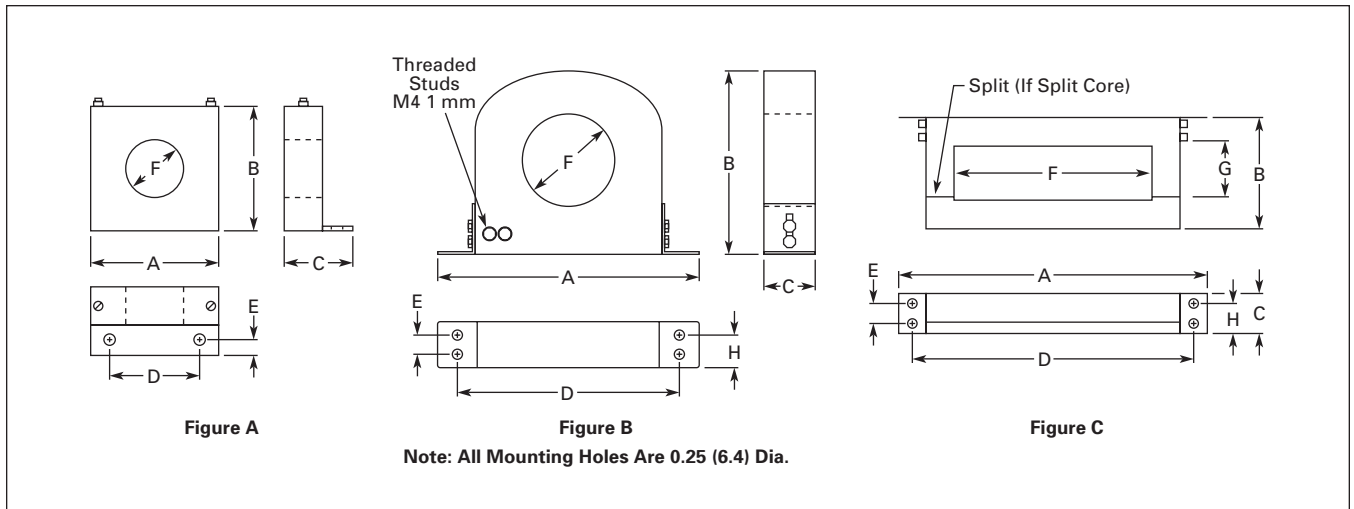
**D64R Series, Digital Ground Fault Relays**



**Figure 49-192. D64D1 and D64D2 — Approximate Dimensions in Inches (mm)**

**Table 49-210. C311CT Series Dimensions**

Catalog Number	Figure	Approximate Dimensions in Inches (mm)							
		Wide A	High B	Deep C	Mounting		F	G	H
D	E								
<b>C311CT1</b>	A	3.35 (85)	3.35 (85)	1.57 (40)	0.98 (25)	0.39 (10)	1.81 (46)	—	—
<b>C311CT2</b>	B	7.30 (185)	5.50 (140)	1.20 (30)	6.42 (163)	0.59 (15)	3.54 (90)	—	0.89 (22.5)
<b>C311CT3</b>	C	13.58 (345)	8.75 (222)	1.57 (40)	12.80 (325)	0.59 (15)	6.70 (170)	5.90 (150)	0.89 (22.5)
<b>C311CT4</b>	C	20.87 (530)	7.87 (200)	1.57 (40)	20.08 (510)	0.59 (15)	13.78 (350)	3.94 (100)	0.89 (22.5)
<b>C311CT5</b>	B	10.12 (257)	8.27 (210)	1.46 (37)	9.33 (237)	0.59 (15)	5.70 (145)	—	0.89 (22.5)
<b>C311CT6</b>	B	13.86 (352)	11.89 (302)	1.46 (37)	13.07 (332)	0.59 (15)	9.45 (240)	—	0.89 (22.5)
<b>C311CT8</b>	A	2.17 (55)	2.56 (65)	2.20 (56)	0.98 (25)	0.39 (10)	1.10 (28)	—	—
<b>C311CT9</b>	B	6.68 (167)	4.84 (123)	1.18 (30)	5.78 (147)	0.59 (15)	2.56 (65)	—	0.89 (22.5)
<b>C311CT11</b>	B	6.68 (167)	4.84 (123)	1.18 (30)	5.78 (147)	0.59 (15)	2.56 (65)	—	0.89 (22.5)
<b>C311CT12</b>	B	10.12 (257)	8.27 (210)	1.85 (47)	9.33 (237)	0.59 (15)	5.70 (145)	—	0.89 (22.5)
<b>C311CT13</b>	B	13.86 (352)	11.89 (302)	1.85 (47)	13.07 (332)	0.59 (15)	9.45 (240)	—	0.89 (22.5)



**Figure 49-193. C311CT Series Approximate Dimensions in Inches (mm)**

**D64L Series, Digital Ground Fault Monitors**

**D64L Series —  
Ground Fault Monitors**



D64L

**Product Description**

Type D64L ground fault monitors are designed to monitor ungrounded supplies on 3-phase AC power systems up to 600V. If an insulation fault develops anywhere on the system between the source and the load, the D64L will detect it and give an alarm or trip, depending on the adjustable field settings selected.

The D64L is ideally suited for systems supplied from the secondary of either an ungrounded delta or an ungrounded wye connected transformer.

Because D64L has high immunity from the effects of voltage transients and cable capacitance, it may be applied in automotive, sub-sea, mobile lighting, portable generators, sensitive equipment and other installations where ungrounded systems are used extensively.

The user is able to individually set the alarm level and the trip level from 20% – 80% of the maximum leakage current limit of the D64L selected. Any leakage current above the alarm level will activate the alarm relay and light the alarm LED. Should the leakage current rise above the trip level, the trip relay and trip LED will activate.

**Features**

- Adjustable leakage current limit setting (20 mA, 35 mA or 50 mA). Factory set at 20 mA.
- Built-in RESET button on all models.
- Selectable failsafe/non-failsafe operation.
- Auto reset after alarm condition.
- Selectable auto/manual reset after trip.
- Three LEDs for POWER ON, ALARM and TRIP.
- Three LEDs to indicate which phase is faulted.

- Adjustable alarm setting 20% – 80% of leakage current limit.
- Adjustable trip setting 20% – 80% of leakage current limit.
- 70 mS response time for alarm and trip level. Resample time — 2 seconds.
- Minimum alarm signal duration — 70 mS.
- 110/120V or 220/240V 50/60 Hz control power, 4 VA.
- Isolated voltage free Form Z NO and NC contacts on both alarm and trip relays, 5A at 250V AC.

- 30A 600V screw terminals, 12 AWG capacity, for phase and ground connections.
- 10A 300V screw clamp terminals, 12 AWG capacity for relay outputs and control supply.
- CSA certified.
- 35 mm DIN rail or two screw mounting.

**Suggested Fuse Block and Fuses**

- DIN Rail Mounting
  - 1 – C350BD3C61 600V 30A 3-pole fuse block
  - 3 – Class CC 600V 5A fuses

**Product Selection**

**When Ordering Specify**

- Catalog Number of Ground Fault Monitor.
- Catalog Number of Fuse Block and Fuses as required.

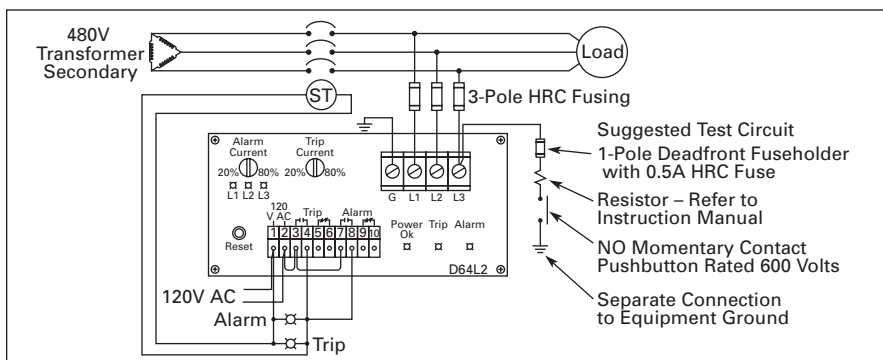
**Table 49-211. Fuse Block and Fuses**

Mtg. Type	Fuse Holder Rating	Fuse Type	Catalog Number	Price U.S. \$
DIN Rail	600V 30A 3-Pole	Class CC 600V 5A	WMR633G	

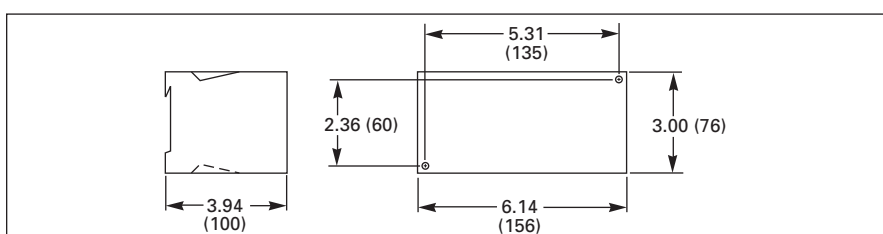
**Table 49-212. Line Insulation Monitors**

Line Voltage Range 50/60 Hz	Control Power	Catalog Number	Price U.S. \$
380 – 600V	110/120V 50/60 Hz	D64L2A	
	220/240V 50/60 Hz	D64L2B	

**Wiring Diagram and Dimensions**



**Figure 49-194. Connection Diagram**



**Figure 49-195. Approximate Dimensions in Inches (mm)**

Discount Symbol ..... 1CD1